ISSN 2392-1641
e-ISSN 2450-0097

Economics and Business Review

Volume 10 (3) 2024

CONTENTS

Poznań University of Economics and Business Press

Paper based publication

https://doi.org/10.18559/ebr.2024.3

ISSN 2392-1641
e-ISSN 2450-0097

POZNAŃ UNIVERSITY OF ECONOMICS AND BUSINESS PRESS
ul. Powstańców Wielkopolskich 16, 61-895 Poznań, Poland
phone +48 61 854 31 54, +48 61 854 31 55
https://wydawnictwo.ue.poznan.pl, e-mail: wydawnictwo@ue.poznan.pl
postal address: al. Niepodległości 10, 61-875 Poznań, Poland

Printed and bound in Poland by:
Poznań University of Economics and Business Print Shop

Circulation: 80 copies

sciendo

Economics and Business Review

Volume 10 (3) 2024

CONTENTS

sciendo Economics and Business Review https://www.ebr.edu.pl Vol. 10 (3), 2024: 58–83 https://doi.org/10.18559/ebr.2024.3.1490

The effect of output on employment in Poland during the COVID-19 pandemic

Krzysztof Bartosik[1]

Abstract

The COVID-19 pandemic caused a significant decline in output, as well as economic policies aimed at mitigating the negative effects of the pandemic. Both of these factors had an impact on the labour market. This paper investigates changes in employment across groups of workers during the coronavirus pandemic in Poland and the effect of output on these changes. Firstly, it examines changes in employment growth rates across different groups of workers in 2020. Secondly, the paper analyses the impact of the coronavirus crisis on employment by comparing actual and predicted employment growth during the pandemic period (2020). Using Okun's law, Ordinary Least Squares, and quarterly data, the elasticities of employment growth with respect to GDP growth in the pre-pandemic period (2003–2019) are calculated. These elasticities are then used to estimate projected employment growth during the pandemic. The results suggest that the total employment response to output change was relatively small, compared to the historical pattern. However, the response was unequal across groups of workers. The youngest workers, particularly women, and those with temporary employment contracts were most affected by the pandemic.

Keywords

- COVID-19
- employment
- employment elasticity
- Okun's law

JEL codes: E24, E32, J21, J23.

Article received 17 April 2024, accepted 26 June 2024.

Suggested citation: Bartosik, K. (2024). The effect of output on employment in Poland during the COVID-19 pandemic. *Economics and Business Review*, *10*(3), 58–83. https://doi.org/10.18559/ebr.2024.3.1490

[1] Institute of Economics, Polish Academy of Sciences, ul. Nowy Świat 72, 00-330 Warsaw, Poland, kbartosik@inepan.waw.pl, https://orcid.org/0000-0002-1488-7031.

Introduction

The pandemic caused a sharp fall in Poland's GDP. In response, policies known as "anti-crisis shields" were introduced to mitigate the negative effects. These included wage subsidies, exemptions from social security contributions, and other forms of social security support to maintain economic activity and protect jobs (Ambroziak, 2022; Dębkowska et al., 2021). These instruments may have encouraged labour hoarding among employers and reduced the responsiveness of employment to output. This effect may have been reinforced by the institutional reforms that started in 2016, which increased employment protection for temporary workers (Dral, 2016; Paluszkiewicz, 2017) and reduced their share in total employment (see Figure A1 in the Appendix). This may have affected the responsiveness of employment to output, as temporary workers are less protected and more likely to be laid off in a downturn than permanent workers. This raises the question of whether these changes have affected the cyclical sensitivity of different groups of workers, in particular, those who tend to be laid off in recessions, such as young workers and those on temporary contracts.

This paper investigates changes in employment across groups of workers during the coronavirus pandemic in Poland and the effect of output on these changes. The study identifies which groups of workers were most affected by layoffs and if the relationship between output and employment changed after the introduction of structural reforms and anti-crisis policies. This can contribute to a better understanding of inequalities in job security in the Polish labour market.

Firstly, the paper examines employment growth rates across different groups of workers in 2020. The analysis considers breakdowns by age, gender, education, working hours, employment status, and type of contract. Secondly, the paper analyses the impact of the coronavirus crisis on employment by comparing actual and predicted employment growth during the pandemic (2020). Using an employment version of Okun's law and Ordinary Least Squares (OLS), the study estimates the elasticities of employment growth to GDP growth (Okun's coefficient) for the pre-pandemic period (2003–2019). These elasticities are then used to estimate projected employment growth during the pandemic. The difference between the predicted and actual changes highlights the distinct employment response to output during the coronavirus crisis compared to the previous years.

The study uses quarterly data from Statistics Poland and the Eurostat database. The analysis focuses on the changes in employment in 2020. This is due to the availability of comparable data. The methodology of the Polish Labour Force Survey (LFS) changed in 2021, which means that data from 2021 onwards may not be entirely comparable to previous years.

This article extends the existing literature on the impact of the pandemic on the Polish labour market by analysing the employment response to output for different groups of workers using Okun's law. Previous studies have focused on different issues and used different methodologies. Kukołowicz (2021) found that actual unemployment was lower than the unemployment predicted by international and national institutions. This was due to some workers who had been dismissed becoming economically inactive. Kwiatkowski and Szymańska (2022) argue that the coronavirus crisis caused a reallocation shock, resulting in reduced employment in some sectors and increased employment in others. Maj and Kubiciel-Lodzińska (2022) examined the impact of the pandemic on immigrant employment in the Opolskie Voivodeship and found that immigrants were often the first to be laid off, especially in the early stages of the pandemic, but often on their own initiative. According to Strzelecki (2020, pp. 16–17), the reduction in Ukrainian employment was relatively small, due to the low share of their wages in wage funds and the flexible forms of employment. Other studies have examined changes in employment structure. Muster (2022) and Radziukiewicz (2021) found a significant increase in the number of people working from home during the pandemic.

The remaining sections of the paper are structured as follows. Section 1 presents the literature review. Section 2 describes the research method and used data. Section 3 presents the results of the analysis. Section 4 presents a discussion and conclusions.

1. Literature review

This paper refers to research trends that use Okun's law to analyse the impact of macroeconomic shocks on the labour market, and to analyse cyclical sensitivity across age and gender. For example, Cazes et al. (2013) and IMF (2010) use Okun's law to examine the impact of the global financial crisis on unemployment in a sample of OECD countries. They found that the responsiveness of unemployment to output changed over time. Additionally, the responsiveness was higher in countries with low employment protection and a high proportion of temporary workers. The IMF (2010) also showed that other factors such as financial stress, house price collapse and sectoral shocks increased this responsiveness during the recession. In a more recent study, the IMF (2022) showed that during the coronavirus pandemic in OECD countries, the response of unemployment to output contraction was muted compared to the past and varied across countries, mainly due to anti-crisis policies, in particular, the implementation of job retention schemes (JRS). In turn, Hutengs and Stadtmann (2014), and Dunsch (2016) examined the re-

sponse of unemployment to output by age in Poland, among other countries. They found that economic fluctuations affect younger workers more than older ones. Zanin (2014) also found that younger workers are more sensitive to changes in output than older workers, but also that young men are more sensitive than women.

This paper also relates to studies analysing the impact of the pandemic on labour markets. Cross-country studies, such as those conducted by the OECD (2020) and Eurofound (2021, 2022), also show that the impact of the pandemic on employment and unemployment varied across countries, due to different policy responses. For example, EU countries that implemented different JRSs experienced lower job losses than the US. Country case studies confirm that JRS programmes reduced the impact on the labour market. For example, Aiyar and Dao (2021) suggest that Germany's job protection programme (*Kurzarbeit*) reduced the rise in unemployment by about 3 percentage points in the second quarter of 2020. Similarly, Meriküll and Paulus (2023) indicate that the job retention scheme in Estonia prevented the unemployment rate from being 2–4 percentage points higher in 2020. Osuna and Perez (2021) find that the unemployment rate in Spain would have reached 42% without short-time work (STW).

The research demonstrates also that the pandemic had varying effects on employment across different groups of workers. According to García-Pérez and Villar (2020), in Spain, mainly young and less-educated workers were laid off. Gaudecker et al. (2021) indicate that in the Netherlands, the self-employed and less educated workers experienced the largest reductions in working hours, while workers with higher education began working from home more frequently. Beland et al. (2020) found that self-employed Canadians experienced the largest reductions in working hours. This was particularly true for women, immigrants, and those with lower levels of education. The sectors most affected were arts, culture, and recreation, social, community, and government services, as well as sales and services. Lemieux et al. (2020) demonstrated that in Canada the pandemic had a more significant impact on low-wage workers, as well as sectors that were most affected by lockdown measures, such as accommodation and food services, and younger and non-unionized workers. Lee et al. (2021) found that in the US the pandemic disproportionately affected women, young people, those with lower levels of education, and ethnic minorities. Auer (2022) shows that in Germany immigrants were more strongly affected than natives. Nunes et al. (2023) found that in Portugal municipalities with a higher proportion of temporary workers had a higher increase in unemployment.

Other studies indicate that the prevalent use of working from home helped to protect jobs during the pandemic. Gallacher and Hossain (2020) indicated a negative correlation between the ability to work remotely and employment losses in Canada. Alipour et al. (2020) showed that working from

home in Germany reduced the risk of short-term work and coronavirus infection. However, studies indicate that the ability to work remotely varies across different groups of workers, sectors, regions, and countries. Dingel and Neiman (2020) fund that in the US, individuals who are better-paid and educated, employed in the financial sector, or provided professional services are more likely to work from home. They also suggest that the ability to work from home is generally higher in developed countries.

2. Research method and data

2.1. Method

This paper analyses the impact of the coronavirus crisis on employment by comparing actual and predicted employment growth during the pandemic period (2020). A two-step method is used. In the first step, Okun's law (Okun, 1962) is used to calculate the elasticity of employment growth to economic growth, known as Okun's coefficient, during the pre-pandemic period (2003–2019). In a second step, this elasticity is used to estimate the forecast for 2020. The actual and the forecast changes are then compared. The difference highlights the different response of employment to output during the coronavirus crisis compared to the past. This approach is similar to that used by the IMF (2010, 2022) to identify the drivers of cross-country variation in unemployment dynamics during recessions. Unlike the IMF (2010, 2022), this study uses a different specification of Okun's law, focuses on employment and differences between groups of workers in the single country.

The study uses the employment version of Okun's law, which relates the employment growth rate (Δn) to the GDP growth rate (Δy):

$$\Delta n_t = \beta_0 + \beta_1 \Delta y_t + \varepsilon_t \tag{1}$$

The basic specification is modified, as proposed by Sögner & Stiassny (2002, p. 1776), by including the current and lagged changes in GDP. The use of this specification allows taking into consideration delayed adjustment of employment to output (e.g., due to the notice period):

$$\begin{aligned} \Delta n_t &= \beta_0 + \beta_1 \Delta y_t + \beta_2 \Delta y_{t-1} + \varepsilon_t = \\ &= \beta_0 + \beta_1 \Delta^2 y_t + (\beta_1 + \beta_2)\Delta y_{t-1} + \varepsilon_t \end{aligned} \tag{2}$$

where Δ represents the percentage change from the same quarter in the previous year, Δ^2 represents the change in the GDP growth rate from the

previous quarter, the β_0 is an intercept, and the β_1 coefficient captures the short-term effect while ($\beta_1 + \beta_2$) captures the total effect of GDP changes on employment changes. Employment and GDP growth rates are measured as the change compared with the same quarter of the previous year. Model (2) is estimated using OLS.

A large number of studies have confirmed the existence of Okun's law, the relationship between output and (un)employment. It is a useful tool for studying the impact of output on (un)employment socio-economic groups and how this impact changes over time because the value of Okun's coefficient depends on the cost of adjusting employment to output, which can be vary, due to economic policy and institutional factors. This study focuses on the output-employment relationship, because during the pandemic the relationship between output and unemployment was affected by changes in the labour force participation rate (see next section).[2] This paper employs a basic specification of Okun's law to analyse the differences in employment sensitivity across groups of workers.[3] The use of this specification allows us to overcome the limited data availability and to analyse the effects of the pandemic in more detail, as some data are not available at the level of employee groups and on a quarterly basis.

2.2. Data

The study uses quarterly data from Statistics Poland and the Eurostat database. Data on the real GDP growth rate (at constant prices) is sourced from the *Macroeconomic Data Bank* and *Quarterly Macroeconomic Indicators* of Statistics Poland. Data on the labour market is obtained from the Polish LFS, which is published by Statistics Poland and the Eurostat database. The analysis focuses on the changes in employment in 2020, because the methodology of the LFS changed in 2021, and data from 2021 onwards may not be fully comparable to previous years (see Statistics Poland, 2020, 2022). To ensure data comparability over time, the study primarily used data based on the methodology before 2021 for most calculations. As a result, in most cases, the analysis only goes up to the fourth quarter of 2020. Table 2A in the Annex presents descriptive statistics for the variables used to estimate Okun's coefficient.

[2] Examples of studies using the employment version of Okun's law include Döpke (2001), Basu and Foley (2013) and Chinn et al. (2014).

[3] Many studies use the basic versions of Okun's law. For example, Sögner & Stiassny (2002), Cazes et al. (2013), d'Apice (2014), Zanin (2014), Ball et al. (2017), Russnak et al. (2023).

3. Empirical analysis

3.1. Changes in GDP and employment

The analysis starts by presenting the main developments on the Polish labour market. Figure 1 shows the long-term changes in employment and GDP growth rates from the first quarter of 2001 to the fourth quarter of 2021. It shows that during the pandemic, the sharpest decline in economic growth coincided with a moderate decline in employment. In the second quarter of 2020, GDP fell by 7.8% compared to the same quarter of 2019. In the following quarters, it fell by 1.0% and 1.8%, respectively. However, the changes in employment are much smaller. Only in the second and third quarters of 2020 did employment fall by 1.3% and 0.6%, respectively (or by 1.7% and 0.8% according to the data defined for 2021). This contrasts with previous economic slowdowns at the turn of the century or during the global financial crisis, when employment fell more than GDP. A larger fall in output than in employment implies a fall in labour productivity, which in turn suggests that labour hoarding was an important mechanism of labour market adjustment to the shock.

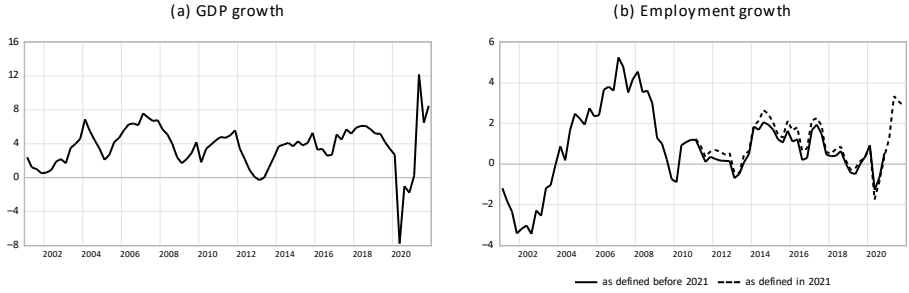

Figure 1. GDP and employment growth rates (in %, 2001q1–2021q4)

Note: Change is compared to the quarter of the previous year.

Source: Statistics Poland and own calculations.

Figure 2 shows in more detail the changes between the first quarter of 2020 and the fourth quarter of 2021.[4] It shows that the adjustment took place mainly through changes in employment and labour force participation rate, and to a lesser extent through changes in unemployment. Figure 2 suggests a positive relationship between changes in GDP and employment in 2020–2021, as

[4] Figure 2 consists of two panels because, as mentioned above, the LFS methodology changed in 2021. Panel I shows 2020 data as defined before 2021 and 2021 data as defined in 2021, while panel II shows unified data as defined in 2021.

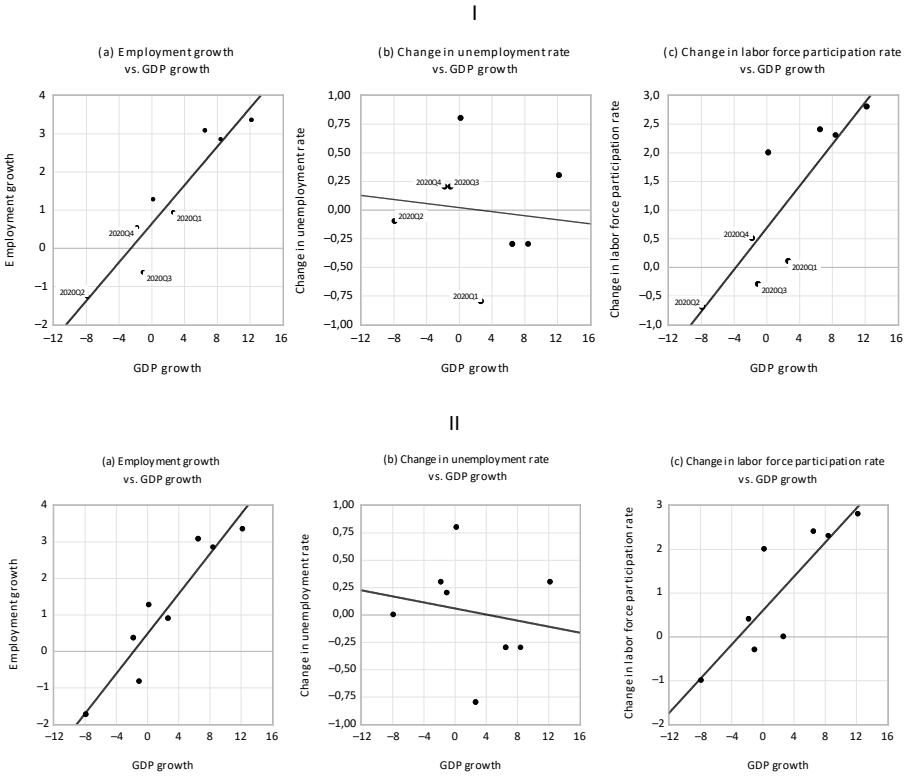

Figure 2. GDP growth rate and changes in selected labour market indicators (in 2020–2021)

Note: Panel I in 2020 data as defined before 2021 and in 2021 data as defined in 2021; Panel II in 2020–2021 data as defined in 2021; change compared to the same quarter of the previous year; GDP and employment growth rates in per cent; change in unemployment rate and labour force participation rate in percentage points.

Source: Statistics Poland and own calculations.

predicted by Okun's law, and changes in the labour force participation rate. However, the relationship between GDP and unemployment appears to be weaker. The procyclical behaviour of the participation rate suggests a larger transition from employment to inactivity than to unemployment, and a stronger impact of output on employment than on unemployment (see also Table A1 in the Appendix). This also means that the unemployment rate only partially reflects the impact of the pandemic on the labour market.

3.2. Changes in employment across groups of workers

To examine the impact of the pandemic on different groups of workers, the average employment growth rates are calculated for the period between the second and fourth quarters of 2020, when economic growth slowed down. They are calculated for different age groups, genders, levels of education, working hours, employment status and types of employment contracts. Tables 1–3 present the results, which suggest that the changes in employment were significantly different across groups of workers.

Young workers, especially those aged 15–24, experienced the largest falls in employment. While the total number of employees fell by 1.2%, the number of those aged 15–24 and 25–34 fell by 17.2% and 4.9%, respectively. Employees on temporary contracts were also hard hit by redundancies. The number of employees on permanent contracts rose by 2.8%, while the number on temporary contracts fell by 16%. Declines were common to all working age groups, but the largest falls were in the 15–24 and 24–25 age groups, at 22.5% and 17.9%, respectively. Note also that these groups were the only ones to experience a fall in permanent employment, by 9.6% and 0.2%, respectively. Larger falls in employment were recorded for those working part-time than full-time, by 3.5% and 0.2%, respectively. Again, the largest falls were in the 15–24 and 25–34 age groups, by 28.9% and 7.6%, respectively.

Table 1. The growth rate of employees by age, gender, and employment contract (in %, 2020q2–q4)

	Total			Males			Females		
	Employment contract								
	total	permanent	temporary	total	permanent	temporary	total	permanent	temporary
Total	–1.2	2.8	–16.0	–1.6	2.1	–15.9	–0.9	3.6	–16.0
15–24	–17.2	–9.6	–22.5	–13.5	–5.0	–20.2	–21.8	–16.3	–25.4
25–34	–4.9	–0.2	–17.9	–5.6	–2.4	–15.5	–4.1	2.7	–20.2
35–44	1.7	4.4	–12.3	1.6	4.0	–12.1	1.8	4.9	–12.4
45–54	2.4	5.2	–14.6	1.8	5.1	–19.0	3.1	5.3	–10.3
55–59	–1.8	0.0	–15.6	–3.1	0.1	–25.7	–0.5	–0.3	–2.8
60–64	7.1	9.1	–2.9	3.6	5.4	–7.5	14.5	17.3	2.4
65+	11.1	13.1	6.5	14.3	17.7	6.2	6.8	7.4	5.7

Note: Date as defined before 2021; compared to the similar period of the previous year.

Source: Statistics Poland and own calculations.

More men than women were laid off. However, women experienced greater job losses than men in the 'at-risk' groups. In the youngest age group, 21.8% of women and 13.5% of men were dismissed, including 25.4% and 20.2%, respectively, on temporary contracts. The employment of women on part-time contracts was reduced by 4.3%, while the employment of men on part-time contracts dropped by 1.8%.

Table 2. The growth rate of employed persons by age and education level (in %, 2020q2–q4)

	Total			Males			Females		
	Level of education								
	primary	secondary	tertiary	primary	secondary	tertiary	primary	secondary	tertiary
Total	–2.4	–0.6	1.2	–2.0	0.8	0.0	–3.5	–2.3	2.0
15–24	–21.6	–11.1	–27.2	–24.4	–2.7	–26.0	–13.1	–21.0	–27.8
25–34	–1.5	–1.7	–6.2	1.2	–3.1	–7.7	–12.9	0.9	–5.1
35–44	–6.9	1.1	5.5	–6.0	2.8	5.8	–9.1	–1.3	5.2
45–54	–0.2	3.4	7.8	0.7	6.0	4.9	–1.7	0.9	9.8
55–64	2.7	0.1	4.9	1.7	0.5	2.3	5.2	–0.4	7.2
65+	19.7	5.7	0.2	24.9	–	–6.2	–	4.5	11.6

Note: date as defined before 2021; compared to the similar period of the previous year.

Source: Statistics Poland and own calculations.

The relationship between education and changes in employment appears to be ambiguous. On the one hand, those with primary and secondary education experienced the largest falls in total employment, 2.4% and 0.6%, respectively. The number of those with tertiary education increased by 1.2%. On the other hand, in the 15–24 and 25–34 age groups, the largest decline was among those with tertiary education, 27.2% and 6.2%, respectively.

Interestingly, the number of self-employed increased by 2.7%, with a particularly high increase of 21.6% among women aged 15–24, who experienced sharp declines in other categories. This may indicate that the pandemic has forced self-employment.

The negative impact of the pandemic on the labour market was mitigated by government support (see Ambroziak, 2022; Dębkowska et al., 2021) and the widespread use of working from home (see Muster, 2022; Radziukiewicz, 2021). This reflects two pandemic-specific changes in the structure of employment. Firstly, Figure 3 shows an unprecedented increase in the share of employees temporarily released from work. Before the pandemic, the proportion

Table 3. The growth rate of employed persons by working time and by status in employment (in %, 2020q2–q4)

	Total		Males		Females		Total	Males	Females
	Working time						Status in employment		
	full--time	part--time	full--time	part--time	full--time	part--time	self-employed		
Total	–0.2	–3.5	–0.3	–1.8	–0.1	–4.3	2.7	3.5	1.0
15–24	–14.9	–28.9	–12.0	–28.9	–20.2	–36.4	8.2	3.7	21.6
25–34	–3.6	–7.6	–3.9	4.9	–3.0	–12.1	1.9	2.0	1.6
35–44	0.9	7.9	0.8	26.2	1.0	2.7	–0.6	1.4	–4.4
45–54	3.3	2.8	3.4	–0.6	3.2	3.3	5.7	7.5	2.5
55–64	3.2	–6.7	2.3	–12.8	4.4	–3.0	4.1	4.5	2.8
65+	8.5	5.7	9.3	2.9	6.2	8.8	4.0	–0.7	16.4

Note: date as defined before 2021; compared to the similar period of the previous year.

Source: Statistics Poland and own calculations.

of these workers increased gradually but never exceeded 8%. In 2020, however, it reached almost 15%. Secondly, the share of people working from home increased significantly to almost 9% in 2020, compared with around 4.5% in the pre-pandemic years. These pandemic-specific changes in the structure of employment may help to understand why a relatively small number of workers were laid off. The limited availability of detailed data for 2020 makes it difficult to analyse these phenomena in depth in Poland. However, the greater impact of the pandemic on the young, those with temporary contracts,

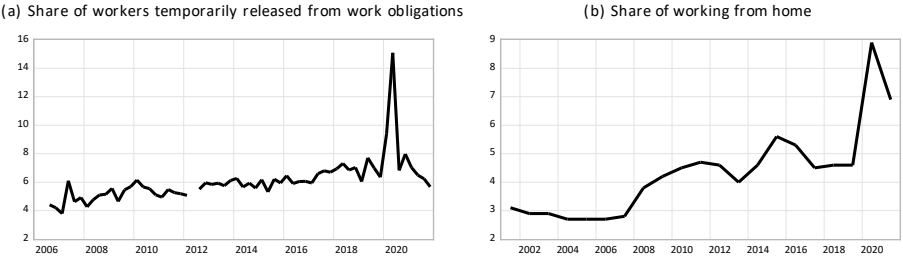

Figure 3. Share of workers temporarily released from work obligations and working from home (in %)

Note: share of workers temporarily released from work obligations—quarterly data seasonally adjusted, after 2020 as defined in 2021; share of working from home yearly data.

Source: Eurostat, Statistics Poland, and own calculations.

less educated and women suggests that these groups were less likely to benefit from these forms of support.

3.3. Employment response to the output

This section estimates Okun's coefficients for the pre-pandemic period (2003–2019) and compares actual and predicted employment growth during the pandemic period (2020). The pre-pandemic sample starts in 2003q1 because some of the changes in employment at the turn of the century, such as the sharp rise in the number of workers with temporary contracts and the fall in the number of workers with permanent contracts, were unlikely to be related to economic growth.[5] The analysis is carried out separately for total employment (aged 15–64) and for young people (aged 15–24), who were most affected by the coronavirus crisis. Both groups are disaggregated by sex, education, working hours, type of contract, and employment status.

3.3.1. Pre-pandemic employment elasticity

Tables 4 and 5 show the elasticities calculated for the pre-pandemic period. Some interesting findings emerged from these results. They confirm that economic growth determines changes in total employment in the Polish economy, but its impact varies for different groups of workers. Between the first quarter of 2003 and the fourth quarter of 2019, the coefficient ($\beta_1 + \beta_2$) for total employment is 0.48. This means that a 1% change in GDP growth was associated with a 0.48% change in total employment growth.

However, the elasticity of employment to business fluctuations varies between groups of employees. For total employment, the elasticities for men and women are similar at 0.49 and 0.48, respectively. Full-time employment, permanent employment, and self-employment are sensitive to output with elasticities of 0.55, 0.63, and 0.53, respectively. The Okun's coefficient for young employees is 1.23. This is almost twice as high as for total employment. However, among young people, female employment is more elastic than male employment, with elasticities of 1.39 and 1.10, respectively. Part-time and permanent employment are sensitive to output, with elasticities of 1.67 and 3.38, respectively. In both age groups, employees with primary education are

[5] It seems that shortening the time series should result in a smaller discrepancy between actual and forecast employment. On the one hand, e.g., the analysis for the years 2003–2019 gives more accurate forecasts than for the period 2001–2019. On the other hand, starting the analysis in 2014, e.g., after the global financial crisis and the debt crisis in Europe, leads to inconclusive results.

Table 4. Okun's coefficients for employed persons and employees aged 15–64 (2003q1–2019q4)

Employed persons growth rates	Δ^2GDP	ΔGDP$_{t-1}$	Constants	N	R^2	Prob (F-stat)
Total	0.28	0.48***	–0.73	68	0.27	0.000
	(0.18)	(0.15)	(0.55)			
Males	0.25	0.49***	–0.73	68	0.25	0.000
	(0.21)	(0.15)	(0.61)			
Females	0.32*	0.48***	–0.73	68	0.23	0.000
	(0.18)	(0.17)	(0.59)			
Primary education	0.43	1.35***	–10.17***	68	0.28	0.000
	(0.47)	(0.35)	(1.51)			
Secondary education	0.28	0.67***	–2.74***	68	0.27	0.000
	(0.28)	(0.19)	(0.76)			
Tertiary education	0.43	–0.10	6.43***	68	0.03	0.380
	(0.42)	(0.27)	(1.25)			
Full-time	0.29	0.55***	–0.76	68	0.28	0.000
	(0.22)	(0.18)	(0.61)			
Part-time	0.41	–0.08	–1.00	68	0.02	0.597
	(0.46)	(0.30)	(1.16)			
Self-employed	0.12	0.53***	–2.49***	68	0.19	0.001
	(0.23)	(0.15)	(0.70)			
Employees growth rates	**Δ^2GDP**	**ΔGDP$_{t-1}$**	**Constants**	**N**	**R^2**	**Prob (F-stat)**
Total	0.36	0.58**	–0.74	68	0.20	0.001
	(0.26)	(0.23)	(0.87)			
Permanent contract	–0.00	0.63**	–1.38	68	0.15	0.005
	(0.42)	(0.25)	(1.16)			
Temporary contract	1.63	0.26	3.09	68	0.03	0.422
	(1.34)	(0.89)	(3.89)			

Note: Newey-West standard errors in parentheses, statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Eurostat, Statistics Poland, and own calculations.

Table 5. Okun's coefficients for employed persons and employees aged 15–24 (2003q1–2019q4)

Employed persons growth rates	Δ^2**GDP**	Δ**GDP**$_{t-1}$	**Constants**	N	R^2	**Prob (*F*-stat)**
Total	0.68	1.23***	–5.83***	68	0.21	0.001
	(0.49)	(0.29)	(1.23)			
Males	0.71	1.10***	–5.16***	68	0.18	0.001
	(0.54)	(0.35)	(1.27)			
Females	0.69	1.39***	–6.65***	68	0.15	0.006
	(0.68)	(0.35)	(1.80)			
Primary education	1.18	1.58**	–8.85***	68	0.06	0.134
	(1.50)	(0.59)	(2.28)			
Secondary education	0.40	1.17***	–5.75***	68	0.14	0.007
	(0.60)	(0.37)	(1.62)			
Tertiary education	3.23*	1.28	–0.98	68	0.06	0.136
	(1.89)	(1.15)	(4.75)			
Full-time	0.32	–0.56	–0.71	68	0.01	0.654
	(1.34)	(0.78)	(3.28)			
Part-time	0.89	1.67***	–7.07***	68	0.26	0.000
	(0.59)	(0.42)	(1.56)			
Self-employed	–2.32*	0.39	–5.01*	68	0.06	0.155
	(1.34)	(0.60)	(2.98)			
Employees growth rates	Δ^2**GDP**	Δ**GDP**$_{t-1}$	**Constants**	N	R^2	**Prob (*F*-stat)**
Total	1.21**	1.63***	–6.47***	68	0.25	0.000
	(0.55)	(0.42)	(1.53)			
Permanent contract	0.50	3.38***	–14.84***	68	0.25	0.000
	(1.40)	(0.89)	(3.60)			
Temporary contract	1.83	0.61	–0.40	68	0.04	0.230
	(1.20)	(0.76)	(3.19)			

Note: Newey-West standard errors in parentheses, statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Eurostat, Statistics Poland, and own calculations.

more sensitive to business fluctuations than those with secondary education (1.35 vs. 0.67 and 1.58 vs. 1.17).

Economic fluctuations impacted the employment of most groups before the pandemic. However, some groups remained unaffected by changes in output. For the 15–64 age group, GDP fluctuations were statistically significant for 9 out of 12 subgroups. For the 15–24 age group, GDP fluctuations were statistically significant for 8 out of 12 subgroups. Among those aged 15–64, output effect was statistically insignificant for individuals with part-time and temporary contracts. In the 15–24 age group, output effect was statistically insignificant for the self-employed, full-time employees, and temporary employees. In both age groups, output had no statistically significant effect on employment for those with tertiary education. This suggests that factors other than changes in output also influence employment dynamics and are of different importance across groups of workers.

These finding are interesting for two reasons. Firstly, some groups of employees with atypical contracts are insensitive to economic fluctuations. However, some previous research (e.g., Cazes et al., 2013; IMF, 2010, 2022) suggests that employees with temporary contracts are more sensitive to economic fluctuations than workers with permanent contracts. Secondly, some of the groups insensitive to changes in output were strongly affected by the pandemic. Striking examples are employees with temporary contracts, young people with tertiary education, and all with part-time contracts. It is likely that the sensitivity of these groups to economic fluctuations depends on the phase of the business cycle or has increased recently. On the other hand, also groups of workers with high elasticities, such as workers with primary education, experienced relatively large declines in employment (see Tables 1–3).

3.3.2. Actual and predicted changes in employment

Using the estimated elasticities for the 2003–2019 samples, forecasts were generated to predict employment growth rates in the subsequent quarters of 2020. Figures 4 and 5 compare the actual and predicted changes in employment, Table A3 in the Appendix presents forecast errors. The findings show that in 2020, the total employment response to the changes in GDP growth was smaller than suggested by the historical relationship. However, this response varied across different groups of workers.

Figures 4 and 5 confirm that the response of total and youth employment to changes in output follows different patterns. Total employed persons and total employees are less responsive and more smoothed than the forecast values. For example, in the second quarter of the 2020, when economic activity contracted most, they fell less than forecasts. In contrast, youth employment fell more than predicted. These trends were similar for the most sub-groups

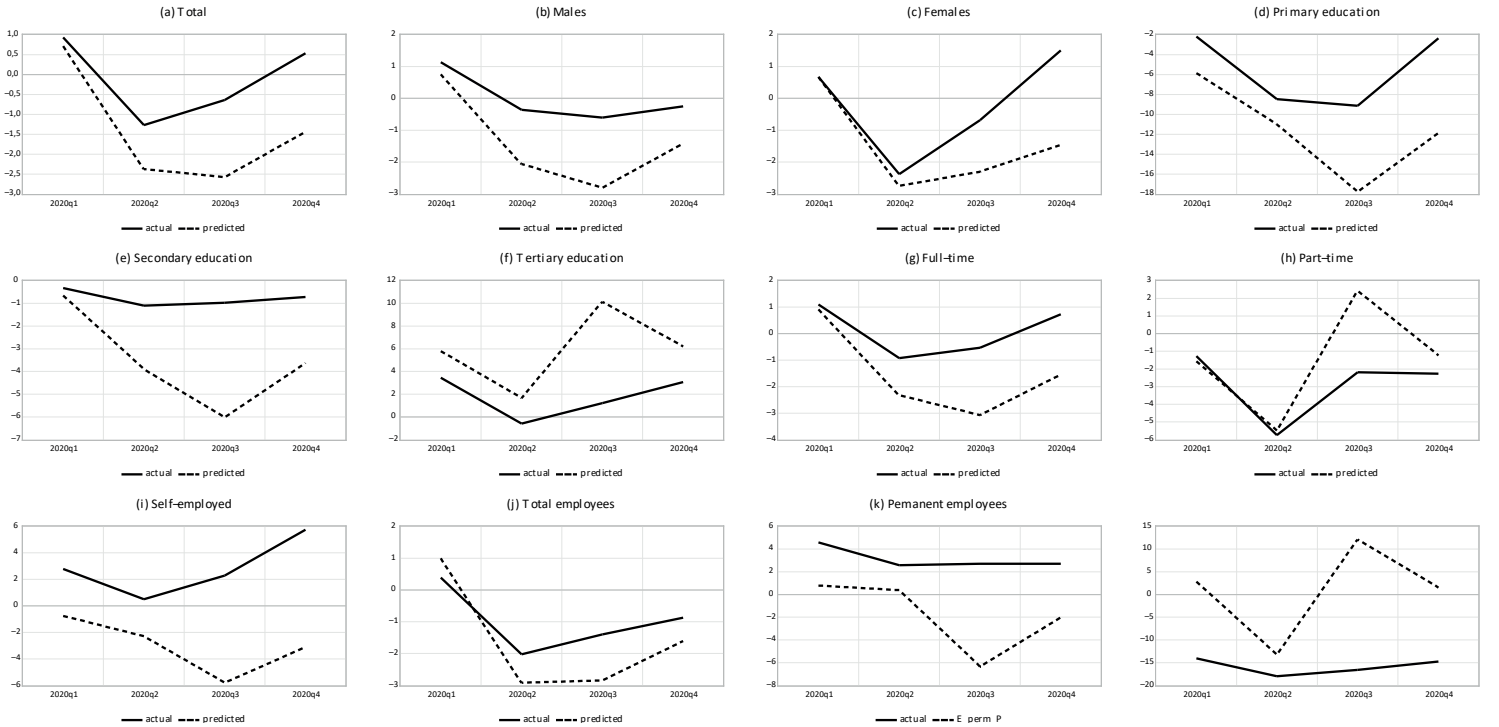

Figure 4. Actual and predicted changes in employment by gender, education, working time, employment contract, and employment status for aged 15–64 (in %, 2020)

Note: Changes compared to the same period in the previous year.

Source: Eurostat, Statistics Poland, and own calculations.

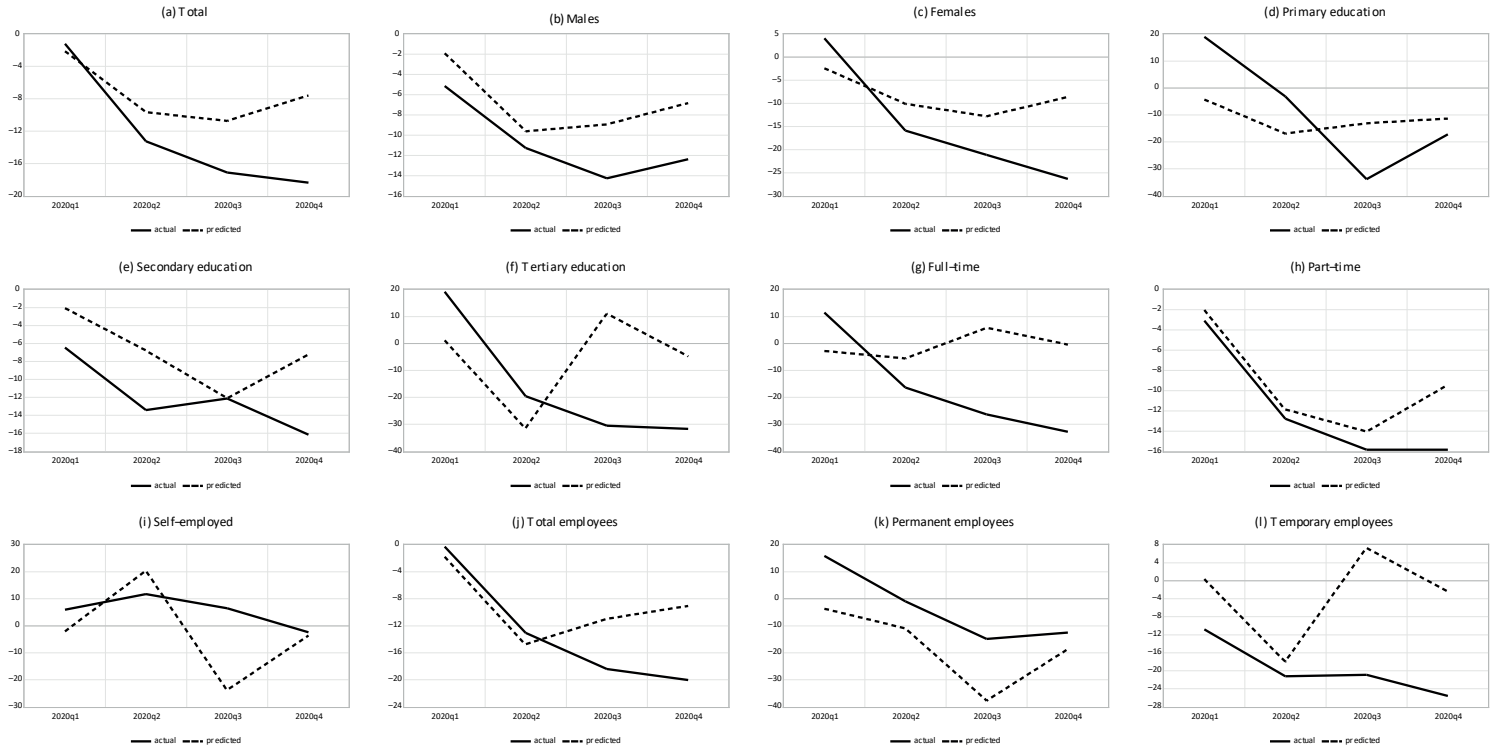

Figure 5. Actual and predicted changes in employment by gender, education, working time, employment contract, and employment status for aged 15–24 (in %, 2020)

Note: Changes compared to the same period in the previous year.

Source: Eurostat, Statistics Poland, and own calculations.

of workers. The graphical presentation of the data makes it possible to follow the dynamics of changes throughout the year. For total employed persons and employees, the actual changes are in many cases in line with the forecasts. However, youth employment continues to decline in several cases in the second half of the year, although the forecasts suggest a reversal of the negative trends. This suggests that young workers were hit harder and for longer.

Table A3 in the Appendix shows the forecast errors (Mean Error – ME and Root Mean Square Error – RMSE). For the 15–64 age group, most of the MEs are positive. For the 15–25 age group, however, most of the MEs are negative. For example, the ME is 1.31 for total employment and –4.95 for youth employment. A positive ME value can be interpreted as the forecast underestimating the result, and a negative sign as an overestimation. A positive ME value suggests that the actual changes in employment are higher than the predicted changes. On the other hand, a negative ME value suggests that the actual changes in employment are below the predicted changes. These differences may indicate that some factors changed a long-term relationship between output and employment during the pandemic. In the case of the 15–64 age group, they weakened it, while in the case of the 15–24 age group, they strengthened it.

It is beyond the scope of this paper to assess the forecasting ability of models based on Okun's law. However, the analysis of the data suggests that forecasts for total employment are more accurate than those for youth employment. In all cases, the forecast error is smaller for total employment. For example, the RMSE is 1.49 for total employment and 6.53 for youth employment. Moreover, for some groups of workers, changes in output have a limited ability to predict changes in employment. This is particularly the case for groups of workers for which the estimated Okun's coefficients are statistically insignificant, suggesting that employment was not sensitive to GDP fluctuations. Among those aged 15–64, those with tertiary education, part-time and temporary contracts were characterised by high forecasting errors. For the group aged 15–24, the self-employed, full-time and temporary employees and those with a tertiary education were also characterised by high forecasting errors.

Conclusions and discussion

The paper analyses the impact of output changes on employment for different groups of workers during the coronavirus pandemic in order to understand how employment adjusted to the changes in GDP and which groups were most affected by the pandemic. The study shows that economic gro-

wth impacted on employment in the Polish economy in the pre-pandemic and pandemic periods. The change in employment during the pandemic was smaller than suggested by Okun's law, but probably relatively larger than the change in unemployment, as some of those laid off became economically inactive. However, the impact of output on employment was varied across groups of workers.

The results are in line with previous research that found a positive relationship between output and employment in Poland (e.g., Ciżkowicz & Rzońca, 2003; Czyżewski, 2002; Jadamus-Hacura & Melich-Iwanek, 2014) and different sensitivity across age and gender to business cycle fluctuations (Dunsch, 2016; Hutengs & Stadtmann, 2014; Zanin 2014). While some of these studies suggest that the sensitivity of unemployment is higher for young men than for young women, this paper finds that in the case of employment sensitivity, the opposite is true. It is likely that women are less attached to the labour market and that more women than men become economically inactive after being dismissed, hence the differences in the elasticity of unemployment and employment.

Much of the relatively weak impact of output changes on employment can be explained by the anti-crisis policies aimed at protecting jobs. As mentioned above, Poland, like other countries, introduced such a policy including typical JRS instruments, such as wage subsidies, exemptions from social security contributions and other forms of social security support to maintain economic activity and protect jobs. Cross-country and country case studies (e.g. Eurofund, 2021; IMF, 2022) have shown that these instruments weakened the impact of output on employment. During the pandemic, Polish employers used labour hoarding to adjust the labour demand to the fall in output. This is evidenced by the significant decline in labour productivity (output fell much more than employment) and changes in employment structure. On the one hand, there was an unprecedented increase in the number of workers temporarily exempted from work obligations. On the other hand, there was the significant reduction in the employment of low-skilled workers, those with primary education and the youngest workers, for whom re-employment costs are relatively low in economic recovery. However, other factors such as the widespread use of working from home may also have changed the relationship between the economic growth and employment.

The impact of the pandemic on employment varied between groups of workers, while the composition of employment changes was similar to those in other countries. The employment levels of the youngest workers, especially women, and those on part-time and temporary contracts was severely affected by the pandemic. Part of this heterogeneity can be explained by differences in the responsiveness of employment to output. For example, younger workers are more responsive to output than older workers, and changes in their employment were also higher. This seems to reflect differences in the

share of temporary workers. Typically, a relatively high proportion of young workers have temporary employment contracts, are less protected and are more likely to be laid off in a downturn than permanent workers. However, the results suggest that temporary employment behaves asymmetrically over the business cycle. It is only responsive to output during recessions, as it was insensitive to output in the pre-pandemic period and suffered from large cuts during the pandemic. Some previous studies, Cazes et al. (2013) found that Polish unemployment is more responsive during recessions than during recoveries. Nevertheless, the coronavirus crisis showed that temporary workers are still easily dismissed, despite the structural reforms that started in 2016, which strengthened their employment protection.

This indicates that policies should concentrate on groups at higher risk of redundancy. Specifically, efforts should aim to protect the jobs of young, low-paid workers and women. Additionally, these policies should offer social protection for these groups to reduce the risk of material deprivation during periods of unemployment or economic inactivity.

Further research could examine how the structural reforms have affected the responsiveness of employment to output. Admittedly, they did not prevent the decline in temporary employment during the pandemic, but the question is how they affected employment growth during the recovery. Further research could also more closely examine the impact of 'anti-crisis shields', labour hoarding and working from home on employment during the pandemic.

Appendix

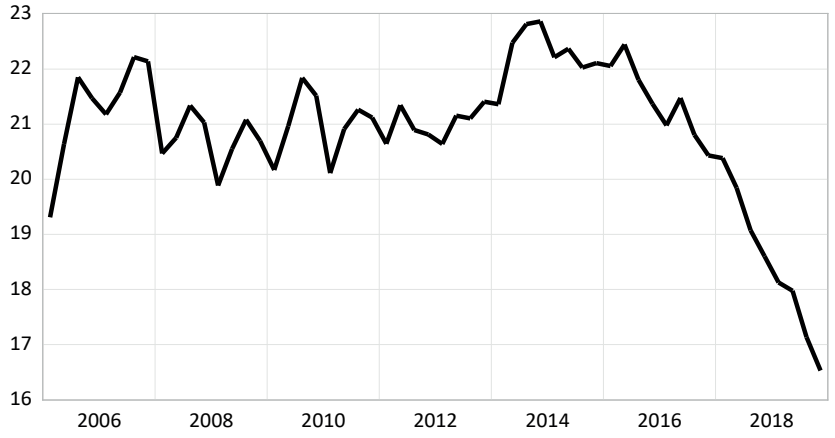

Figure A1. Share of temporary workers in the total employed (in %, aged 15–64)

Source: Eurostat, and own calculations.

Table A1. The GDP growth rate and changes in selected labour market indicators (in 2020 and 2021)

	2020				2021			
Quarter	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**
GDP growth rate (in %)	**2.7**	**–7.8**	**–1.0**	**–1.8**	**0.2**	**12.2**	**6.5**	**8.5**
	date as defined before 2021							
Employment growth rate (in %)	0.9	–1.3	–0.6	0.5				
The employment-to-population ratio (in percentage points)	0.5	–0.6	–0.3	0.3				
Unemployment rate (in percentage points)	–0.8	–0.1	0.2	0.2				
Labor force participation rate (in percentage points)	0.1	–0.7	–0.3	0.5				
	date as defined in 2021							
Employment growth rate (in %)	0.9	–1.7	–0.8	0.4	1.3	3.4	3.1	2.8
The employment-to-population ratio (in percentage points)	0.5	–1.0	–0.4	0.2	1.4	2.6	2.5	2.4
Unemployment rate (in percentage points)	–0.8	0.0	0.2	0.3	0.8	0.3	–0.3	–0.3
Labor force participation rate (in percentage points)	0.0	–1.0	–0.3	0.4	2.0	2.8	2.4	2.3

Note: The change is compared to the quarter of the previous year.

Source: Statistics Poland and own calculations.

Table A2. Descriptive statistics of the variables used (2003–2019)

	Mean	Median	Maximum	Minimum	Std. Dev.	*N*	Mean	Median	Maximum	Minimum	Std. Dev.	*N*
Employed growth rates	aged 15–64						aged 15–24					
Total	1.25	1.07	5.26	–2.55	1.57	68	–0.81	–0.25	8.21	–12.29	4.59	68
Males	1.27	0.89	5.68	–2.83	1.66	68	–0.64	–0.78	10.38	–8.80	4.41	68
Females	1.22	1.10	5.45	–2.22	1.68	68	–0.95	–0.14	9.66	–17.20	6.19	68
Primary education	–4.62	–4.21	6.83	–15.10	4.39	68	–2.37	–4.48	46.65	–20.59	11.04	68
Secondary education	0.01	–0.18	4.86	–5.06	2.20	68	–0.98	–0.20	11.11	–12.25	5.26	68
Tertiary education	6.03	5.35	12.38	1.34	3.05	68	4.31	1.12	48.40	–15.44	13.95	68
Full-time	1.50	1.12	6.24	–1.95	1.77	68	–2.98	–4.14	21.71	–22.04	9.95	68
Part-time	–1.32	–1.34	8.58	–11.34	3.85	68	–0.23	–1.03	12.39	–11.44	5.58	68
Self-employed	–0.32	–0.03	4.12	–7.46	2.10	68	–3.44	–5.98	40.52	–24.96	11.33	68
Employees growth rates	aged 15–64						aged 15–24					
Total employees	1.66	1.31	6.96	–3.72	2.22	68	0.22	0.70	12.52	–12.37	5.58	68
Permanent contract	1.21	1.47	7.18	–5.14	2.91	68	–1.01	–4.34	23.37	–20.61	11.86	68
Temporary contract	4.18	0.87	28.91	–11.53	9.84	68	2.11	–0.76	24.60	–11.25	8.84	68
Δ^2GDP	0.02	0.10	2.40	–2.40	1.02	68	0.02	0.10	2.40	–2.40	1.02	68
ΔGDP_{t-1}	4.09	4.20	7.60	–0.30	1.78	68	4.09	4.20	7.60	–0.30	1.78	68

Source: Eurostat, Statistics Poland, and own calculations.

Table A3. Forecast errors (in percentage points, in 2020)

	Employed persons growth rate									Employees growth rate		
	Gender			Education level			Working time		Status in employment	Contract		
	total	males	females	primary	secondary	tertiary	full-time	part-time	self-employed	total	permanent	temporary
	Aged 15–64											
Mean error	1.31	1.36	1.24	6.11	2.78	–4.16	1.60	–1.40	5.84	0.62	4.95	–16.68
Root Mean Square Error	1.49	1.52	1.70	6.82	3.24	5.00	1.85	2.37	6.42	0.98	5.57	18.72
	Aged 15–24											
Mean error	–4.95	–3.92	–6.33	2.65	–4.97	–9.60	–15.22	–2.54	7.72	–3.80	–16.44	14.66
Root Mean Square Error	6.53	4.24	10.71	17.31	5.96	26.98	24.48	3.40	16.31	6.72	19.13	16.17

Source: Eurostat, Statistics Poland, and own calculations.

References

Aiyar, S., & Dao, M. C. (2021). *The effectiveness of job-retention schemes: COVID-19 evidence from the German states*. IMF Working Papers, 242. https://doi.org/10.5089/9781513596174.001

Alipour, J. V., Fadinger, H., & Schymik, J. (2020). *My home is my castle – the benefits of working from home during a pandemic crisis: Evidence from Germany*. Ifo Working Papers, 329. https://econpapers.repec.org/RePEc:bon:boncrc:crctr224_2020_178

Ambroziak, A. A. (2022). Forms of COVID-19 state aid by beneficiary size in Poland in 2020. *International Journal of Management and Economics*, *58*(1), 44–63. https://doi.org/10.2478/ijme-2022-0003

Auer, D. (2022). Firing discrimination: Selective labor market responses of firms during the COVID-19 economic crisis. *PLoS ONE*, *17*(1), 0262337. https://doi.org/10.1371/journal.pone.0262337

Ball, L., Leigh, D., & Loungani, P. (2017). Okun's Law: Fit at 50? *Journal of Money, Credit and Banking*, *49*(7), 1413–1441. https://doi.org/10.1111/jmcb.12420

Basu, D., & Foley, D. K. (2013). Dynamics of output and employment in the US economy. *Cambridge Journal of Economics*, *37*(3), 1077–1106.

Beland, L. P., Fakorede, O., & Mikola, D. (2020). Short-term effect of COVID-19 on self-employed workers in Canada. *Canadian Public Policy*, *46*(1), 66–81. https://doi.org/10.3138/CPP.2020-076

Cazes, S., Verick, S., & Al Hussami, F. (2013). Why did unemployment respond so differently to the global financial crisis across countries? Insights from Okun's Law. *IZA Journal of Labor Policy*, *2*(10), 1–18. https://doi.org/10.1186/2193-9004-2-10

Chinn, M., Ferrara, L., & Mignon, V. (2014). Explaining US employment growth after the great recession: The role of output–employment non-linearities. *Journal of Macroeconomics*, *42*, 118–129. https://doi.org/10.1016/j.jmacro.2014.07.003

Ciżkowicz, P., & Rzońca, A. (2003). Uwagi do artykułu Eugeniusza Kwiatkowskiego, Leszka Kucharskiego i Tomasza Tokarskiego, pt. Bezrobocie i zatrudnienie a PKB w Polsce w latach 1993–2001. *Ekonomista*, *5*, 675–699.

Czyżewski, A. B. (2002). Wzrost gospodarczy a popyt na pracę. *Bank i Kredyt*, *33*(11–12), 123–133.

D'Apice, P. (2014). The Slovak labour market in the wake of the crisis: Did Okun's law hold ? *ECFIN Country Focus*, *11*(4), 1–8. https://doi.org/10.2765/69210

Dębkowska, K., Kłosiewicz-Górecka, U., Szymańska, A., Ważniewski, P., & Zybertowicz, K. (2021). *Tarcza antykryzysowa… Koło ratunkowe dla firm i gospodarki?* Polski Instytut Ekonomiczny.

Dingel, J. I., & Neiman, B. (2020). How many jobs can be done at home? *Journal of Public Economics*, *189*, 104235. https://doi.org/10.1016/j.jpubeco.2020.104235

Döpke, J. (2001). *The "employment intensity" of growth in Europe*. Kiel Working Paper, 1021. https://www.econstor.eu/bitstream/10419/17746/1/kap1021.pdf

Dral, A. (2016). Zatrudnienie na podstawie umów terminowych w świetle nowelizacji kodeksu pracy z dnia 25 czerwca 2015 roku. *Studia z Zakresu Prawa Pracy i Polityki Społecznej*, *23*(4), 21–37. https://ejournals.eu/czasopismo/szppips/artykul/zatrud-

nienie-na-podstawie-umow-terminowych-w-swietle-nowelizacji-kodeksu-pracy-z--dnia-25-czerwca-2015-r

Dunsch, S. (2016). Okun's law and youth unemployment in Germany and Poland. *International Journal of Management and Economics*, *49*(1). https://doi.org/10.1515/ijme-2016-0003

Eurofound. (2021). *COVID-19: Implications for employment and working life*. COVID-19 series. Publications Office of the European Union.

Eurofound. (2022). *Recovery from COVID-19: The changing structure of employment in the EU*. Publications Office of the European Union.

Gallacher, G., & Hossain, I. (2020). Remote work and employment dynamics under COVID-19: Evidence from Canada. *Canadian Public Policy*, *46*(1), 44–54. https://doi.org/10.3138/CPP.2020-026

García-Pérez, J. I., & Villar, A. (2020). Non-working workers. The unequal impact of COVID-19 on the Spanish labour market. *Estudios Sobre La Economía Española*, *43*, 1–24. https://documentos.fedea.net/pubs/eee/eee2020-43.pdf

Gaudecker, H. M., Holler, R., Janys, L., Siflinger, B., & Zimpelmann, C. (2021). *Labour supply in the early stages of the COVID-19 pandemic: Empirical evidence on hours, home office, and expectations*. IZA Discussion Papers, 13158. https://doi.org/10.2139/ssrn.3579251

Hutengs, O., & Stadtmann, G. (2014). Don't trust anybody over 30: Youth unemployment and Okun's law in CEE countries. *Bank i Kredyt*, *45*(1), 1–16.

IMF. (2010, April). *World economic outlook: Rebalancing growth* (chapter 3). https://doi.org/10.5089/9781589069152.081

IMF. (2022). *European labor markets and the COVID-19 pandemic. Fallout and the path ahead*. IMF Departmental Paper, DP/2022/004, 1–86.

Jadamus-Hacura, M., & Melich-Iwanek, K. (2014). Bezzatrudnieniowy wzrost gospodarczy – przykład Polski. *Studia Ekonomiczne Uniwersytetu Ekonomicznego w Katowicach*, *203*, 79–90.

Kukołowicz, P. (2021). *Rynek pracy w czasie pandemii*. Working Paper Polski Instytut Ekonomiczny, 2. https://pie.net.pl/wp-content/uploads/2021/05/PIE_Rynek-Pracy-w-pandemii.pdf

Kwiatkowski, E., & Szymańska, A. (2022). Sectoral changes of employment in Poland during the COVID-19 pandemic: Are reallocation shock effects applicable? *Economics and Business Review*, *8*(22), 113–144. https://doi.org/10.18559/ebr.2022.2.7

Lee S. Y., Park, M., & Shin, Y. (2021). *Hit harder, recover slower? Unequal employment effects of the COVID-19 shock*. NBER Working Paper, 28354. https://www.nber.org/papers/w28354

Lemieux, T., Milligan, K., Schirle, T., & Skuterud, M. (2020). Initial impacts of the COVID-19 pandemic on the Canadian labour market. *Canadian Public Policy*, *46*(1), 55–65. https://doi.org/10.3138/CPP.2020-049

Maj, J., & Kubiciel-Lodzińska, S. (2022). COVID-19 pandemic and the situation of immigrants in enterprises. *Central European Economic Journal*, *9*(56), 178–190. https://doi.org/10.2478/ceej-2022-0011

Meriküll, J., & Paulus, A. (2023). The impact of the COVID-19 job retention support on employment. *Economics Letters*, *222*, 110963. https://doi.org/10.1016/j.econlet.2022.110963

Muster, R. (2022). Pandemia COVID-19 a zmiana modelu pracy. Polska na tle krajów Unii Europejskiej. *Acta Universitatis Lodziensis. Folia Sociologica*, *81*, 29–44. https://doi.org/10.18778/0208-600x.81.02

Nunes, C., Carvalho, B. P., Pereira dos Santos, J., Peralta, S., & Tavares, J. (2023). Failing young and temporary workers: The impact of a disruptive crisis on a dual labour market. *The B. E. Journal of Economic Analysis & Policy*, *23*(2), 349–395. https://doi.org/10.1515/bejeap-2022-0316

OECD. (2020, October). *Job retention schemes during the COVID-19 lockdown and beyond*. OECD Policy Responses to Coronavirus (COVID-19) Papers, 1–23. https://doi.org/10.1787/0853ba1d-en

Okun, A. M. (1962). *Potential GNP: Its measurement and significance*. Cowles Foundation Paper, 190. Cowles Foundation, Yale University: New Haven, CT, USA.

Osuna, V., & García Pérez, J. I. (2021). Temporary layoffs, short-time work and COVID-19: The case of a dual labour market. *Applied Economic Analysis*, *30*(90), 248–262. https://doi.org/10.1108/AEA-06-2021-0118

Paluszkiewicz, M. (2017). Zatrudnienie tymczasowe po nowelizacji. *Praca i Zabezpieczenie Społeczne*, *11*, 22–29. https://www.pwe.com.pl/czasopisma/praca-i-zabezpieczenie-spoleczne/numery-czasopisma/praca-i-zabezpieczenie-spoleczne-nr-112017,p537180507

Radziukiewicz, M. (2021). Remote work in Poland and its perspectives. *Economic and Regional Studies / Studia Ekonomiczne i Regionalne*, *14*(4), 409–427. https://doi.org/10.2478/ers-2021-0029

Russnak, J., Stadtmann, G., & Zimmermann, L. (2023). Does Okun's law suffer from COVID-19? Evidence from Europe and the US—a research note. *Economics and Business Letters*, *12*(2), 165–171. https://doi.org/10.17811/ebl.12.2.2023.165-171

Sögner, L., & Stiassny, A. (2002). An analysis on the structural stability of Okun's law—a cross-country study. *Applied Economics*, *34*(14), 1775–1787. https://doi.org/10.1080/00036840210124180

Statistics Poland. (2020). *Informacja Głównego Urzędu Statystycznego na temat zmian wprowadzanych od 2021 r. w Badaniu Aktywności Ekonomicznej Ludności*. https://stat.gov.pl/obszary-tematyczne/rynek-pracy/pracujacy-bezrobotni-bierni-zawodowo-wg-bael/informacja-glownego-urzedu-statystycznego-na-temat-zmian-wprowadzanych-od-2021-r-w-bael,35,1.html

Statistics Poland. (2022). *Informacja na temat przeliczonych dla lat 2010–2020 wyników Badania Aktywności Ekonomicznej Ludności (BAEL) z 26.01.2022*. https://stat.gov.pl/obszary-tematyczne/rynek-pracy/pracujacy-bezrobotni-bierni-zawodowo-wg-bael/informacja-na-temat-przeliczonych-dla-lat-2010-2020-wynikow-badania-aktywnosci-ekonomicznej-ludnosci-bael,37,1.html

Strzelecki, P. (2020, lipiec). Imigranci w polskiej gospodarce – raport z badań ankietowych. *NBP, Departament Statystyki*, 1–22. https://nbp.pl/wp-content/uploads/2022/11/imigranci-vii2020.pdf

Zanin, L. (2014). On Okun's law in OECD countries: An analysis by age cohorts. *Economics Letters*, *125*(2), 243–248. https://doi.org/10.1016/j.econlet.2014.08.030

Aims and Scope

The **Economics and Business Review** is a quarterly journal focusing on theoretical, empirical and applied research in the fields of Economics and Corporate and Public Finance. The Journal welcomes the submission of high quality articles dealing with micro, mezzo and macro issues well founded in modern theories and relevant to an international audience. The EBR's goal is to provide a platform for academicians all over the world to share, discuss and integrate state-of-the-art Economics and Finance thinking with special focus on new market economies.

The manuscript

1. Articles submitted for publication in the **Economics and Business Review** should contain original, unpublished work not submitted for publication elsewhere.
2. Manuscripts intended for publication should be written in English, edited in Word in accordance with the **APA editorial** guidelines and sent to: secretary@ebr.edu.pl**.** Authors should upload two versions of their manuscript. One should be a complete text, while in the second all document information identifying the author(s) should be removed from papers to allow them to be sent to anonymous referees.
3. Manuscripts are to be typewritten in **12' font in A4 paper** format, one and half spaced and be aligned. Pages should be numbered. Maximum size of the paper should be up to 20 pages.
4. Papers should have an abstract of about 100-150 words, keywords and the Journal of Economic Literature classification code (**JEL Codes**).
5. Authors should clearly declare the aim(s) of the paper. Papers should be divided into numbered (in Arabic numerals) sections.
6. **Acknowledgements** and references to grants, affiliations, postal and e-mail addresses, etc. should appear as a separate footnote to the author's name a, b, etc and should not be included in the main list of footnotes.
7. **Footnotes** should be listed consecutively throughout the text in Arabic numerals. Cross-references should refer to particular section numbers: e.g.: See Section 1.4.
8. **Quoted texts** of more than 40 words should be separated from the main body by a four-spaced indentation of the margin as a block.
9. **References** The EBR 2022 editorial style is based on the **7th editio**n of the Publication Manual of the American Psychological Association (**APA**). For more information see APA Style used in EBR guidelines.
10. **Copyrights** will be established in the name of the **EBR publisher**, namely the Poznań University of Economics and Business Press.

More information and advice on the suitability and formats of manuscripts can be obtained from:

Economics and Business Review
al. Niepodległości 10
61-875 Poznań
Poland
e-mail: secretary@ebr.edu.pl
www.ebr.edu.pl

Subscription

Economics and Business Review (EBR) is published quarterly and is the successor to the Poznań University of Economics Review. The EBR is published by the Poznań University of Economics and Business Press.

Economics and Business Review is indexed and distributed in Scopus, Claritave Analytics, DOAJ, ERIH plus, ProQuest, EBSCO, CEJSH, BazEcon, Index Copernicus and De Gruyter Open (Sciendo).

Subscription rates for the print version of the EBR: institutions: 1 year – €50.00; individuals: 1 year – €25.00. Single copies: institutions – €15.00; individuals – €10.00. The EBR on-line edition is free of charge.