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The impact of digitalization on unemployment: The case of the Nordic countries

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The topic of digitalization has a high relevance in the literature nowadays, where many authors try to figure out the impact of digitalization on the labour market in the short and long terms. Some authors argue that the process of digitalization creates new jobs, whereas others claim that it increases unemployment. The Nordic countries, such as Iceland, Finland, Norway, Denmark and Sweden are the leading countries in terms of digitalization on the European continent, and the estimation of an impact of digitalization on unemployment has a high relevance for these countries. The paper assesses the impact of digitalization on the unemployment rate in the Nordic countries with help of the robust OLS regression in STATA, for the period of 1991–2019. Results show that digitalization on average has a high significance and a negative association with the variable of unemployment. The increase of the variable of digitalization by 1% on average leads to a decrease in the unemployment rate by 0.025% in the Nordic countries.

Keywords: Digitalization, labour market, ordinary least squares regression, the Nordic countries, unemployment.

1. Introduction

The labour market can be affected by many factors, including the level of development of institutions, for example, trade unions, the educational system, social security, demography and migration, and digitalization is one of the important factors too. The process of digitalization can be defined as the transformation of all sectors of the economy, government and society based on the adoption of digital technologies. According to Manyika et al. (2013) the existing digital technologies are the internet of things, artificial intelligence, and mobile internet. There are also technologies which have not been adopted yet, for example, 3D printing and next generation genomics. Digitalization was promoted by the increase in internet connections at the end of the 1990s and was further developed by the high-speed internet and mobile data access. According to Sabbagh et al. (2013), digitalization is the mass adoption of connected digital services by consumers, enterprises, and governments, which promotes growth and job creation. Digital technologies affect the computerization of production, service delivery and even the private sphere. According to Frey and Osborne (2013), the development of the areas, such as machine learning, mobile robotics and artificial intelligence will further stimulate a computerization of the economy. Due to digital technologies, electronic devices connect people, machines with workers and machines with machines. The process of digitalization already affects our daily life and the world economies. Digitalization drives entrepreneurial innovation, productivity and economic growth. According to Solow (1956), technological change is important for economic

growth and productivity. Due to digitalization more output can be produced with given input, or the same amount of output can be produced with less input. Digital technologies can also bring new products and services to the market.

The topic of digitalization has a high relevance in the literature nowadays, where many authors try to figure out the impact of digitalization on the labour market in the short and long terms. The process of digitalization affects the structure of the labour market and can create many new jobs on the market and at the same time cause problems such as the persistence of unemployment because of skill gaps and inequality. Therefore, such structural changes in employment can be either positive or negative.

Some authors argue that the process of digitalization will create new jobs, whereas others claim that the long-term digital revolution will increase unemployment. According to Eichhorst and Spermann (2016), the existence of various internet platforms creates new services and jobs and stimulates a demand on the market. According to Hong and Chang (2020), since the introduction of internet technology in China in the 1990s, the degree of informatization has improved rapidly. The Chinese government has implemented a few development strategies, such as "Smart City", "Internet Plus" and "Digital China," where the main goal of the government was the popularization of internet technologies in society. Authors examined how digitalization influenced the economic welfare of forest farm families, where under digitalization authors have considered the internet use by the households. They found that compared with non-internet users, internet users have 28% higher household income and 10% higher life satisfaction. At the same time according to Brynjolfsson, McAfee (2011), technologies are able to replace not only jobs with routine tasks as well as with non-routine tasks which require high skills. Rifkin (2014) argues that the long-term digital revolution will reduce employment. According to him, even a low-paid worker will be more expensive than the additional cost of using a machine. As a result, there will be a growth in jobs for innovative products and a decline in jobs for standard products. A significant contribution to this topic was provided by Frey and Osborne (2013), who forecasted the situation on the labour market in 10–20 years. With the help of experts, they estimated the future of 702 jobs in the United States. The model predicts that about 47% of all employment in the United States will be under the threat of replacement by machines, robots or computer programs. According to the authors, jobs related to logistics, transportation, office and administrative support have the highest risk of automation, and jobs which require lower skills have a higher chance of automation. Autor and Dorn (2013) argue that the structure of the labour market will change, but jobs will not disappear. According to them, not only the level of skills can determine the risk of automation, but the character of jobs as well. For example, routine tasks have a higher chance of being replaced by robots. Hanush (2016) supports this idea and points out that the technological revolution will change fundamentally essential characteristics of the three pillars which constitute a socio-economic system: the financial, the public and the real sector.

As we can see, there is still no consensus in the literature regarding this question nowadays. Some authors argue that the process of digitalization will create new jobs, whereas others claim that the long-term digital revolution will increase unemployment. This topic needs further investigation, and in this paper, I have considered the case of the Nordic countries. The Nordic countries, which include Iceland, Finland, Norway,

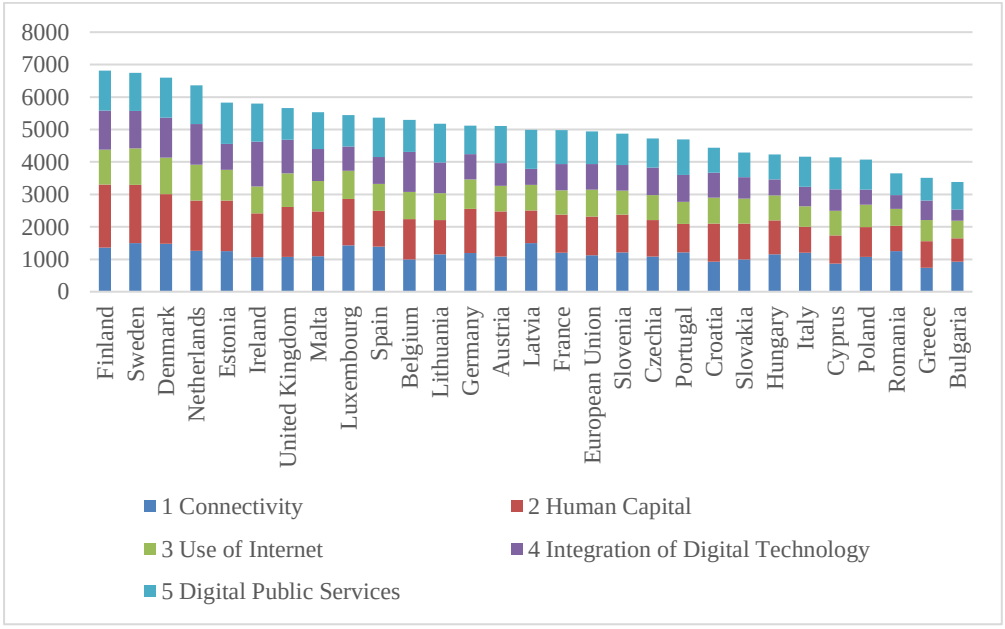
Denmark and Sweden, are the leading countries in terms of digitalization on the Europe continent, and the estimation of an impact of digitalization on unemployment has a high relevance for these countries.

The next section will be devoted to the literature review regarding the digitalization in the Nordic countries, followed by a methodology and data section, whereas the three sections after that will be present the empirical results and conclusions.

2. Literature review: Digitalization in the Nordic countries

According to a report of the European Commission (2019) about the Digital Economy and Society Index (DESI) (2019), the Nordic countries are the leading countries in terms of digitalization on the European continent (Figure 1). DESI index includes an analysis of connectivity (fixed broadband, mobile broadband, speed, and affordability), human capital (basic skills and usage, advanced skills and development), use of internet services (content, communication, and transactions), integration of digital technology (business digitization and ecommerce) and digital public services (eGovernment).

Figure 1 Digital Economy and Society Index (DESI), 2019



Source: own construction based on European Commission data (2019)

Of the Nordic countries, Finland is the leading country in terms of human capital, whereas Sweden is leading in terms of connectivity and use of the internet, and Denmark is leading in terms of digital public services and integration of digital technology. Iceland and Norway were not considered in this research.

Based on the European Commission report (2015), with the creation of the connected digital single market, countries can generate up to EUR 250 billion of additional growth in Europe and create hundreds of thousands of new jobs, notably for younger jobseekers. The digital single market can be achieved through the elimination of roaming charges, creation of the same data protection for companies regardless of their location, modernisation of copyright rules, and modernisation of consumer rules for online and digital purchases. The main goals of the EU eGovernment Action Plan 2016–2020 include the provision of the cross-border mobility of citizens and businesses, and support of the digital interaction between administrations and citizens in terms of the public services (European Commission 2016).

The report of Nordic Council of Ministers (2020) has examined qualitatively the impact of digitalization on employment and the structure of the labour market in the case of the Nordic countries. All the Nordic countries such as Denmark, Finland, Norway and Sweden were included in the report, only Iceland was not considered. According to the authors, during the past 20–30 years, the digital transformation has not led to reduced employment, slower job growth or increased labour productivity growth in the Nordic economies. The authors pointed out that despite no decrease in the employment, some jobs were affected by digitalization process. For example, new digital technologies have contributed to reduced employment growth and labour intensity in several industries such as retail, banking and manufacturing. In addition to that, the authors highlighted the importance of the service sector for the economies of Nordic countries. Nowadays employment in the service sector accounts for four-fifth of Nordic employment. According to the authors, the process of digitalization forced the rise of employment in the service sector for high-skilled employees, whereas in case of less-skilled employees the impact of digitalization is still uncertain. In terms of the structure of the labour market, there was a tendency towards an upgrading of the occupational structure of employment in most Nordic countries, except Denmark, in the period 2000–2015. This upgrade is characterised by the rise in employment with high pay and skill requirements and decrease in employment low-skilled and low-paid jobs. Authors also highlighted that the technological transformation brings further job decline in male-dominated manufacturing and other goods industries. According to the authors, the employment growth was somewhat stronger among women than among men, except in Sweden and Finland after the severe crises in the early 1990s. The authors also noticed that during the financial crisis of 2008, male employment was more sensitive to cyclical fluctuations, mirroring the male dominance in manufacturing and construction. The authors conclude that the role of economic cycles plays an important role in employment. The great ups and downs in Nordic employment since 1990 – as illustrated by Finland and Sweden in the early 1990s, and Denmark, Finland and Iceland after the 2008 crisis – are related to the impact of economic cycles, and financial crises in particular. According to the authors, it took almost a decade after the 2008 financial crisis before employment in Denmark reached pre-crisis levels, and around two decades in Sweden and Finland after their financial crunches in the early 1990s (Nordic Council of Ministers 2020).

These ideas were supported by data for unemployment (% of total labour force), taken from the World Bank official site (Figure 2).

In addition to the effect of economic cycles on employment, the authors highlighted the importance of immigration and aging society. For example, Denmark, Finland and Norway show quite similar employment rates in both 1990 and 2019, although the number of the employed increased much more in Norway because of its younger population and higher immigration. In Finland, ageing has brought decline in the labour force, and Denmark has seen stagnation. In case of Sweden, the economy has shown markedly stronger employment growth than Denmark, Norway and Finland since the 1990s, probably influenced by faster Swedish population growth, due to higher immigration (Nordic Council of Ministers 2020).

Based on the results, provided in the report of Nordic Council of Ministers (2020), it is possible to say that employment in the Nordic countries can be influenced not only by technologies, but also by economic cycles and demography. Despite the promising qualitative results, there is still no exact answer to how digitalization influences employment nowadays. There is also a need to prove or refute the current results of authors quantitatively. In this article I examine the impact of digitalization on unemployment quantitatively and compare the results with Nordic Council of Ministers (2020) report.

3. Methodology and data

The article assesses the impact of digitalization on unemployment in the case of the Nordic countries with the help of the robust OLS regressions in STATA. Because the process of digitalization was promoted through the increase in the internet connections in the late 1990s and was further developed by the high-speed internet and mobile data access, the chosen period for regression was 1991–2019 based on data availability.

The descriptive statistics of data is presented in Table 1.

Table 1 Descriptive statistics

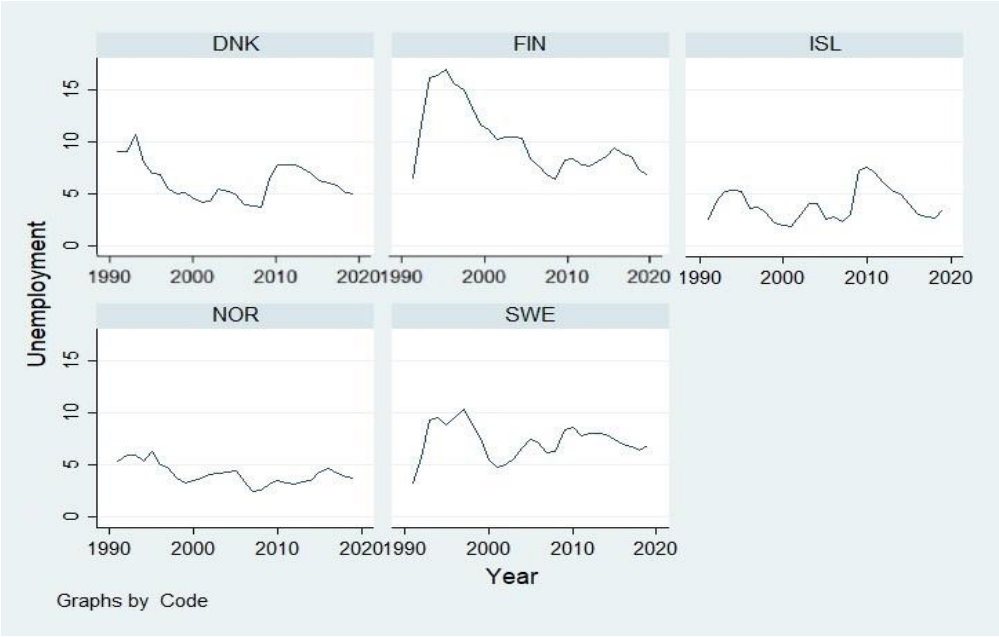
Variable	Obs	Mean	Std. Dev.	Min	Max
Year	145	2005	8.396	1991	2019
Internet	145	62.166	36.16	.194	99.5
Unemployment	145	6.327	3.021	1.87	17.01
Country	145	3	1.419	1	5
crisis2	145	.069	.254	0	1
crisis1	145	.103	.306	0	1

Source: own construction based on World Bank data

Because there were five countries considered in the period of 1991–2019, it is possible to say that the panel data were estimated.

As a dependent variable, I have used the yearly data of unemployment rate (% of total labour force). The data on unemployment were also taken from the World Bank official site (Figure 2).

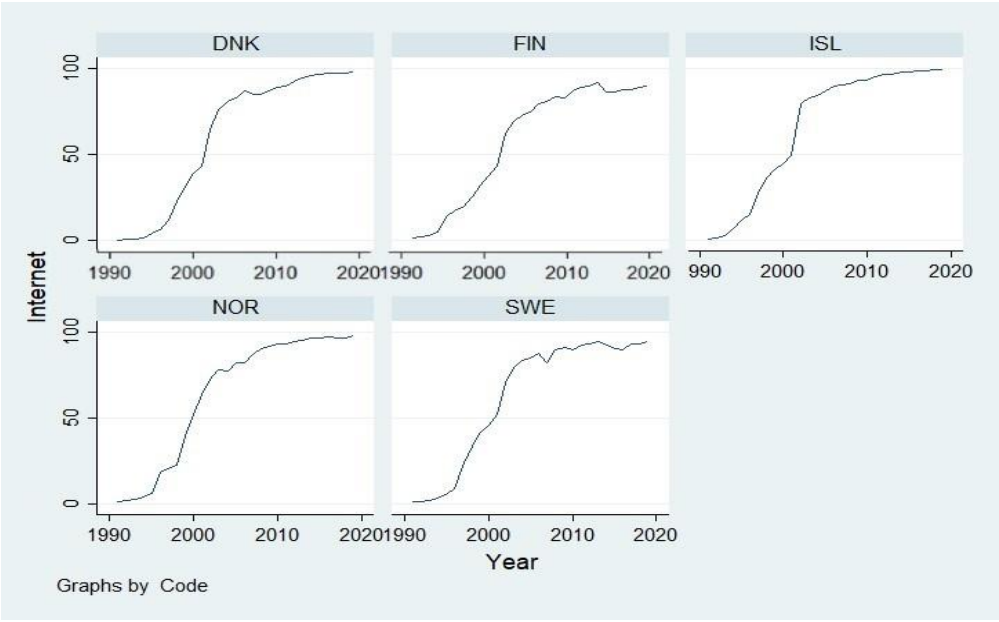
Figure 2 Unemployment, total (% of total labor force), 1991–2019



Source: own construction based on World Bank data

For the variable of digitalization I have used the yearly data of the variable from the World Bank official site – the Individuals using the Internet (% of population), (Figure 3).

Figure 3 Individuals using the Internet (% of population), 1991–2019



Source: own work based on World Bank data

As a result, the level-level regression model has been estimated. The first regression equation (1) has the following form:

$$\text{Unemployment} = \beta_1 \text{Internet} + \varepsilon \quad (1)$$

where ε is an error term. This regression equation will help to see if there is any impact of digitalization on unemployment on average in case of the five considered Nordic countries. But to be able to improve the model and consider each country separately, the final regression equation (2) for the robust OLS regressions has been created and has the following form:

$$\text{Unemployment} = \beta_1 \text{Country*Internet} + \beta_2 \text{Country*crisis1} + \beta_3 \text{Country*crisis2} + \varepsilon \quad (2)$$

In addition to dependent and explanatory variables two dummy variables of crisis were created and added into the regression equation. These variables were created for two crises: the crisis of 1990 and the global financial crisis of 2008. The dummy variable of crisis1 was created for the period of 1994–1996. The dummy variable of crisis2 was created for the period of 2009–2010. The periods were chosen based on the graphs in Figure 2. The use of these variables will help to improve the regression model because, as it was shown in the Nordic Council of Ministers (2020) report, the economic cycles are important determinants of employment in Nordic countries. To be able to examine an effect of digitalization on the unemployment rate for each country separately, an interaction between variables of the Internet and a variable of Country was created in the regression equation. To be able to examine the effect of the crises on the unemployment in each country, interaction between variables of crisis1, crisis2 and Country was created.

4. Results

Table 2 shows the results of the robust OLS regression based on equation (1) for the period of 1991–2019, for five Nordic countries, such as Iceland, Finland, Norway, Denmark and Sweden together. The dependent variable is the variable of unemployment rate, measured in percentage points, and the explanatory variable is the variable of individuals using the Internet, measured in percentage points too. To be able to see the effect of digitalization on the unemployment rate in each year separately, the regressions by year for the period of 1991–2019 were performed. The results are presented in Tables 4 through 10 in the Appendix, section 6.

Table 2 Linear regression, 1991–2019

Unemployment	Coef	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Internet	–.025	.007	–3.77	0	–.038	–.012	***
Constant	7.89	.479	16.48	0	6.943	8.836	***

Mean dependent var	6.327	SD dependent var	3.021
R-squared	0.091	Number of obs	145.000
F-test	14.239	Prob > F	0.000
Akaike crit. (AIC)	721.359	Bayesian crit. (BIC)	727.313

*** *p<.01,* ** *p<.05,* * *p<.1*

Source: own construction based on World Bank data

The results of the regression show that the variable of Internet has a high significance (*p*-value is less than 1%), which means that digitalization has an effect on the unemployment rate in the case of the Nordic countries, and on average has a negative association with unemployment. But it is possible to see that the R-squared is low, just 0.091, which means that the model could be improved.

To be able to improve the regression model, equation (2) has been applied. In addition to dependent and explanatory variables the dummy variables of crisis were created and added into the regression equation, which were created for the periods of 1994–1996 and 2009–2010. These variables will help to improve the regression model because the economic cycles can affect the unemployment rate. In addition to that, in the regression equation there were interactions between variables of Internet and Country and interaction between variables of crisis and Country. The results are shown in Table 3.

It is important to note that each country got its numerical equivalent for the regression, this information is important for the interpretation of the results. Iceland is number 1, Finland is 2, Norway is 3, Denmark is 4, and Sweden is 5.

Table 3 Linear regression with interactions and dummy variables of crisis, 1991–2019

Unemployment	Coef.	St.Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
1.Country*Internet	-.04	.009	-4.43	0	-.058	-.022	***
2.Country*Internet	.02	.009	2.10	.038	.001	.038	**
3.Country*Internet	-.041	.009	-4.75	0	-.058	-.024	***
4.Country*Internet	-.019	.009	-2.03	.045	-.037	0	**
5.Country*Internet	-.003	.009	-0.29	.77	-.02	.015	
1.Country*crisis1	-2	.751	-2.66	.009	-3.487	-.513	***
2.Country*crisis1	8.954	.731	12.25	0	7.508	10.4	***
3.Country*crisis1	-1.193	.689	-1.73	.086	-2.555	.17	*
4.Country*crisis1	.208	.747	0.28	.781	-1.27	1.686	
5.Country*crisis1	2.208	.69	3.20	.002	.843	3.573	***
1.Country*crisis2	3.993	.442	9.04	0	3.119	4.867	***
2.Country*crisis2	-.487	.41	-1.19	.237	-1.298	.324	
3.Country*crisis2	-.063	.281	-0.23	.822	-.62	.493	
4.Country*crisis2	1.592	.633	2.52	.013	.341	2.844	**
5.Country*crisis2	1.563	.266	5.89	0	1.038	2.089	***
Constant	7.151	.711	10.05	0	5.743	8.558	***

Mean dependent var	6.327	SD dependent var	3.021
R-squared	0.602	Number of obs	145.000
F-test	150.924	Prob > F	0.000
Akaike crit. (AIC)	629.478	Bayesian crit. (BIC)	677.106

*** *p<.01*, ** *p<.05*, * *p<.1*

Source: own construction based on World Bank data

The results of the regression show that for most of the Nordic countries, the variable of Internet is significant and mostly has a negative association with unemployment. Table 3 shows that in case of Iceland, in the period of 1991–2019, the process of digitalization led to a decrease in unemployment by 0.04% (*p*-value is less than 1%). There is a similar result in the case of Norway, the process of digitalization led to decrease in unemployment by 0.041% (*p*-value is less than 1%). In the case of Denmark the process of digitalization also decreased unemployment by 0.019% (*p*-value is less than 5%). The case of Finland has the opposite results: the process of digitalization led to an increase in unemployment by 0.02% (*p*-value is less than 5%). The case of Sweden shows that in the period of 1991–2019 the process of digitalization did not play a significant role for the unemployment (*p*-value is higher than 10%).

In addition to these results, it is possible to see that the economic cycles had a high significance for unemployment also for most of the countries. The crisis of the 1990s had a positive association with unemployment in the case of Finland and Sweden (*p*-value is less than 1%), which result is consistent with findings of the Nordic Council of Ministers (2020) report, according to which the employment of Finland and Sweden was affected by the crisis of 1990s.

In case of the impact of the global financial crisis of 2008 on unemployment, there was a high significance of the dummy variable of crisis2 for unemployment in the case of Denmark, Finland and Iceland, the regression shows the significance of the crisis for Iceland and Denmark and Sweden (*p*-value is 0, 0.013 and 0, respectively), whereas the impact of the global financial crisis on unemployment in Finland and Norway does not seem to be significant (*p*-value is 0.237 and 0.822 respectively) contrary to what was expected.

5. Conclusion

The topic of digitalization has a high relevance in the literature nowadays, where many authors try to figure out the impact of digitalization on the labour market in the short and long terms. Some authors argue that the process of digitalization creates new jobs, whereas other authors claim it increases unemployment. The Nordic countries, such as Iceland, Finland, Norway, Denmark and Sweden, are the leading countries in terms of digitalization on the European continent, and the estimation of an impact of digitalization on unemployment has a high relevance for these countries.

The paper assesses the impact of digitalization on the unemployment rate in the Nordic countries with help of the robust OLS regression in STATA, for the period of 1991–2019. Based on the results, it is possible to conclude that the process of digitalization already influences unemployment in most of the Nordic countries, whereas for some countries it does not have a significant impact nowadays, despite the high levels of digitalization. In addition to that, while considering the impact of digitalization on unemployment it is necessary to take into account the economic cycles as well. Results show that digitalization on average has a high significance and a negative association with the variable of unemployment. The increase of the variable of digitalization by 1% leads to a decrease in the unemployment rate by 0.025% in the case of the Nordic countries.

6. Appendix

Table 4 Linear regression, 1991–1994

VARIABLES	(1991) Unemployment	(1992) Unemployment	(1993) Unemployment	(1994) Unemployment
Internet	-1.218	-0.721	-1.003	-0.111
	(2.859)	(1.435)	(1.762)	(0.906)
Constant	6.498	8.399**	11.56***	9.403**
	(3.621)	(1.668)	(1.531)	(2.707)
Observations	5	5	5	5
R-squared	0.066	0.028	0.045	0.002

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 5 Linear regression, 1995–1998

VARIABLES	(1995) Unemployment	(1996) Unemployment	(1997) Unemployment	(1998) Unemployment
Internet	0.654	0.0658	-0.0386	-0.0579
	(0.558)	(0.403)	(0.347)	(0.320)
Constant	3.591	7.269	8.620	8.427
	(3.187)	(3.345)	(7.513)	(9.685)
Observations	5	5	5	5
R-squared	0.350	0.006	0.002	0.008

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 6 Linear regression, 1999–2002

VARIABLES	(1999) Unemployment	(2000) Unemployment	(2001) Unemployment	(2002) Unemployment
Internet	-0.352	-0.379	-0.158	-0.317
	(0.388)	(0.259)	(0.156)	(0.187)
Constant	19.03	21.88	12.88	27.50
	(15.02)	(12.12)	(8.977)	(14.03)
Observations	5	5	5	5
R-squared	0.236	0.395	0.184	0.533

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 7 Linear regression, 2003–2006

VARIABLES	(2003) Unemployment	(2004) Unemployment	(2005) Unemployment	(2006) Unemployment
Internet	-0.474**	-0.369	-0.348*	-0.254
	(0.103)	(0.212)	(0.142)	(0.252)
Constant	42.51**	35.58	34.14*	26.60
	(7.926)	(17.11)	(10.92)	(21.48)
Observations	5	5	5	5
R-squared	0.848	0.476	0.481	0.207

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 8 Linear regression, 2007–2010

VARIABLES	(2007) Unemployment	(2008) Unemployment	(2009) Unemployment	(2010) Unemployment
Internet	-0.507**	-0.250	-0.198	-0.470
	(0.0997)	(0.227)	(0.191)	(0.334)
Constant	47.41**	26.36	24.32	49.68
	(8.294)	(19.85)	(16.11)	(29.55)
Observations	5	5	5	5
R-squared	0.897	0.222	0.163	0.421

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 9 Linear regression, 2011–2014

VARIABLES	(2011) Unemployment	(2012) Unemployment	(2013) Unemployment	(2014) Unemployment
Internet	-0.353	-0.504	-0.628**	-0.368**
	(0.303)	(0.288)	(0.162)	(0.101)
Constant	39.15	53.46	65.88**	40.93**
	(26.98)	(26.32)	(14.56)	(9.083)
Observations	5	5	5	5
R-squared	0.208	0.345	0.318	0.616

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

Table 10 Linear regression, 2015-2019

VARIABLES	(2015) Unemployment	(2016) Unemployment	(2017) Unemployment	(2018) Unemployment	(2019) Unemployment
Internet	-0.429***	-0.408**	-0.472**	-0.430**	-0.336**
	(0.0519)	(0.0990)	(0.104)	(0.0895)	(0.0967)
Constant	46.46***	44.24**	50.20**	45.94**	37.40**
	(4.521)	(9.022)	(9.361)	(8.312)	(9.374)
Observations	5	5	5	5	5
R-squared	0.908	0.812	0.814	0.826	0.714

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own construction based on World Bank data

References

Autor, D. – Dorn, D. (2013): The growth of low-skill service jobs and the polarization of the U.S. labour market. *American Economic Review*, 103, 5, 1590–1591.

Brynjolfsson, E. – McAfee, A. (2011): *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*. Lexington, MA, Digital Frontier Press, 9.

Eichhorst, W. – Spermann, A. (2016): Sharing Economy: Mehr Chancen als Risiken? *Wirtschaftsdienst*, 96, 6, 433–439.

European Commission (2019): Digital Economy and Society Index. https://ec.europa.eu/digital-single-market/en/desi Accessed: 23/04/2021.

European Commission (2015): *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Digital Single Market Strategy for Europe.* European Commission, Brussels. http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1447773803386&uri=CELEX%3A52015DC0192 Accessed: 23/04/2021.

European Commission (2016): *Communication: EU eGovernment Action Plan 2016-2020 - Accelerating the digital transformation of government*. https://ec.europa.eu/digital-single-market/en/news/communication-euegovernment-action-plan-2016-2020-accelerating-digital-transformation Accessed: 23/04/2021.

Frey, C. – Osborne, M. (2017): The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114(C): 254–280.

Hanusch, H. (2016): *Revolutionary Developments in the World Economy*. Discussion Paper Series 332, Universitaet Augsburg, Institute for Economics, 1–21.

Hong, Y. – Chang, H. (2020): Does digitalization affect the objective and subjective wellbeing of forestry farm households? Empirical evidence in Fujian Province of China. *Forest Policy and Economics*, 118 (C): 1–9.

Manyika, J. – Chui, M. – Bughin, J. – Dobbs, R. – Bisson, P. – Marrs, A. (2013): *Disruptive technologies: Advances that will transform life, business, and the global economy* https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies Accessed: 15/04/2021.

Nordic Council of Ministers (2020): Digital Transformations of Traditional Work in the Nordic Countries https://pub.norden.org/temanord2020-540/ Accessed: 10/04/2021.

Rifkin, J. (2014): *The Zero Marginal Cost Society: The internet of things, the collaborative commons, and the eclipse of capitalism*. Basingstoke: Palgrave Macmillan, 101.

Sabbagh, K. – Friedrivh, R. – El-Darwiche, B. – Singh, M. – Koster, A. (2013): Digitization for Economic Growth and Job Creation: Regional and Industry Perspectives. The Global Information Technology Report 2013, World Economic Forum, 1–9.

Solow, R. (1956): A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70, 1, 85–86.

World Bank official site (2021): Unemployment, total (% of total labor force) https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS Accessed: April 10, 2021.

World Bank official site (2021): Individuals using the Internet (% of population) https://data.worldbank.org/indicator/IT.NET.USER.ZS Accessed: April 10, 2021.