

Milena Lutovac Đaković, Aleksandra Anić*
University of Belgrade, Faculty of Economics and Business, Serbia

Efficiency of State Incentives in Serbia's Industry: Impact on Investment and Employment

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Abstract:

Research Question: We investigate the effectiveness of state incentives of industrial policy in terms of investment and employment. **Motivation:** Serbia implements various support models of industrial support to attract investments and increase employment. Total spending on state aid in Serbia is much higher than in EU countries. State incentives are deemed justified if they effectively lead to an increase in direct investments, that is, if they enable the implementation of investment projects that would not have been realized in the absence of such support. Incentives are considered acceptable insofar as the benefits generated by the supported projects exceed the costs of the incentive programmes, including both direct and indirect expenditures. However, previous research showed that there is not enough transparency in allocated incentives, and their effectiveness is questioned. **Data:** This research analyses 197 investment projects that received incentive funding during the period 2016–2022. Data are obtained from the Ministry of Economy and contain project data on total investment and incentive amount, as well as the number of newly employed workers. **Tools:** We use a bootstrap methodological framework to generate both point and interval estimates of average values of investment and incentive amount, number of newly employed workers, and incentive amount per employee. **Findings:** We find a high degree of heterogeneity in all four indicators analysed. We observe that average incentive per employee increased during the analysed period. Also, average investments increased during the period, with the peak in 2020 of 80 mil. euros. Average newly created jobs ranged between 255 and 399 and average investment ranged between 15.9 and 39.2 million euros with the confidence of 95%. **Contribution:** Our findings provide an evidence-based assessment of the effectiveness of state incentives for attracting investment and employment in Serbia and offer recommendations for the reform.

Keywords: state incentives, industrial policy, investment promotion, employment growth, bootstrap analysis, economic competitiveness, Serbia

JEL Classification: L52, O25, O14, C15

1. Introduction

Industrial policy is undergoing a significant period of transformation and resurgence globally. The United States, Brazil, the European Union, and South Africa are making substantial efforts to foster the competitiveness of their domestic industries and accelerate economic growth. New industrial strategies differ markedly from those pursued in previous decades and are designed to stimulate inclusive and sustainable growth. A new approach to economic policy is needed—one that prioritizes people, the planet, society, ecology, and health simultaneously, since growth is not neutral (Mazzucato & Rodrik, 2023). The share of labour in global income has declined, while the share of capital has increased. Real wage growth lags the one of productivity (Mazzucato & Rodrik, 2023). The global interest in revitalizing industrial policy has especially intensified after the COVID-19 pandemic, which further exacerbated the challenges faced worldwide (Anand et al., 2020; Mazzucato, 2020; Ferrannini et al., 2021; Sen, 2020). Excessive reliance on the invisible hand of

* Corresponding author: Aleksandra Anić, e-mail: aleksandra.anic@ekof.bg.ac.rs

the market has led to widespread social exclusion, growing inequality, and the unsustainable patterns of production and consumption. The new industrial policy recognizes that fostering growth cannot be separated from social, environmental, and health-related priorities. Artificial intelligence and automation are becoming key drivers in redefining industrial development. It is also necessary to reform state incentives that guide resource allocation in order to break away from current unsustainable technological trajectories and fundamentally transform certain economic subsystems (Altenburg & Assmann, 2017).

Industrial Policy Strategy in Serbia for the period 2021-2030 defines industrial policy as a set of intervention measures in the structure of industry in order to promote economic growth (Vlada Republike Srbije/Government of the Republic of Serbia, 2020). The goals, measures, and activities of industrial policy are directed toward enhancing industrial competitiveness and achieving dynamic, smart, sustainable, and inclusive economic growth. Given that Serbia aspires to become a member of the European Union, it is essential for the country to align its industrial policy with EU rules and standards. This alignment entails adapting the legislative framework, implementing strategies that promote sustainable development, innovation, and competitiveness, and adopting measures that support economic integration with the EU's single market. The European Commission advocates for a horizontal, sector-neutral industrial policy aimed at fostering a favourable business environment and enhancing industrial competitiveness. However, a successful industrial policy must combine this general horizontal approach with targeted support for specific sectors through well-designed sectoral policies. The industrial policy of Serbia, which follows a horizontal orientation, should be aligned with the Smart Specialization Strategy that identifies priority sectors and provides the foundation for the development of sector-specific policies (Government of the Republic of Serbia, 2021).

The primary objective of this paper is to assess the effectiveness of state incentives for attracting investments and generating new employment. The paper analyses 197 projects that received financial support from the budget of the Republic of Serbia during the period 2016–2022. To evaluate the efficiency of these state incentives, a bootstrap methodological framework was applied in order to obtain both point and interval estimates of average values for selected indicators. These indicators include the amount of investment, total incentives granted, the number of newly employed workers, and incentives per employee. The results are presented separately by year and for the entire observed period.

2. Literature Review

Rodrik (2004) argues that market failures often occur because firms lack adequate incentives to consider the external effects of their actions on other firms. As a result, they may avoid activities that are not individually profitable but generate positive externalities for the broader economy. In the context of the Fourth Industrial Revolution, industrial policy is increasingly focused on innovation, digitalization, and sustainable development, positioning state incentives as a strategic tool for promoting economic growth (Mazzucato, 2013). A growing body of literature is examining the role of the state in fostering innovation, challenging the conventional narrative of the private sector's superiority over the public sector. New approach to industrial policy is necessary in order to serve both people and the planet (Juhász et al., 2023; Mazzucato, 2021; Mazzucato & Rodrik, 2023). Industrial policy is viewed as mission-oriented instrument, where public investments are directed toward sectors that can yield long-term benefits (Mazzucato, 2018). Accordingly, state incentives play a crucial role in fostering new technologies and enhancing the competitiveness of domestic industry. Several researchers have developed frameworks to assess the costs and benefits of innovation-oriented industrial policies. These frameworks are based on endogenous innovation models incorporating sectoral knowledge spillover networks (Liu & Ma, 2023; Garcia-Marcia & Sollaci, 2024). Many developed countries employ various forms of state incentives to support industrial development. The European Union, for instance, promotes research and innovation in industry through grants and subsidies under programmes such as Horizon Europe (European Commission, 2021). The new industrial policy of Serbia is aligned with global trends, EU strategies, and the demands of Industry 4.0. The key document that aims to lay the foundation for the future development of the domestic industry in line with the Fourth Industrial Revolution is the Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030. The Smart Specialization Strategy serves as the basis for directing state incentives toward sectors with the highest potential for innovation and technological development (Government of the Republic of Serbia, 2021). NALED (2020) investigated the satisfaction of recipients of state aid in the food sector. Most of surveyed beneficiaries (90%) said that the incentive contributed significantly to the project implementation. However, insufficient emphasis is placed on automation, modern technologies and preserving environment. A number of employees favour labour intensive instead of modern technological projects, as a crucial criteria for incentives. Previous research on incentives for attracting investment and new employment in Serbia covered

the period 2006–2016 (Lutovac, 2020; Savic and Lutovac, 2019; Lutovac Djakovic et al., 2022; Lutovac Djakovic, 2024). However, our research uses advanced methodology covering a period 2016–2022, to access the relationship between incentives, investments and employees.

3. Industrial Policy Effects

There is no universally accepted definition of industrial policy in the literature, due to the complexity and the nature of the industrial policy concept. Industrial policy is any targeted government intervention aimed at supporting specific domestic firms, industries, or economic activities to achieve either economic or non-economic objectives (IMF, 2024). In practice, policy measures now aim to influence structural transformation in ways that reduce regional disparities, support labour-intensive industries and small enterprises, and promote environmental sustainability (Altenburg & Assmann, 2017). Government intervention via industrial policy can help correct market inefficiencies and achieve more optimal economic outcomes. There is a need for a strategic and proactive industrial policy that is oriented toward long-term sustainable development.

The main objective of Serbia's industrial policy is to enhance the competitiveness of the national industrial sector. This goal directly supports the development of an open, regionally and globally competitive, investment-driven, educated, innovative, and digitally transformed Serbian industry that strongly contributes to economic growth and the overall quality of life of its citizens. Specifically, the Strategy of Industrial Policy of the Republic of Serbia 2021–2030 highlights that a competitive Serbian industry makes a significant contribution to high and sustainable economic growth, measured by the national GDP growth rate, and to improved living standards, measured by GDP per capita (Government of the Republic of Serbia, 2020). The industrial policy follows a horizontal approach, meaning that it does not prioritize any specific branch of industry. Instead, it defines a set of measures and activities within key intervention areas, focusing on industrial restructuring toward innovative and technology-intensive sectors, while respecting the principles of sustainable development (Ministry of Economy, 2024).

The new industrial policy of Serbia aims to increase industrial competitiveness through new investments and entrepreneurship. Serbia's new industrial policy should comply with the European Union's state aid rules, ensure transparency of its support programmes, and assess their effectiveness. However, state aid is generally prohibited in the EU unless it is exceptionally justified (European Commission, 2025). Total state aid spending amounted to 0.92 EU GDP in 2019. It increased to 2.36% in 2020 due to Covid-19 pandemic and returned to 1.1% in 2023.¹ State aid in Serbia as a percentage of GDP is much higher than in EU member states. Due to Covid-19 crisis, state aid increased significantly in 2020 and reached 5% of GDP. In the period 2012–2019, the state aid ranged between 1.9% and 2.74% (Commission for State Aid Control, 2017; 2019; 2022).

State aid in Serbia has been granted through subsidies, tax incentives (including tax credits, debt write-offs, and tax exemptions), concessional loans, guarantees, and other instruments (Lutovac, 2020). Such aid is considered justified if it effectively leads to an increase in direct investments, that is, if it enables the implementation of investment projects that would not have been realized in the absence of these incentives. Moreover, state aid is deemed acceptable when the benefits of the supported projects exceed the costs of the incentive programmes, including both direct and indirect costs. State incentives function as a tool for enhancing competitiveness, increasing production, creating new jobs, and attracting investments. Through these incentives, the government promotes the adoption of innovative technologies, supports sustainable development, and facilitates export growth. In 2015, the government directed its reforms toward creating a favourable environment for investment and private sector development, reforming the public sector, combating the shadow economy and corruption, regulating the labour market, and modernizing the tax system. These reforms led to changes in the incentive system. The majority of incentives have been aimed at development projects of both domestic and foreign private enterprises, with a particular emphasis on direct investments (Government of the Republic of Serbia, 2017).

4. Incentives for Attracting Investments and New Employment in Serbia

The state aid control system in Serbia was established in 2010. As a potential destination for attracting investment projects in the manufacturing sector, Serbia is most often in direct competition with the countries of Central and Southeastern Europe. In practice, Central European countries focus significantly on research

¹ Scoreboard state aid data available at https://competition-policy.ec.europa.eu/state-aid/scoreboard/scoreboard-state-aid-data_en

and development projects, while Southeastern European countries remain predominantly oriented toward “efficiency-seeking” projects. In such cases, incentives are mainly granted based on the number of jobs created and the amount of investment. Foreign investments are important for development, particularly in the era of globalization (Stankov, Markov & Milosevic, 2017). There has been significant growth in the inflow of foreign capital which influenced economic growth since the early 2000s (Lutovac, 2020). Serbia has formulated a comprehensive package of tax incentives, direct financial support, and other forms of investment aid for potential investors.

One of the main criteria for the justification of investment incentives is that their positive effects exceed the costs associated with granting such incentives. Therefore, the criteria for distributing investment incentives should be structured to focus on: projects that would not be implemented without incentives, sustainable projects, the evaluation of project elements that generate the greatest impact on economic growth and public revenues, and the establishment of a correlation between the intensity of incentives and the measurable outcomes of project implementation (Lutovac, 2020). When analysing the benefits arising from investment attraction, it is also necessary to take into account other revenues generated through the implementation of investment projects and subsequent business activities (Lutovac, 2020).

5. Methodological Framework²

Bootstrap method is a program-based method for assessing accuracy of statistical estimates. Bootstrap estimate of the standard error is available, regardless of how complicated the estimator (denoted by $\hat{\theta}$) may be. The bootstrap data points $x_1^*, x_2^*, \dots, x_n^*$ are a random sample of size n drawn with replacement from the population of size n ($x_1, x_2, \dots, x_n$). We use $*$ as notation for bootstrap, i.e., x^* is not the actual value x , but resampled version of x . The bootstrap data set ($x_1^*, x_2^*, \dots, x_n^*$) consists of members of the original dataset ($x_1, x_2, \dots, x_n$), some observations may appear several times, however, some observations do not appear at all. $s(\cdot)$ is the function applied to the dataset. For example, $\bar{x} = s(x) = \sum_{i=1}^n x_i/n$ is a sample mean of original sample, whereas $\bar{x}^* = s(x^*) = \sum_{i=1}^n x_i^*/n$ is a sample mean of bootstrap sample. We select B independent bootstrap samples $x^{*1}, x^{*2}, \dots, x^{*B}$, each consisting of n data values drawn with replacement from original dataset ($x_1, x_2, \dots, x_n$), i.e. $x^{*1} = (x_1^{*1}, x_2^{*1}, \dots, x_n^{*1})$ and $x^{*B} = (x_1^{*B}, x_2^{*B}, \dots, x_n^{*B})$. The next step is to evaluate the bootstrap replications corresponding to each bootstrap sample $\hat{\theta}^*(b) = s(x^{*b})$, $b = \overline{1, B}$. Standard error is estimated by using the sample standard deviation of the B replications.

Although there are several ways to construct bootstrap confidence intervals, bias corrected and accelerated (BC_a) confidence intervals are in general recommended, especially for nonparametric problems.

$\hat{\theta}^{*(\alpha)}$ denotes $100\alpha^{th}$ percentile of B bootstrap replications $\hat{\theta}^*(1), \hat{\theta}^*(2), \dots, \hat{\theta}^*(B)$. The percentile interval of $(1 - 2\alpha)$ is obtained from those percentiles $(\hat{\theta}_{lo}, \hat{\theta}_{up}) = (\hat{\theta}^{*(\alpha)}, \hat{\theta}^{*(1-\alpha)})$. We use 10,000 replications ($B = 10,000$) and $\alpha = 0.05$. The percentile interval $(\hat{\theta}^{*(0.05)}, \hat{\theta}^{*(0.95)})$ is constructed by ordering 10,000 numbers of $\hat{\theta}^*(b)$, where the cut points are 500th and 9,500th ordered values. The BC_a interval endpoints are also given by percentiles of the bootstrap distribution.³

6. Results

In the period 2016-2022, the government signed 197 incentives contracts. The lowest number of contracts was signed in 2017, 17 contracts. Fifty contracts were signed in 2021. There is a high heterogeneity in the amounts of incentives and investments between contracts. The lowest incentive amounted to approximately 120 thousand euros and the corresponding investment amounted to 749 thousand euros. The highest incentive amounted to 75.8 million euros. Similarly, incentives per employee show significant heterogeneity, the lowest incentive per employee was recorded in 2017, 2 thousand 6 hundred euros, whereas an extreme

² We use Efron & Tibshirani (1993) as main reference for bootstrap methodology.

³ Due to space limitation, we do not provide formulas for BC_a confidence intervals. Formulas could be found in the textbook by Efron and Tibshirani (1993) chapter 14.

value of 294 thousand euros per employee was observed in 2022. There is no information about the number of newly employed in several companies in 2021 and 2022, whereas one company reported none of newly employed persons. Descriptive statistics is presented in Table 1.

Table 1: Descriptive statistics of main indicators

		Obs.	Mean	Std. dev.	Min	Max
2016	Incentives	18	4.0	4.9	0.1	17.9
	Investments	18	11.9	14.1	0.6	50.0
	Employees	18	763	944	24	3,000
	Incentive per employee	18	6,787	7,543	2,732	35,562
2017	Incentives	17	2.2	3.0	0.2	10.2
	Investments	17	8.3	10.5	0.2	30.5
	Employees	17	301	421	62	1,500
	Incentive per employee	17	7,050	3,777	2,601	17,957
2018	Incentives	23	2.7	3.9	0.2	16.5
	Investments	23	8.8	9.9	0.4	34.5
	Employees	23	335	568	27	2,500
	Incentive per employee	23	11,446	8,012	3,135	37,591
2019	Incentives	37	3.4	5.4	0.1	21.3
	Investments	37	21.1	41.9	0.3	180.3
	Employees	37	330	462	15	2,000
	Incentive per employee	37	14,399	22,130	2,644	120,000
2020	Incentives	21	10.2	18.3	0.2	75.8
	Investments	21	79.9	185.9	0.2	800.0
	Employees	21	280	329	30	1200
	Incentive per employee	21	28,146	35,031	3,201	144,363
2021	Incentives	50	2.1	2.8	0.1	15.5
	Investments	50	12.7	18.7	0.2	85.0
	Employees	47	184	218	0	1,000
	Incentive per employee	46	13,262	12,422	3,000	69,958
2022	Incentives	31	5.4	11.1	0.1	48.0
	Investments	31	26.0	50.2	0.1	238.0
	Employees	21	224	251	25	1,020
	Incentive per employee	21	41,068	63,280	3,068	294,081

Notes: Investments and incentives are in mil. euros, whereas incentive per employee is in euros.

We continue our analysis by providing point and interval estimates for average values of analysed indicators by using bootstrap statistical framework. We present results separately by years and for the whole period. The average investment amounted to 22.6 mil. euros (Table 2). Average investments ranged between 15.9 and 39.2 mil. euros with the confidence of 95% in the period 2016-2022. Average incentives amounted to almost 4 mil. euros in the period analysed, with the bootstrapped confidence interval in a range of 3.1 to 5.6 mil. euros (Table 2). However, looking separately by years, the year of 2020 was extraordinary regarding the value of incentives, with an average of 10.2 mil. euros. With the confidence of 95%, average incentives ranged between 4.8 and 22.5 mil. euros in 2020. The highest investment on average was observed also in 2020, 80 mil. However, the highest number of new employees was observed in 2016 (Table 3).

Table 2: Investments and incentives in millions EUR

	Investments					Incentives				
	Average	Bias	S.E.	BC _a confidence interval		Average	Bias	S.E.	BC _a confidence interval	
2016	11.87	-0.04	3.24	6.66	19.93	3.97	-0.01	1.13	2.19	6.86
2017	8.26	0.01	2.44	4.37	14.25	2.20	0.00	0.71	1.18	4.20
2018	8.75	-0.03	2.01	5.55	13.80	2.72	-0.02	0.79	1.61	5.05
2019	21.07	-0.04	6.80	11.16	40.77	3.40	-0.01	0.89	2.04	5.72
2020	79.87	0.06	39.73	28.67	215.69	10.19	0.01	3.93	4.84	22.50
2021	12.67	0.02	2.64	8.56	19.32	2.08	0.00	0.40	1.49	3.18
2022	25.98	0.01	8.98	13.77	53.42	5.35	0.00	1.98	2.57	11.55
2016-2022	22.59	-0.02	4.93	15.91	39.24	3.97	0.00	0.60	3.06	5.58

Table 3: Number of new employees and incentives per employee in euros

	Number of new employees					Incentives per employee				
	Average	Bias	S.E.	BC _a confidence interval		Average	Bias	S.E.	BC _a confidence interval	
2016	763	-1.37	216	415	1292	6,787	8.6	1,740	4,728	14,202
2017	302	-0.56	99	164	606	7,050	9.5	884	5,645	9,223
2018	335	-2.81	115	180	724	11,446	21.6	1,625	8,944	15,676
2019	330	-0.21	76	215	520	14,399	2.1	3,616	9,469	26,026
2020	280	-0.35	70	171	458	28,146	18.1	7,459	17,249	49,009
2021	184	-0.05	32	135	261	13,262	-7.5	1,823	10,507	18,197
2022	224	-0.27	54	141	370	41,068	-52.9	13,629	23,911	89,714
2016-2022	315	0.14	36	255	399	16,948	2.4	2,131	13,802	22,939

Table 3 presents results for incentives per employee in euros. Average incentives per newly employed amounted to almost 17 thousand euros, with bootstrapped confidence interval ranging between 13 thousand 8 hundred and 22 thousand 9 hundred (13,802; 22,939). We observed an increase in average incentives per employee in the period analysed. The highest incentive per employee was observed in 2022, approximately 41 thousand euros. The lowest incentive per employee was at the beginning of the period analysed, around 7 thousand euros in 2016 and 2017. In 2022, the average incentive was slightly higher than the average for the whole period (5.35 vs. 3.97, see Table 2), however, the average number of newly employed was among the lowest in the period 2016-2022 (224.3, see Table 3).

Conclusion

The renewed industrial policy plays a vital role in attracting investments, fostering industrial development with potential "spillover effects", subsidizing early-stage entrepreneurship, promoting environmentally friendly industries, and addressing market failures. A modern industrial strategy must enable both green and digital transitions, while emphasizing lifelong learning and the acquisition of new skills that workers will need.

Serbia needs to align its industrial policy with the EU regulatory framework and standards. It is necessary to reduce the overall level of state aid and to shift from sectoral objectives of industrial policy to horizontal ones related to employment, regional development, environmental protection, and research and development. In contrast to the EU, where the average level of state aid is around 1%, in Serbia it ranges between 2–3% of GDP. Our results suggest that the incentives have a positive effect on employment growth and the increase in the number of investment projects implemented in Serbia. The average number of newly created jobs per project was between 255 and 399 and the average investment values ranged between 15.9 and 39.2 million euros with the confidence of 95%. The average amount of incentives was nearly 4 million euros, while the 95% confidence interval calculated using the bootstrap method ranged between 3.1 and 5.6 million euros. Given that the constructed confidence intervals for investment are relatively wide, we can conclude that, under current conditions, investment activity in the observed sample is quite heterogeneous in amounts. Under existing circumstances, it is unlikely that average investments will fall outside the constructed interval. In order to increase the average level of investment, the prevailing conditions must be altered. For this reason, the authors suggest a shift away from the current

defensive development strategy, in which the demands imposed by investors are accepted almost unconditionally and where there are no clear and transparent prerequisites that investors are required to meet. Despite the achieved results, an open question remains as to whether the design of the program for attracting foreign direct investment was optimal—that is, to what extent the program was truly directed at encouraging new investments versus supporting projects that would have been implemented even without the allocation of direct financial incentives. Therefore, it is crucial that the criteria for awarding investment incentives are defined to prioritize projects that would not be realized without state support, projects that ensure long-term sustainability, as well as those investment initiatives that yield the highest positive impact on economic growth and public revenue.

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About the Authors

Milena Lutovac Đaković

University of Belgrade, Faculty of Economics and Business, Serbia
 milena.lutovac@ekof.bg.ac.rs

Milena Lutovac Đaković, PhD, is an Assistant Professor at the Faculty of Economics and Business, University of Belgrade. Within the undergraduate academic program, she teaches the courses Industrial Economics and Technological Development and Policy. At the master's level, she delivers lectures in Industrial Policy and Economic Development, Modern Trends in the Global Economy, and Scientific and Technology Policy and Economic Development. Her research interests are primarily focused on industrial policy and technological development. Milena Lutovac Đaković is the author of numerous academic publications in these fields and has participated in a wide range of national and international scientific conferences.

**Aleksandra Anić**

University of Belgrade, Faculty of Economics and Business, Serbia
 aleksandra.anic@ekof.bg.ac.rs

Aleksandra Anić is an associate professor at the University of Belgrade - Faculty of Economics and Business. She teaches Econometrics and Economic Statistics. Her primary research interests are labour market and social policy. However, she also did research in tourism economics, industry and environmental economics. Aleksandra worked on many projects financed by Science Fund, Ministry of Education, KPMG, UNDP, USAID, RRPP, SORS, and others.

