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Digital Divide and the Opportunity Dimension of Economic Inequality: The Case of the Republic of Moldova

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Purpose: to analyse how the Republic of Moldova has been coping with digital inequality during the pandemic and the extent to which the digital divide has impacted the economic inequality in the country, as well as to understand what leads to digital disparities.

Study design/methodology/approach: In this research, the level of preparedness of the Moldovan households for the digitalisation needs that occurred as a result of the pandemic and both ways impact of the opportunity dimension of economic inequality and the digital divide have been analysed, as well as how the lack of ICT utilities deprived certain social layers of economic opportunities during the pandemic. Concurrently, the causes of the digital divide in the Republic of Moldova have been analysed to get a deeper understanding of the digital discrepancies that resulted in a lack of economic opportunities. For this purpose, the data on the access to mobile phones and computers, notebooks, tablets of Moldovan households and the connection to the Internet have been analysed, and the digitalisation trend has been contrasted with the disposable-income based economic inequality data (Gini index). The data used for the analysis have been retrieved from the National Bureaus of Statistics (NBS) of the Republic of Moldova. They have been segregated per urban and rural areas as well as per quintiles. In addition, to understand the cause of the digital divide and the impact on economic opportunity, we added two more variables to the equation: absolute poverty and employment indicator for the pandemic period (2019-2020).

Findings: Covid-19 found the Moldovan households unprepared for the digitalisation needs generated by the pandemic. Even though deeper in the rural area, the digital divide has enhanced the economic inequality, especially in the urban area during the early pandemic period. The high absolute poverty in the rural area and the increasing trend in the urban area, associated with a decreasing employment rate, especially in the cities, represent a presumed outcome of the Moldovan digital unpreparedness, which enhanced the economic inequality by affecting its opportunity dimension.

Originality/value: The novelty of the research is that the impact and interlink between two types of inequality (digital and economic) in the Republic of Moldova have been analysed with a special focus on the opportunity dimension of economic inequality.

Introduction

As digitalisation has been moving downward Maslow's pyramid toward security and basic needs (Grebnev, Moskalev and Shagidulina, 2021, p.1) and the inequalities upwards on the officials' agenda, the topicality of the digital divide and economic inequality has increased as well. Digitalisation, which has already infiltrated all the spheres of life, enhances and even becomes vital in the Covid-19 context. As most of the activities, including the economic ones, have moved online and telework has become the new normal, having access to the necessary information and communication technology (ICT) utilities by households is crucial for countries in general and individuals, in particular, to cope with the challenges posed by the pandemic and to fit into the novel reality.

However, access to ICT utilities seems unaffordable for certain layers of society. As a result, the low-income households are exposed to digital inequality that triggers at the level of the society the so-called digital divide, which, in a larger sense, refers to "the gap between

individuals, households, businesses and geographic areas at different socio-economic levels concerning both their opportunities to access ICTs and to their use of the Internet for a wide variety of activities" (OECD, 2001, p.5).

In this research, we consider the digital divide in the light of "having or not having access to technologies" (Loh and Chib 2021, apud Compaine, 2001), coined later by scholars as to the "first-level digital divide" or the "digital access divide" (Loh and Chib 2021, apud Campos-Castillo, 2015). On the other hand, the digital divide, as stated by Levine and Taylor (2018, pp. 23-24), "interacts with other economic inequalities in important ways, and there are causal relationships in both directions in the Digital Divide – economic inequality nexus". Furthermore, the economic inequality, which refers to "how economic variables are distributed—among individuals in a group, among groups in a population, or among countries" (Afonso, LaFleur, and Alarcón, 2015, p. 2), includes the opportunity dimension in addition to the inequality of outcome that encompasses income and wealth (EC, 2017, p.2). The inequality of opportunity "occurs when people living in the same society do not have access to the same opportunities. High levels of inequality of opportunity mean that people's circumstances at birth – their gender, the place where they were born, their ethnicity or their parental background – determine to a significant degree the educational qualifications they obtain, the type of job they get and, ultimately, their level of earnings" (EBRD, 2016). At the same time, the inequality of opportunity may be more intense in the context of "skill-biased technical change" where the certain population can neither master new technical skills, nor get benefits related to technological breakthroughs (Murphy and Topel, 2016). Thus, it could be inferred that the digital divide, perhaps, affects to a larger extent the opportunity dimension of economic inequality, which can be more or less intense depending on the area, rural or urban, the individuals live in. At the same time, the digital divide via the inequality of opportunity is likely to cause a chain reaction activating other disparities, especially by preventing certain groups from accessing the economic activities conducted online or telework, leaving in such a way the disadvantaged behind. Reversely, due to the lack of economic opportunity caused by the digital divide that harms the economic outcome (i.e. income and wealth), the access to technology becomes unaffordable. Ultimately, the segment of the population left behind is trapped in a vicious circle of the digital divide and economic inequality since lack of funds makes access to ICT utilities unaffordable. This leads to the lack of economic opportunities because of digital deprivation. And as stated above, the digital deprivation also leads to the lack of telework opportunities, which in its turn also widens the income inequality gap (EC, 2020, p.3). Given the aforementioned causal relationship between the digital divide and economic inequality, by mitigating or enhancing the disparity in one dimension, other inequalities, including the digital divide, might also be impacted (Levine & Taylor, 2018, pp. 23-24).

In this order of ideas, it is of particular interest to research the digital divide and economic inequality trends in the Republic of Moldova, as lower-middle-income economies tend to be more affected by these phenomena (Alvarez Jr., 2021, p.27). Thus, acknowledging the relevance of the digital divide – the opportunity dimension of economic inequality nexus for the Republic of Moldova, especially in the Covid-19 context, this research aims to analyse how the country is coping with digital inequality and the extent to which the digital divide impacts the economic inequality in the country as well as to understand what leads to digital disparities. The research hypothesises that the Republic of Moldova was not prepared for the digitalisation needs generated by the Covid-19 pandemic, and the opportunity dimension of economic inequality in the Republic of Moldova was affected by the existing digital divide, which in its turn was caused by scarce resources and deprivation of certain society levels. In this research, the level of preparedness of the Moldovan households for the digitalisation needs that occurred as a result of the pandemic and both ways impact of the opportunity dimension of economic

inequality and the digital divide have been analysed, as well as how the lack of ICT utilities deprived certain social layers of economic opportunities during the pandemic. Concurrently, the causes of the digital divide in the Republic of Moldova have been analysed to get a deeper understanding of the digital discrepancies that resulted in a lack of economic opportunities. For this purpose, the data on the access to mobile phones and computers, notebooks, tablets of Moldovan households and the connection to the Internet have been analysed, and the digitalisation trend has been contrasted with the disposable-income based economic inequality data (Gini index). The data used for the analysis have been retrieved from the National Bureaus of Statistics (NBS) of the Republic of Moldova. They are segregated per urban and rural areas as well as per quintiles. To understand the cause of the digital divide and the impact on economic opportunity, we have added two more variables to the equation: absolute poverty and employment indicator for the pandemic period (2019-2020). The novelty of the research is that the impact and interlink between two types of inequality (digital and economic) in the Republic of Moldova have been analysed with a special focus on the opportunity dimension of economic inequality.

The descriptive method of statistical data as well as analysis and synthesis, contrast and comparison have been used to reach certain conclusions about the level of preparedness of the Republic of Moldova for the digitalisation needs posed by the pandemic as well as the effect of the digital divide on the opportunity dimension of the economic inequality.

The article includes an introduction describing the problem under discussion, the hypothesis with the methodology used to confirm it, the research results meant to provide the necessary support for the stance, and the main conclusions and references.

Literature review

The digital divide as a form of inequality has been the focus of researchers before the COVID-19 pandemic; however, the interest outburst once digitalisation became one of the core solutions to address the pandemic consequences. For instance, Lai and Widmar (2021) described in their research how the digital divide limits opportunities for those without ready access to the Internet, especially when the essential activities have been moved online during COVID-19. Meanwhile, Alvarez Jr (2021) claims that the most advanced countries are flexible enough to adapt to the new normal. In contrast, the others face difficulties aligning to emergency remote education because of the digital divide. In the same order of ideas, Francis and Weller (2021), in their research, consider the economic inequality, digital divide, and remote learning during COVID-19 and in particular, they analyse how wealth, reliable internet and electronic device availability, remote learning time, race, and ethnicity link. Inegbedion (2021), on the other hand, has researched the nature of the inequalities in internet consumption and inequalities in the growth rate in Internet usage, aiming to identify the possibility of convergence of the digital divide between the major regions of the world. At the same time, Du et al. (2021) have explored whether income inequality is related to the use of the Internet by individuals, pointing out that formerly, income inequality used to be considered in the light of its impact on limiting access to material resources.

In contrast, once digital resources have become more critical in the twenty-first century, income inequality is also being analysed as associated with digital limitations. Datoo (2021), analysing the digital divide and social inequalities, has concluded that what appears to be "symptoms" of the digital divide, in fact, indicates deeper layers of economic and social inequalities that are enhanced even more as a result of the pandemic. Vassilakopoulou and Hustad (2021), in their turn, have been seeking ways to bridge the digital divides and concluded that digital inequality overlaps largely with offline inequality. Meanwhile, a range of Moldovan researchers analysed the impact of the digital divide on public libraries, education and the digitalisation of trade. For

instance, Osoianu (2011), analysing the digital divide in the context of public libraries, has mentioned that the digital inequality is more enhanced in the villages where the share of persons that use the computer and Internet is about twice lower than in the urban areas of the Republic of Moldova. Titchiev and Balan (2018) refer to the digital divide in the light of information technologies used for distance learning in the Republic of Moldova, specifying that necessary measures should be taken to gradually reduce the digital gap between the rural and urban areas as well as in the educational institutions of different levels. Concerning the digitalisation of trade, Leahovcenco (2020) has noted the potential threats associated with the increase in the digital divide from the point of view of establishing protection barriers between countries in the context of transforming traditional commerce into a digital model.

Research results

As stated above, the research aims to analyse the digital divide and the opportunity dimension of economic inequality in the Republic of Moldova and to consider both sides' potential influence on these phenomena. Thus, to understand the digital divide gap in the Republic of Moldova, firstly, the preparedness of the Moldovan households for the critical digitalisation needs during the COVID-19 pandemic, in terms of ICT utilities the households had access to during the 2019-2020 period, were analysed. The data related to the ICT utilities (mobile phones and computers, notebooks, tablets and Internet connection), access segregated per urban/rural/whole country and then per quintiles have been considered to provide an idea of the actual digital gap among the Moldovan households. Secondly, the economic inequality based on the disposable income Gini indicator and the quintile distribution was analysed for 2019-2020. The relevance of the 2019-2020 period resides in the fact that these data illustrate the situation at the beginning of the pandemic lockdowns (2019) and the point when the digital divide started actually showing certain economic effects (2020). These analyses helped estimate whether the digital divide influenced economic inequality as digitalisation became critical during the pandemic.

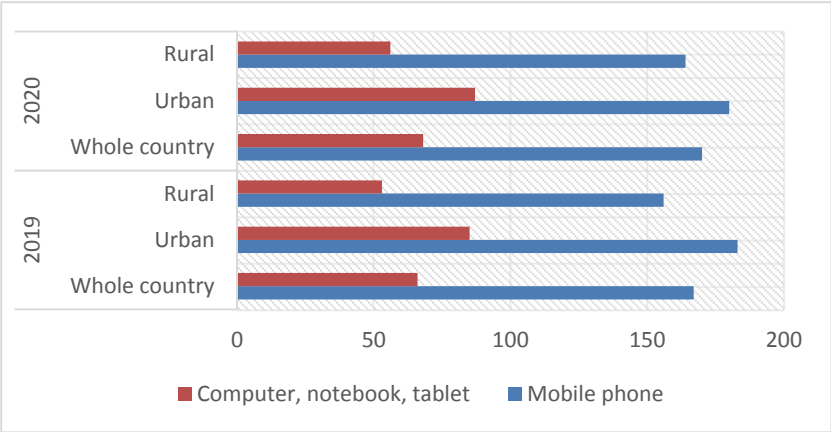

Figure 1: Households equipment with Durable goods, Years and Areas (mobile phone, computer, notebook, tablet) for 2019-2020. Units: pieces per 100 households. Source: NBS https://statistica.gov.md/index.php?l=en

Thus, the data on the mobile phones held by the Moldovan households for 2019-2020 as pieces per 100 households (Figure 1) show an ascending trend for the whole country, whereas per area, a descending trend is noticed in the urban areas, while in the rural area - an upward trend is observed. At the same time, it should be noted that even though the number of mobile phones in the rural area is on an ascending trend, it is still much lower than in the urban area. Nevertheless, despite the possibility of developing certain electronic operations via mobile phones, especially smart phones, we consider that for the digital economic activities, such electronic devices as computers, notebooks and, to a certain extent, tablets are more relevant;

therefore, the latter are analysed as a separate group. So, regarding computers, notebooks, and tablets held as of the data for 2019-2020 as pieces per 100 households, an ascending trend is noticed in the whole country and the urban and rural areas. As presented in Figure 1, though, the increase is not significant, and the gap between the urban and rural areas is almost twice larger as in the case of mobile phones (31 pieces less per 100 rural households than urban ones in 2020).

Thus, we can conclude that in terms of mobile phones, both rural and urban areas have been covered as all the households seem to possess at least one mobile phone per household. At the same time, if we look at the data on computers, notebooks, and tablets held, the situation is rather dramatic as in the whole country, just 66 pieces of computers, notebooks or tablets were attested per 100 households as of 2019, and in the rural area, the number was a little over 50 pieces. At the same time, in the urban area, 15 of 100 households entered the pandemic years without the listed electronic equipment. This points, on the one hand, to a large digital divide between the rural and urban areas and the severe unpreparedness of the Moldovan households for the digitalisation needs at the beginning of the pandemic in 2019 (34 of 100 households possessed no computer, notebook or tablet as per 2019 data). On the other hand, the situation slightly improved in 2020, but not substantially and remained still poor.

In Figure 2, the distribution per quintiles of mobile phones and computers, notebooks, and tablets is presented for 2019-2020 as pieces per 100 households. As noticed, the distribution in the case of the mobile phones is very much even; the difference between the fifth and the first quintile is just one unit in 2020, down from the difference of 13 units in 2019, which is a noticeable improvement in this respect. However, the situation in the case of computers, notebooks, and tablets looks a lot different. There is a substantial gap between the fifth and the first quintile in 2019 and 2020 (the ratio is 2.42 % in 2019 and 2.25% in 2020), which indicates a large digital divide between the richest and the poorest groups of the society.

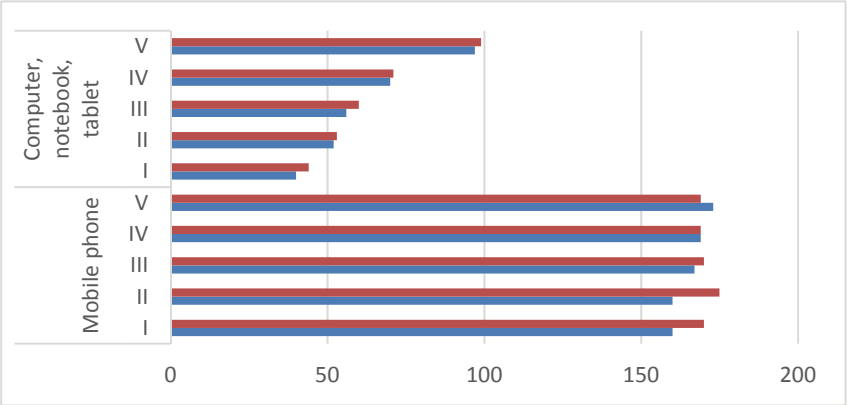

Figure 2: Households equipment by Durable goods, Years and Quintiles (mobile phone, computer, notebook, tablet) for 2019-2020. Units: pieces per 100 households
Source: NBS https://statistica.gov.md/index.php?l=en

Hence, we can conclude that a large divide in terms of computers, notebooks, and tablets held between 2019 and 2020, which overlapped with the period of start and evolution of the pandemics, persisted in Moldova, with the rural areas being particularly deprived (Figure 1). At the same time, the pandemic found over half of the Moldovan households in the poorest quintile unprepared for the digitalisation needs posed by the COVID-19, most of them being rural (Figure 2). The situation improved in 2020, but insignificantly.

Another variable worth considering in the context of the digital divide analysis is the connection of the households to the Internet. Figure 3 below presents the percentage of households connected to the Internet for the whole country and per the urban and rural areas as of 2019-2020.

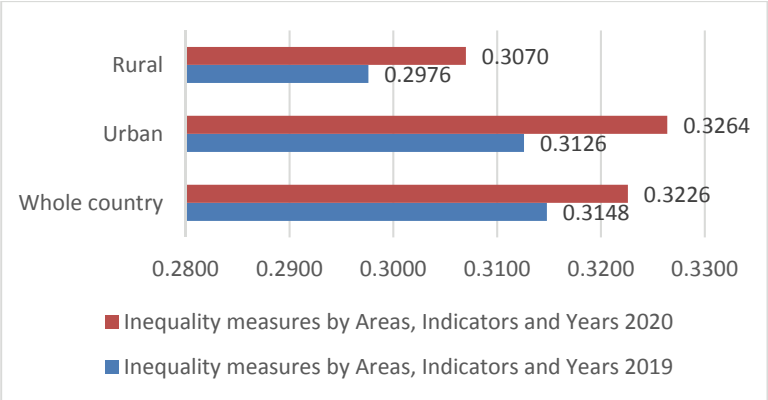

Figure 3: Households equipment by Dwelling facilities, Areas and Years (Internet connection) for 2019-2020. Units: per cent.
Source: NBS https://statistica.gov.md/index.php?l=en

The data confirms that Internet connectivity has been on an upward trend for the whole country since 2019; however, with a lower increase in the urban area (by 2.1 %) and a higher rise in the rural areas (by 5 %) in 2020. At the same time, the gap between the urban and rural areas stays quite deep (23.5% discrepancy in 2019 and 20.6% difference in 2020). This again points to a severe digital gap between the urban and rural areas and a low level of Internet connection in individual households at the country level (39.2% and 35.4% of households with no Internet in 2019 and 2020, respectively).

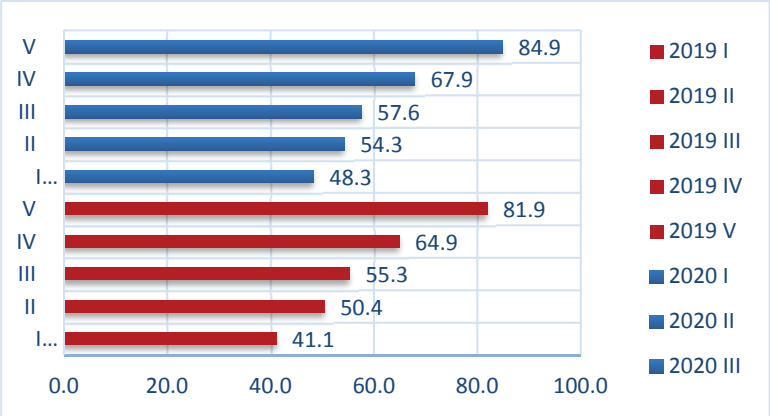

Figure 4: Households equipment by Dwelling facilities, Years and Quintiles (Internet connection) for 2019-2020. Units: per cent.
Source: NBS https://statistica.gov.md/index.php?l=en

Thus, the distribution per quintiles of internet access of households for the whole country presented above, even though being on a downward trend, shows a rather large gap in Internet connection between the first and the fifth quintiles (the ratio between the 1st and 5th quintile was of 1.99% in 2019 and 1.75% in 2020). In conclusion, based on the data provided in Fig. 3 and Fig. 4, we can state that the Internet connection gap is rather deep and obviously reconfirms a larger digital divide in the rural area.

Another element of the nexus that should be considered for the purpose of this research is economic inequality, which is commonly assessed via the Gini coefficient. At the same time, the disposable income-based inequality according to the distribution per quintiles is also considered to determine the actual distribution and the gap between the richest and the poorest population groups. Before the pandemic (2014-2018), in line with the NBS data, the Gini coefficient was overall on a descending trend, including as measured by the income ratio between the first and fifth quintile, except for 2016 when it raised both at the country and the

rural/urban areas. Therefore, in Figure 5, the Gini coefficient for 2019-2020 is presented as the period of start and the first signs of the impact of the COVID-19 pandemic.

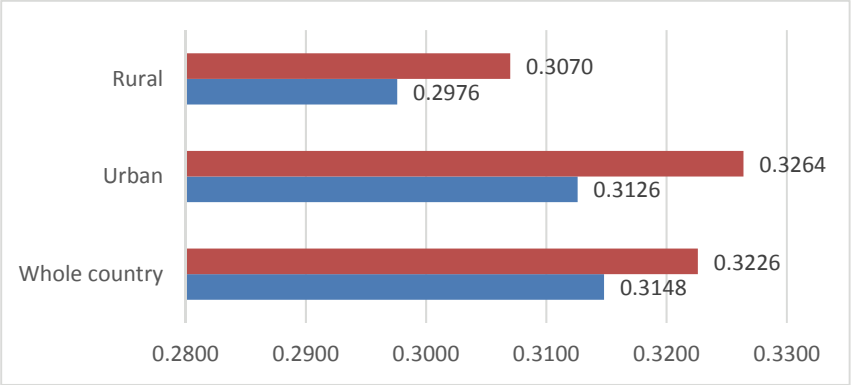

Figure 5: GINI coefficient by disposable income for 2019-2020.
Source: NBS https://statistica.gov.md/index.php?l=en

As illustrated in Figure 5, in 2020, the Gini coefficient (0.3226) went up compared to 2019 (0.3148). At the same time, it is interesting to note that the urban and rural Gini coefficients went up from 0.3126 in 2019 to 0.3264 in 2020 and from 0.2976 to 0.3070, respectively. Concurrently, the urban Gini coefficient is higher than the rural one, suggesting a higher inequality in the urban area.

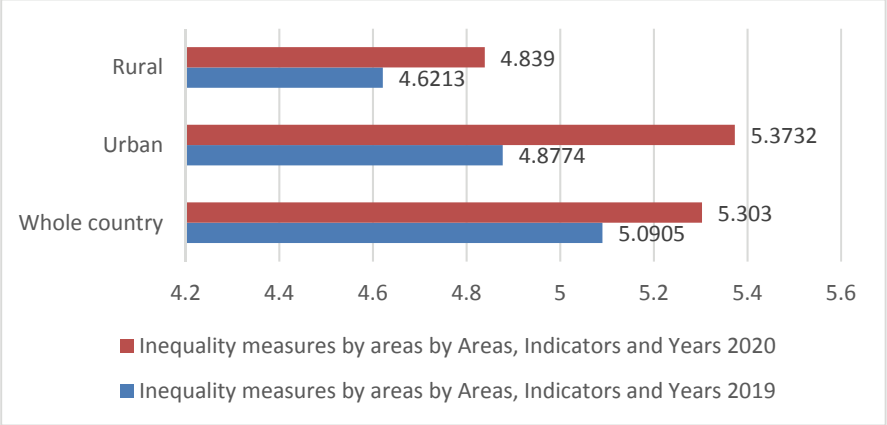

Figure 6: Inequality measures by Areas, Indicators and Years for 2019-2020. The ratio between income of the population from quintiles I and V, times
Source: NBS https://statistica.gov.md/index.php?l=en

Figure 6, which provides data on inequality per the whole country/urban/rural areas based on the ratio between income of population from quintiles 1 and 5, proves the trends presented by the Gini coefficient in Figure 5, showing, though, a larger, concern-rising inequality gap at the country level as well as at the level of urban and rural areas. Thus, in 2020 as compared to 2019, an increase in inequality is noted, and the ratio shows a quite large gap between the 1st and the 5th quintiles. Hence, the inequality was on an ascending trend during 2019-2020 for the whole country, including the areas. The data point to increasing inequality in the country as a whole, with an enhanced gap in the urban area (by almost 0.5%).

At the same time, to grasp an alleged cause of the digital divide, it is important to analyse the absolute poverty indicator, which can indicate whether the increasing inequality (both digital and economic) trend was also occurring in the background of enhancing poverty of the population. Thus, the absolute poverty data by the whole country/urban/rural areas for 2019-2020 present an increasing trend in the poverty severity in the urban area (up by 0.1 % in 2020, reaching 0.5 p.p. as compared to 2019 when the absolute poverty was 0.4 %) and a decreasing trend in the case of the rural area (down by 0.2% from 1.5 p.p. in 2019 to 1.3 p.p. in 2020). But,

even though the severity of absolute poverty is on a descending trend in the rural area, it was almost three times higher than in the urban area from 2019 to 2020. Thus, assuming that the digital and economic inequalities influence each other, we can conclude that a large digital divide in the urban and rural areas seems to have a negative impact on the evolution of the economic inequality at the country and regional levels. To make things worse, the inequalities were occurring on the background of an increasing absolute poverty trend for 2019-2020 in the urban area and a slightly decreasing trend in the rural one, which, as mentioned, was still very deep. In addition, severe poverty, especially in the rural area, and the increasing income inequality might have led to the existing digital divide between the urban and rural areas and among the quintiles.

Further on, as the digitalisation has penetrated all the economic and social spheres, the occupation by areas should be considered, which in our opinion, is another pertinent variable that should indicate the impact of the digital divide, namely on the opportunity dimension of the economic inequality in the Republic of Moldova. Thus, the data for 2019-2020 present a decrease in the number of employed persons at the level of the whole country (by 38.2%) as well as at the level of both areas, namely by 11.1% in the rural area and with a sharper decrease in the urban area (by 27.1%) in 2020 as compared to 2019 (per a thousand persons). Thus, it could be presumed that the digital divide has played its part in the evolution related to employment, especially in the urban area where a range of economic activities, including businesses, had to be moved online, narrowing in such a way the possibility of many to get employed or carry on their jobs.

Conclusions

The research results lead to the conclusion that Covid-19 found the Republic of Moldova's households unprepared for the digitalisation needs posed by the pandemic. Moreover, the digital divide is likely to have harmed the economic inequality with a more profound effect on the urban area of the Republic of Moldova in the early pandemic period (2019-2020). At the same time, the deep absolute poverty, especially in the rural area, but with an increasing trend in the urban one, associated with a decreasing trend of employment rate in the urban area, in particular, shows a potential impact of the digital unpreparedness on the opportunity dimension of the economic inequality in Moldova. In our case, this is expressed by the incapacity of certain groups to access a larger spectrum of economic options due to digital deprivation. In addition, if we look at the economic inequality via its opportunity dimension, we can state that a deeper digital divide limits the population's employment choices in both urban and rural areas as many economic activities have been conducted online during the pandemic. This is proved by the decreasing employment trend in 2019-2020, which is sharper in the urban area, where many more economic activities are fully or partially digital. Meanwhile, almost half of the Moldovan population in the rural areas bear the risk of having access to fewer economic alternatives as the deep digital divide could prevent them from the possibility of choosing from a larger spectrum of economic activities.

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