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Regional economic losses from excluding Roma women from labour market in Serbia

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***Abstract**: In this paper, we calculate the economic costs of labour market exclusion of Roma women at the NUTS 2 level in Serbia in terms of output and fiscal benefits. The approach relies on the analysis of a scenario in which there are no differences in the level of wages or in labour force participation and employment rates between Roma and non-Roma labour market participants. We use Labour Force Survey (LFS) data from 2019 as a basis for the comparison of the Roma and non-Roma in terms of expected gross earnings for working-age individuals provided they are employed. The results show that the total economic loss (output + fiscal) due to the exclusion of Roma women from the labour market in Serbia amounts to about 197.7 million euros on an annual basis. Of that, 70.5% (139.3 million euros) come from output/productivity losses, and 29.5% (58.4 million euros) from fiscal losses. The largest contribution to total economic losses comes from the South and Eastern Serbia region (37.25%), followed by the Vojvodina region (28.25%),*

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the Belgrade region (24.03%) and the Šumadija and Western Serbia region (10.46%).

***Keywords**: Roma women, labour market, economic loss, Serbia, NUTS 2 regions.*

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Regionalni ekonomski gubici nastali usled isključenosti Romkinja na tržištu rada u Srbiji

***Apstrakt**: U ovom radu se izračunavaju ekonomski troškovi isključenosti Romkinja na tržištu rada na nivou NUTS 2 regiona u Srbiji, u pogledu obima proizvodnje i fiskalnih koristi. Pristup se oslanja na analizu scenarija u kojem ne postoje razlike u visini plata, stopi participacije i stopama zaposlenosti između romskih i neromskih aktera na tržištu rada. Korišćeni su podaci Ankete o radnoj snazi (ARS) iz 2019. godine kao osnova za poređenje romske i neromske populacije u smislu očekivane bruto zarade za radno sposobne pojedince pod uslovom da su zaposleni. Rezultati pokazuju da ukupan ekonomski gubitak (proizvodni + fiskalni) zbog isključenja Romkinja sa tržišta rada u Srbiji iznosi oko 197,7 miliona evra na godišnjem nivou. Od toga, 70,5% (139,3 miliona evra) potiče od gubitka proizvodnje/produktivnosti, a 29,5% (58,4 miliona evra) od fiskalnih gubitaka. Najveći doprinos ukupnim ekonomskim gubicima ima region Južne i Istočne Srbije (37,25%), zatim region Vojvodine (28,25%), Beogradski region (24,03%) i region Šumadije i Zapadne Srbije (10,46%).*

***Ključne reči**: Romkinje, tržište rada, ekonomski gubitak, Srbija, NUTS 2 regioni.*

1. Introduction

The analysis of the labour market position of Roma women in Serbia indicates that there are significant gaps in comparison to both Roma men and to non-Roma women. Addressing these gaps is important not only from the social justice perspective but also from the macroeconomic point of view. Excluding any part of the labour force from the labour market and/or restraining them from reaching their full potential implies losses in both output and fiscal terms. In this paper, we focus on macroeconomic losses which result from excluding Roma women from the labour market in Serbia based on the methodology derived by the World Bank (2010). We calculate both output losses and fiscal losses. We estimate forgone fiscal revenues in terms of income tax, social security contributions, and corporate tax which are the result of the lower employment

rate and a lower average wage of Roma women in comparison to their non-Roma peers.

Using this approach, we compare the current situation with a scenario in which there are no differences between Roma and non-Roma labour market participants in the level of wages, or in labour force participation and employment rates. The main source of the labour market indicators is the Serbian Labour Force Survey (LFS) of 2019, which provides data both on employment status and wages. On the other hand, for a more detailed analysis of some Roma sub-groups we use mainly Regional Roma Survey (RRS) and census data due to the problem of sample representativeness of the LFS data for some lower levels of disaggregation.

We also investigate a regional aspect of this problem and identify which NUTS 2 regions in Serbia have the largest economic losses due to the lack of full labour market integration of Roma women.

In spite of the fact that there is an increasing need for a successful Roma integration strategy in Europe, to our knowledge relatively little scientific evidence regarding potential economic losses and anticipated gains of inclusive policy actions has been used in public policy design and implementation so far. The aim of this paper is to bridge the gap in the literature devoted to the measurement of these economic costs for one of the most vulnerable groups in the Serbian labour market – Roma women.

The paper has the following structure: after the introduction, we present a literature review on the economic costs of labour market exclusion of Roma and other marginalised groups. In the third section, we present an overview of key determinants of the Roma vs. non-Roma gap in the labour market position. The fourth section deals with an overview of the labour market position of Roma women in Serbia. In the subsequent section, we present methodology, data, and the results of the empirical research on output and fiscal losses resulting from the unfavourable labour market position of Roma women in Serbia for each NUTS 2 region in Serbia. In the last section, we conclude.

2. Literature review

A study aiming to estimate the economic costs of Roma exclusion was conducted by the World Bank (2010) on a sample of four countries – Serbia, Bulgaria, Romania, and the Czech Republic. The study starts from the assumption that due to lower employment and wage levels working-age Roma pay less in taxes and social security contributions. At the same time, they are more likely to be recipients of various types of social assistance programmes.

An estimate of the combined total annual fiscal benefits is 1.2–3.5 billion euros for the four countries combined, while an estimate of the combined economic benefits is 3.4–9.9 billion euros annually.

The results also indicate that Roma who have finished secondary education on average earn substantially more than Roma who have completed only primary education (e.g. 52% higher in Serbia). These results suggest that the potential gains of inclusion through the educational/school system could by far exceed the necessary investment costs.

The long-term fiscal and economic impacts of selected employment and education measures aimed at inclusion of the marginalised Roma in the EU were also examined in a recent study by Ciaian, Ivanov and d'Artis (2018). The authors applied a general equilibrium approach in order to assess the direct impact of alternative measures, but also to capture all the induced feedback effects. They showed that in spite of the fact that the measures are costly for the public budget in the period of spending, the full repayment may be achieved after seven to nine years.

The main conclusion of a study conducted on Slovakia (Marcinčin & Marcinčinová, 2009) is that the inability to recognize Roma specific social and cultural background and their heterogeneity is one of the main causes of the inefficiency of programs intended to assist Roma. The study is based on the fact that the lack of Roma integration leads to significant direct and indirect losses for Slovakia. Direct losses are related to higher expenditures for welfare, education, healthcare, and fighting crime. The indirect costs represent the cost of lost GDP. Results from this study show that direct and indirect costs amounted to 7% of GDP in 2008 and potentially up to 11% of GDP in 2030.

There are also several studies that analyse the economic costs of labour market exclusion of some other vulnerable groups. Bojadjieva, Trpeski and Merdzan (2022) calculate the economic costs of youth unemployment in terms of GDP loss in North Macedonia. According to their findings, the costs from youth unemployment were around 0.57% of potential GDP in 2011, and in 2020 it was estimated to be approximately 0.14% of potential GDP. Another research analyses the economic costs of youth unemployment in the EU, using the gross domestic product approach (Grinevica & Rivza 2018). Badgett (2014) estimates the economic cost of the exclusion of LGBT people from education, employment, and health care in India, using a model for translating the health impact into economic cost and shows that exclusion of this group results in potentially lower productivity and output. A study which focuses on persons with disabilities and the economic effects of their inclusion/exclusion in the areas of education, employment, and health (Banks & Polack, 2014) finds that the effect of employing people with disabilities can lead to greater economic self-sufficiency, since fewer people may require social assistance. Furthermore,

their labour market integration leads to an increase of activity rates of their caregivers. This “double” effect has a favourable impact on the potential tax base, which could lead to increased budget revenues. According to data from the supported employment projects in Scotland, every £1 spent on the programme led to a savings of £5.87, which was the result of two effects: a) decreased need for disability/welfare benefits and b) increased tax income.

3. Key determinants of the Roma vs. non-Roma gap in labour market position

The rationale for choosing this group lies in the fact that the Roma population is a relatively large group with significant gaps in labour market outcomes in comparison to the non-Roma. Among Roma, there are significant gender gaps, leaving Roma women in a relatively inadequate position. In addition to quantitative aspects, there are significant problems related to the quality of employment. Radovanović and Knežević (2014) find that Roma workers are generally found in the lowest paid occupations, needing skills acquired through work rather than formal education. This is often connected with informal status, a very frequent occurrence of precarious work (ILO, 2014; Mitrović & Jandrić, 2022) and in some cases accompanied with problems related to safety and health at work (Bachus, 2022).

Factors that explain gaps in labour market outcomes between Roma and non-Roma can be divided in two main groups: a) those related to human capital (e.g. education and health) and b) due to differences in returns to certain human capital characteristics, discrimination, and differences in social capital and networks. Using Blinder–Oaxaca decomposition of the Roma vs. non-Roma employment gap (expressed in percentage points) for Western Balkan countries, Robayo-Abril and Millán show that the large employment gap is mostly explained by differences in education. Milcher and Fischer’s (2011) findings for Serbia also show that differences in measured characteristics (gender, education, high skills occupation, work experience, or full-time job) and not labour market discrimination against Roma are the dominant reason for the shortfall in the incomes of Roma, although discrimination may also have indirect influence on incomes. On the other hand, O’Higgins (2009) finds that there is a considerable difference in the employment returns to education between Roma and non-Roma in Albania, Bosnia and Herzegovina, Bulgaria, Croatia, North Macedonia, Serbia, Montenegro, Romania, and Kosovo*. The results of this study support the hypothesis that discrimination in both employment and wages is present, with some gender differences of the magnitude of this effect.

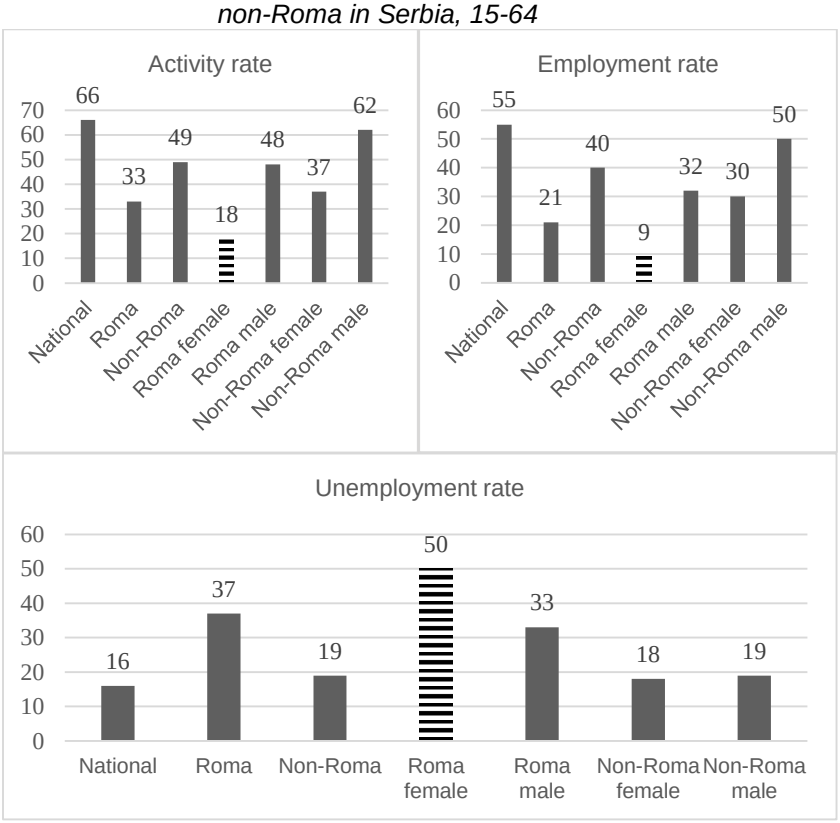
Lack of documents, financial limitations, unfavourable educational background of parents, child labour, discrimination and language barriers are among the major barriers to education access for Roma (Battaglia & Lebedinski, 2015; Open Society Institute, 2008). The RRS data (2017) reveal that early marriage was, among other factors, one of the most important reasons for female participants not continuing education. Problems connected to educational attainment carry over to the labour market position of Roma women, both in terms of economic activity and employment. According to Robayo-Abril, de Paz Nieves and Saavedra Facusse (2019), structural barriers to the participation of Roma women in the labour force include a large set of such factors as low educational and vocational training levels, discrimination, patriarchal norms, difficulties in accessing information and services/support, together with lack of access to childcare services, insufficiently developed networks, limited access to credit and flexible work arrangements. Potentially, taxes and social contributions could also produce disincentives to formal employment. As noted in Marjanović (2015), Roma women are often faced with a vicious cycle driven by the interplay of poverty, education, and gender roles.

Robayo-Abril et al. (2019) find that the probability of participation in the workforce is directly related to the health status of the individual - if a person has any disability, the probability of being active in the labour market is lower and vice versa. Furthermore, they find that age, education, and number of children in the household are important in explaining lower female labour market participation and employment rates. Kajanova and Kmecova (2018) in their meta-analysis report that it is necessary to distinguish the Roma who live in some form of segregated settlement from those who are integrated or assimilated in the country. Residential segmentation seems to worsen labour market outcomes of the inhabitants. It is reported that residential segmentation seems to be one of the key determinants of Roma/non-Roma educational gaps (Marjanović, 2015), which later translates into gaps in labour market outcomes. Furthermore, isolation strongly limits access to information and services, which could have an even stronger effect on Roma women living in these settlements than on Roma men (Marjanović, 2015). An additional problem is presented by the lack of childcare facilities not only within, but very often also in the vicinity of these settlements.

4. Labour market position of Roma women in Serbia

Key labour market indicators (activity rate, employment rate and unemployment rate) point to the rather unfavourable labour market position of the Roma in Serbia (Fig. 1).

Figure 1. Comparison of the key labour market indicators – Roma vs. non-Roma in Serbia, 15-64



Source: RRS (2017), UNDP (2018)

Differences between men and women are larger for the Roma than for the non-Roma labour market participants. Activity rate for Roma women is only 18%, which is almost 20 pp lower than for their non-Roma counterparts. A similar difference is found in the employment rate, where this indicator for Roma women amounts to only 9%. Similar data on female Roma labour market indicators is obtained from the LFS data (2019): the employment rate for the age group 15+ is 10.9%, while the activity rate amounts to around 20%. Both data sources point to large gaps in labour market outcomes between Roma women and their non-Roma counterparts, as well as between Roma men and

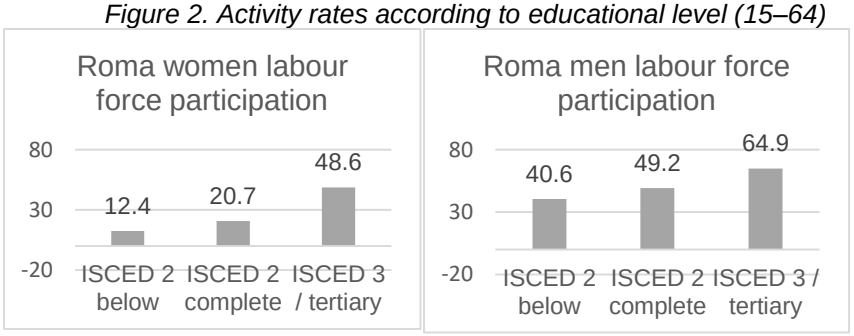
Roma women, with gender gaps being larger in the Roma population. The data from Multiple Indicators Cluster Surveys for Roma settlements in Serbia from 2019 show that these indicators are somewhat better for Roma women of reproductive age (15–49) – with 40% of these women being active in the labour market, and 25% being employed. However, even for this age group the values of these indicators still show a relatively unfavourable labour market position. If we go further into the type of employment, data suggest that employed Roma have fewer opportunities for a secure job than the non-Roma majority.

According to Robayo-Abril and Millán (2019), 64% of employed Roma do not have a pension or health insurance tied to their jobs – i.e. they are in informal employment. Similarly, the RRS (World Bank, 2019) data show that the incidence of informality in entrepreneurship is also significantly higher in the Roma population. Based on the survey questions: “Has anyone from your household ever tried to start his/her own business?” and “Is/was this business registered?”, we can see that among Roma start-ups in Serbia around 55% were not registered, in comparison to 16% in the case of their non-Roma counterparts. However, when employed, the probability for engagement in formal employment is higher for Roma women than for Roma men (Robayo-Abril et al., 2019). According to calculations based on the RRS (2017) data, around 69% of employed Roma men are in informal employment, while this share for female Roma amounts to 51% (Robayo-Abril & Millán, 2019). Majumdar and Woodhouse (2019, p.28) also report that Roma women are “often engaged in informal entrepreneurial activities (selling produce or baking and selling goods, or hairdressing) but seldom see themselves as working”.

LFS data also show a significantly larger share of informal employment in the Roma population than in the majority group (aged 15+), with a gap of 40 pp (58% vs. 18% for the non-Roma population). However, definition of the informal employment rate in the LFS is in some details different to that in the RRS.

The gender gap in activity rate (Fig. 1) shows that four out of five Roma women will more likely stay out of the labour market as compared to one out of two Roma men. Among the other mentioned factors (a smaller probability of finding a job, a greater likelihood of being employed in the informal sector in comparison to the non-Roma counterparts, access to childcare facilities, the role of females as homemakers, health issues), female labour market participation seems to be strongly correlated with education level (Fig. 2).

Figure 2. Activity rates according to educational level (15–64)



Source: Own calculations based on unweighted 2017 RRS data

The breakdown of ISCED levels is based on Robayo-Abril et al. (2019). The group “ISCED 2 below” refers to situations when a person has no formal education or has an incomplete primary school. “ISCED 2 complete” includes individuals who have completed primary school, or have not completed secondary school or vocational school, while the “ISCED 3/tertiary” category incorporates all other above levels of education (completed secondary/vocational school, post-secondary education, college, bachelor’s degree, master’s degree, specialist qualifications, PhD). As Fig. 2 shows, the activity rates of Roma women with lower levels of education are extremely low (12.4% for “ISCED 2 – below” group and 20.7% for “ISCED 2 – complete" group). These rates are significantly lower than those for Roma men with the same levels of education, which also points to the significance of factors other than education in influencing female labour market participation. Despite significant gender gaps, it is still important to emphasise that the activity rates for Roma women increase sharply with education levels, with gaps between less educated and higher educated women being larger than the equivalent gaps for Roma men. Robayo-Abril et al. (2019) show similar findings for Serbia and argue that the fact that Roma women with low educational attainment are most often inactive in the labour market could be connected to generally low returns. They point out that even women with higher education levels (“ISCED 3/tertiary” group) have lower activity rates than men with lower educational levels.

When it comes to the quality of employment, even when employed, Roma and especially Roma women have high probability to be in precarious, lower-quality jobs. A closer look at the structure of Roma women’s employment shows that approximately half of them are employed in elementary occupations (Census 2011 data). According to the usual definition, this major occupation group generally consists of simple and routine tasks and mostly requires skills at the first ISCO skill level. This is in line with the finding that a significant proportion

of employed Roma women have primary school or less as the highest level of completed education. Furthermore, data from the RRS (World Bank, 2019) confirm that the occupation in the current or last job of more than 50% of Roma women in Serbia was “unskilled worker”. Roma women are also in an unfavourable position in terms of wages. O’Higgins (2015) reports that wages of Roma women are below those of Roma men, while the gap between Roma-women and non-Roma men is even more pronounced. He finds that the median wages of Roma women in Serbia are less than one-third of those of non-Roma men. Salazar-Saenz and Robayo-Abril (2020) analyse six Western Balkan countries and also report the gender differences in labour market opportunities in Roma population – in particular, the arrival rates of a job offer, laid-off shocks, the mean and standard deviation of wages offered, and the search costs all differ between Roma males and Roma females.

Table 1. Summary of main findings – effectiveness of measures

Study	Main message
Fresno et al. (2019)	One-off, short-term, single-focused interventions have little chance of success.
Tulumović (2018)	Exclusive ethnic targeting of programmes is rarely an efficient way of reaching out to Roma at a national level - it can be much more effective at a local level.
Martinidis, Andrei & Tkadlecova (2014)	Emphasizes the need for consultation with or direct involvement of the Roma community in designing policies and initiatives for inclusion of Roma women.
Fresno et al. (2019); Battaglia & Lebedinski (2015)	Roma Teaching Assistant Programme in Serbia had a positive effect. It contributed to reducing the gap between Roma and non-Roma students in both school attendance and achievements. Effects were stronger in schools with fewer Roma students, which was especially the case for girls.
Fresno et al. (2019); Messing (2013); Adamecz et al. (2013)	Recommendation for targeted vocational education and training in close cooperation with employers and with local employment opportunities. This should be accompanied with appropriate support, e.g. reimbursements for food and travel.
Messing (2013)	ALMPs are not able to bridge the educational gap which stems from the formal education system but can help in narrowing some specific disequilibria in the local labour market. Training measures have the best effects when they are tailored to the needs of local markets and the unemployed who are involved in the programmes, while the training programmes should be as practical as possible and organised in cooperation with local firms.
Messing (2013)	Direct job creation has not facilitated sustainable employment of Roma, although these programmes should be evaluated not only as a labour market policy tool but also as a social policy measure. These programmes should meet a number of conditions: they should be a part of a complex intervention, be offered to the most vulnerable unemployed and for a limited period of time, provide that beneficiaries are not trapped in a vicious circle of public work–social benefits system, and not be regarded as a unique solution for a Roma unemployment problem.

According to the National Employment Service (NES) data for 2019, more than 90% of Roma women who are registered as unemployed had the lowest educational levels, while 71.8% of them searched for a job for longer than a year. The data on Roma ALMP participants show that, although the number of women is lower, the structure by different groups of measures is very similar for men and women (Lutovac, 2020). Since the effectiveness of a certain ALMP measure depends on various factors, including the targeted group and the general labour market context, the results of evaluations of the respective measures should be considered together with a strong emphasis on the regional or even local labour market situation. Some of the key messages that result from selected evaluations of measures aimed at better Roma labour market integration are presented in Table 1.

5. Macroeconomic losses as a result of exclusion of Roma women from the labour market

5.1. Methodological approach

The estimation of the economic costs of the exclusion of Roma from the labour market is based on the methodology developed in previous studies conducted by De Laat (2010) and World Bank (2010). These studies estimate output and fiscal losses due to Roma exclusion in four Central and Eastern European countries: Bulgaria, the Czech Republic, Romania, and Serbia. According to their results, a more conservative lower bound estimate of annual output losses in Serbia due to Roma labour market exclusion is 252 million euros, while annual fiscal losses amount to around 62 million euros. More recent estimations of the economic losses due to the exclusion of the Roma population from the labour market for the country as a whole show that “the absence of Roma men and women from the labour market is estimated to cost the Serbian economy 413 million euros per year, according to a study conducted by the German Agency for International Cooperation (GIZ)” (Sijerković, 2022). In this research, we focus mainly on output and fiscal losses due to the exclusion of Roma women in the NUTS 2 regions in Serbia.

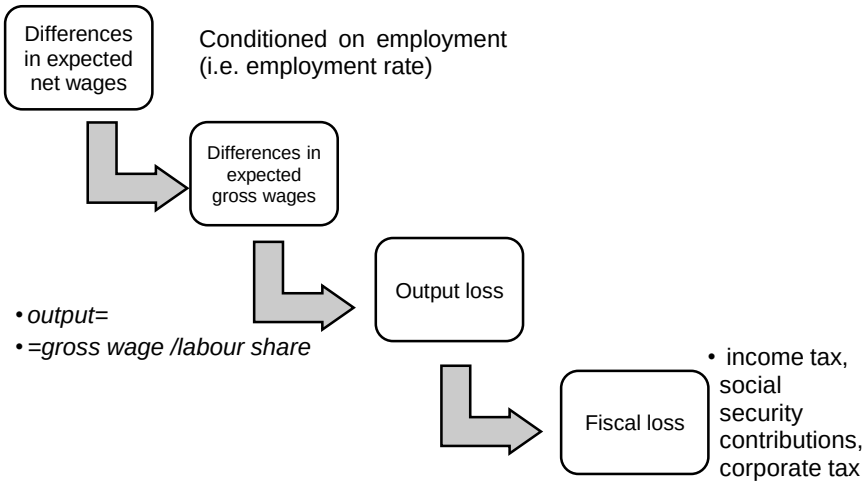
The basic approach relies on the analysis of a scenario in which there is no discrimination in the level of wages and no differences in labour force participation and employment rates between Roma and non-Roma labour market participants.

As baseline values, we take:

- the average earnings of the non-Roma majority in Serbia and
- the employment rate of the non-Roma majority.

Output costs arise due to lower levels of Roma employment and lower earnings of the employed Roma, while fiscal costs also stem from low employment and low earnings, which, on the other hand, translate into substantially lower tax receipts (De Laat, 2010). The methodological approach for estimating output and fiscal costs is presented in Fig. 3.

Figure 3. Methodological approach for the calculation of output and fiscal costs of exclusion of Roma from the labour market



Source: World Bank (2010), adapted

5.2. Data and results

We use Labour Force Survey data from 2019 and compare Roma and non-Roma population in terms of: a) the expected gross earnings of working-age individuals (15+) provided they are employed and b) the probability of employment, which is represented by the employment rate.

Based on the LFS data, the number of Roma aged 15+ in Serbia was about 81,300 while the size of their total population was estimated to be around 114,000. It is clear that this number understates the total number of Roma in Serbia, which, according to some estimates, amounts to between 400,000 and

800,000 (Robayo-Abril & Millán 2019). The same problem is also observed in the Census 2011 data, according to which there were 147,604 people declared as Roma in 2011. The lack of official ethnic disaggregated data is a general problem in this kind of analysis, and it is also present when analysing other sources.

The key differences between Roma and non-Roma at the NUTS 2 level are presented in Table 2. The participation rate and the employment rate for Roma women are highest in Vojvodina region. The gaps between Roma and non-Roma women, on one hand, and between Roma women and Roma men, on the other, are largest in the Belgrade region.

Table 2. Difference between Roma and non-Roma at NUTS 2 level, by gender, 2019

		non-Roma		Roma	
		Total	Female	Total	Female
Belgrade region	Labour force participation rate (%)	56.2	50.8	45.2	18.5
	Unemployment rate (%)	8.1	9.2	27.0	39.0
	Employment rate (%)	51.7	46.1	33.0	11.3
	Annual net wage if working	4,943	4,588	3,234	3,048
	Average annual net wage	2,555	2,115	1,067	344
Vojvodina	Labour force participation rate (%)	53.4	44.9	37.4	24.6
	Unemployment rate (%)	8.7	9.1	38.9	49.6
	Employment rate (%)	48.8	40.8	22.8	12.4
	Annual net wage if working	4,097	3,829	3,164	3,094
	Average annual net wage	1,999	1,562	721	384
Šumadija and Western Serbia	Labour force participation rate (%)	56.1	48.3	30.0	18.7
	Unemployment rate (%)	11.5	12.2	36.3	34.2
	Employment rate (%)	49.7	42.4	19.1	12.3
	Annual net wage if working	3,863	3,681	3,253	3,055
	Average annual net wage	1,920	1,561	621	376
South and Eastern Serbia	Labour force participation rate (%)	53.5	45.6	34.2	18.8
	Unemployment rate (%)	12.4	13.4	52.6	50.5
	Employment rate (%)	46.9	39.5	16.2	9.3
	Annual net wage if working	3,832	3,565	3,183	2,667
	Average annual net wage	1,797	1,408	516	248

Source: Authors' calculation based on LFS

Average annual net wage (i.e., average annual net wage if working multiplied by the probability of employment, which is proxied with the employment rate) is used as an input for the calculation of output costs. If we take into account the probability of employment, average Roma women could expect an annual net wage ranging from 248 euros in the South and Eastern Serbia region to 384 euros in the Vojvodina region, which is significantly lower than the same indicator for non-Roma women (1,408 euros in the South and Eastern Serbia region and 1,562 in the Vojvodina region). This indicator represents the expected average annual net earnings for an individual of working age conditioned on the probability of employment.

In the next step, we calculate output loss based on the following equations:

$$gross\ wage = \frac{net\ wage}{(1-t_i-t_s)} \quad (1)$$

$$output = \frac{gross\ wage}{labour\ share} \quad (2)$$

t_i – *income tax rate = 10%*
t_s – *social contribution rate = 15%*
labour share = 49.26%*

*Source: ILO database, data for 2019, https://ilostat.ilo.org/data/

In equations (1) and (2), as well as in the approximation of t_s, we simplified the calculations to a certain extent due to relatively complex tax and social security contributions in Serbia, which makes it difficult to standardise the exact relation between net and gross wage. However, the presented equations are a good approximation of the general relations between the observed variables.

Based on equation (3), we compare the expected output produced by a working-age member of the non-Roma population and the expected output produced by a working-age Roma.

$$E[Output.loss] = E[\,output \mid Roma\_employed\,] * P(employed_{Roma}) - E\big[\,output \mid nonRoma_{employed}\,\big] * P(employed_{nonRoma}) \quad (3)$$

In this way, we can calculate total output loss at an individual level (World Bank, 2010).

The expected fiscal loss which results from lower income tax revenues is calculated as the difference between average fiscal revenue for the non-Roma

majority and Roma individuals conditioned on the probability of being employed.

Fiscal revenue for both groups is calculated by applying income and social contribution tax rates on the gross wage. For losses of corporate tax revenues, we use the flat corporate tax rate for Serbia (tc = 15%), together with the capital share in gross output, which equals *1 - labour share (l)*.

Adding up all tax revenues, we obtain equation (4) (World Bank 2010):

$$Tax\ revenue = \{[\ t_i\ + t_s] * l + t_c * (1 - l)\} * output \qquad (4)$$

Expected fiscal losses at the individual level are calculated based on the equation (5) (World Bank 2010):

$$[Rev.loss] = E[\,Tax\ revenue \mid Roma\_employed\,] * P(\,employed \mid Roma\,) - E\big[\,Tax\ revenue \mid nonRoma_{employed}\,\big] * P\big((\,employed \mid nonRoma\,)\big) \qquad (5)$$

Multiplying this by the number of working-age Roma gives the aggregate output and fiscal revenue loss. It is obvious that higher employment gaps and higher output gaps will increase output and fiscal revenue losses. The results for the NUTS 2 levels are shown in Table 3.

Table 3. Output and fiscal losses due to exclusion of Roma women (Total working-age Roma, 15+, in euros)

Belgrade		
	Total	Female
Output loss	-54,199,745	-33,482,561
Total yearly fiscal forgone revenue	-22,744,923	-14,050,957
Total	-76,944,668	-47,533,517
Vojvodina		
Output loss	-88,196,187	-39,363,260
Total yearly fiscal forgone revenue	-37,011,530	-16,518,792
Total	-125,207,718	-55,882,052
Šumadija and Western Serbia		
Output loss	-30,963,862	-14,574,543
Total yearly fiscal forgone revenue	-12,993,985	-6,116,207
Total	-43,957,847	-20,690,751
South and Eastern Serbia		
Output loss	-116,629,052	-51,899,087
Total yearly fiscal forgone revenue	-48,943,382	-21,779,452
Total	-165,572,434	-73,678,539

Source: Authors' calculation

The results presented in Table 4 indicate that the total economic loss (output + fiscal) due to the exclusion of Roma women from the labour market in Serbia amounts to about 197.7 million euros on an annual basis. Of this, 70.5% (139.3 million euros) comes from output/productivity losses and 29.5% (58.4 million euros) from fiscal losses. Broken down by NUTS 2 regions in Serbia, the largest contribution to total economic losses comes from the South and Eastern Serbia region (37.25%), followed by the Vojvodina region (28.25%), the Belgrade region (24.03%), and the Šumadija and Western Serbia region (10.46%). In all the NUTS 2 regions, around 70% of the total losses stem from losses in output. However, the estimated fiscal losses are most likely underestimated since we did not consider the differences in welfare expenditures.

The research of the World Bank (2010) uses a similar methodology and also calculates output loss and fiscal losses due to Roma exclusion from the labour market, using 2007 Serbia Living Standards Measurement Survey (LSMS) data. Their results depend on Roma population estimates, and the output loss for Serbia ranges between 252 and 1,049 million euros. In addition, total yearly fiscal forgone benefit (based on payroll and income tax revenue and corporate tax revenue) lies between 62 and 257 million euros. These results do not disaggregate costs according to gender or regional dimension.

The estimated fiscal losses are only indicative, as equation (4) does not consider informal employment, which is more prevalent among the Roma population. Since we consider total employment (formal + informal), the fact that Roma workers are much more frequently employed in informal working arrangements will affect the estimations from Table 4 since there will be additional losses in social security contributions and labour tax. Unfortunately, data on informal employment at the NUTS2 level is not representative for female Roma workers because of an insufficient number of observations.

$$\begin{aligned}&\left[Income\ Tax.loss_{informal}\right]\\&= E\left[Income\ Tax\ revenue \mid Roma_{informal_{employed}}\right]\\&- E\left[Income\ Tax\ revenue \mid nonRoma_{informal_{employed}}\right] * [P(employed \mid Roma)\\&- P(employed \mid nonRoma)]\end{aligned} \quad (6)$$

Nevertheless, at the national level, based on the LFS 2019 data and equation (6), we have calculated the losses in income taxes and social security contributions due to the larger share of informal employment in the Roma population than in the non-Roma population at approximately 9.34 million euros, of which 1.15 million euros represents the losses due to the larger share of female Roma in informal work in comparison to female non-Roma informal workers in Serbia.

6. Conclusions

The relatively unfavourable labour market position of the Roma, especially women, is well documented. Labour market indicators show not only significant gaps between the Roma and non-Roma, but also often point to gender gaps within the Roma population. Addressing the detected gaps is important not only from a social justice perspective but also from the macroeconomic point of view. Theoretically, direct economic costs due to non-employment of Roma women arise due to the impact that is manifested in several directions: lost personal income, reduced labour productivity, i.e., lower than potential GDP, and higher expenditures on social protection. Output costs arise due to lower levels of Roma employment and lower earnings of the employed Roma, while fiscal costs also stem from low employment and low earnings, which, on the other hand, translate into substantially lower tax revenues. Our results show that the total the sum of the output and fiscal due to insufficient inclusion of Roma women in the labour market in Serbia amounts to about 197.7 million euros on an annual basis, while the largest contribution to total economic losses comes from the South and Eastern Serbia region (37.25%) - the region that is already below the country average in terms of economic development. In all the NUTS 2 regions, around 70% of total losses stem from losses in output. These results imply that efficient mitigation of the existing obstacles to the labour market integration of Roma could unlock significant potential for the economy and government/local budgets. When we take into account that informal employment is more prevalent in the Roma population, calculations show that the losses in income taxes and social security contributions arising from these differences amount to approximately 9.34 million euros, with losses from the larger share of female Roma informal workers in comparison to female non-Roma workers in Serbia totalling 1.15 million euros. This could mean that larger expenditures aimed at promoting better integration of Roma women, if appropriately designed, could be offset by gains in output and increased fiscal revenues, as well by lower future expenditures on certain transfers in the medium term. The optimal approach should focus on local/regional needs both in the local Roma community and from the aspect of local labour demand. Furthermore, strengthening institutional capacities at the local level and coordination between the national and local authorities and other relevant local actors are essential in this regard.

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