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Gender-, Age- and Educational Attainment Level-Specific Output–Employment Relationship and Its Dependence on Foreign Direct Investment

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Abstract: This paper analyses the gender-, age- and educational attainment level-specific output–employment relationship and its dependence on foreign direct investment (FDI). The unbalanced panel covers 25 European Union countries' data from 2000 to 2020. Empirical estimations are made using the pooled OLS estimator. The impact of FDI on gender-, age- and educational attainment level-specific output–employment elasticities is estimated by including the multiplicative terms between gross domestic product (GDP) and FDI in regression models. The main results indicate the positive impact of economic growth on employment, with the highest output–employment elasticities for males and youth regardless of gender. The estimation results also indicate limited abilities of economic growth to increase the employment of highly educated people and females older than 25 years regardless of their educational attainment level. Our results suggest that higher FDI level in the host countries is mostly associated with the decreasing employment reaction to economic growth. Although FDI is an important factor affecting the output–employment relationship, it does not help to solve the problem of unemployment in the EU, especially for youth.

Keywords: output–employment elasticity; gender; age; educational attainment level; foreign direct investment

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1. Introduction

Economic growth leading to employment growth is a priority of every country and the European Union as a whole. A high level of employment indicates that the country's labour resources are efficiently used, the country can reach its potential level of production and there is a low unemployment rate and a favourable social environment. A low employment rate or a high unemployment rate in a country indicates unused labour and other resources, economic and social problems such as growing poverty, income inequality, emigration and increasing budget deficit due to increased social benefits. A high employment rate is one of the main goals of macroeconomic policy. The Great Recession has had a different impact on employment and unemployment in countries around the world and encouraged increasing interest in research on employment (unemployment) reaction to economic fluctuations. The coronavirus crisis and the war in Ukraine, with its consequences on the labour market, have further increased the relevance of this topic. Despite the growing economies, the European Union has not reached the employment target which was a 75% employment rate (for people aged 20–64) in 2020. The gender gap in employment and the low employment rate of youth have also remained a serious problem in the European Union.

The results of studies on the economic growth–employment nexus (Seyfried 2007, 2014; Herman 2011; Furceri et al. 2012; Hartwig 2014; Richter and Witkowski 2014; Ezzahidi and El Alaoui 2014; Burggraeve et al. 2015; Dahal and Rai 2019; Thuku et al. 2019;

Adegboye et al. 2019; Mkhize 2019; Ben-Salha and Zmami 2021; Mihajlović and Marjanović 2021; et al.) usually show the positive but heterogeneous impact of economic growth on employment. Authors have analysed the output–employment elasticities in individual countries (Seyfried 2007, 2014; Hartwig 2014; Ezzahidi and El Alaoui 2014; Burggraeve et al. 2015; Dahal and Rai 2019; Thuku et al. 2019) or regions (Furceri et al. 2012; Richter and Witkowski 2014; Adegboye et al. 2019; Mkhize 2019; Ben-Salha and Zmami 2021; Mihajlović and Marjanović 2021) but there is a scarcity of research conducted in the European Union as a whole (Herman 2011; Richter and Witkowski 2014; Burggraeve et al. 2015). Since European Union countries follow rather different employment strategies and targets, it is important to know whether economic growth in the European Union as a whole leads to employment growth or whether the growth not connected to jobs. It also allows us to understand if economic growth in the European Union is more associated with productivity or employment growth. European Union countries have a free labour movement, meaning that decreasing employment in one country could increase employment in another and otherwise. Trying to eliminate this effect, and to increase the efficiency of estimates, this study applies the panel estimation technique in 25 European Union (EU) countries which allows us to look at the European Union as a single market.

Authors have also determined the factors influencing heterogeneity of the output–employment relationship: specific economic characteristics of each country (Pattanaik and Nayak 2014; Slimane 2015; Burggraeve et al. 2015; El-Hamadi et al. 2017; Ali et al. 2018; Dahal and Rai 2019; Thuku et al. 2019; Mkhize 2019; Ben-Salha and Zmami 2021), institutional (Kapsos 2006; Furceri et al. 2012; Richter and Witkowski 2014; Ali et al. 2018; Ben-Salha and Zmami 2021), and demographic characteristics (Furceri et al. 2012; Anderson and Braunstein 2013; Pattanaik and Nayak 2014; Slimane 2015; Anderson 2016; Ben-Salha and Zmami 2021). Scientific literature emphasises that employment reaction to economic growth could vary across gender (Kapsos 2006; Anderson and Braunstein 2013; Anderson 2016; Adegboye et al. 2019) or age (Kapsos 2006; Adegboye et al. 2019), with most estimations indicating the higher responsiveness of employment to economic growth for females compared to males, and lower for youth compared to total male and female output–employment elasticities. The literature analysing the output–unemployment relationship also discusses possible heterogeneity across educational attainment levels (Askenazy et al. 2015; Kadiša et al. 2021), indicating lower unemployment reaction to economic fluctuations for highly educated people. Since we could not find any similar research in the context of the output–employment relationship, our research complements existing literature by analysing the gender-, age- and educational attainment level-specific output–employment elasticity in the European Union.

In the context of growing globalisation, FDI is widely discussed as a factor determining economic growth and employment separately. However, literature analysing the impact of FDI on the output–employment relationship is limited and requires further detailed analysis. The scientific literature emphasises that FDI could increase employment reaction to economic growth directly by inventing new jobs (Mucuk and Demirsel 2013) and indirectly by increasing the level of wages and increasing aggregate demand as well as demand for the labour force (Yousfi and Benziane 2020; Boumediene et al. 2021). The other point of view assumes that employment reaction to economic growth can decrease due to the FDI-driven higher labour productivity, FDI concentration in capital-intensive sectors, etc. (Golejewska 2001; Marelli et al. 2014). What impact FDI would have on the output–employment relationship depends on specific characteristics of countries, including the age, gender and educational attainment level of employees. The earlier empirical evidence does not provide consistent conclusions about the FDI's impact on the output–employment relationship either. Therefore, this research not only complements limited empirical evidence on gender-, age- and educational attainment level-specific output–employment elasticity in the European Union but in addition, examines how this relationship depends on the FDI level in the host country.

Empirical results of this research show that 1% of economic growth would lead to an increase in employment by 0.30%, meaning that economic growth is associated with both productivity and employment growth in the EU. The main results suggest that employment reaction to economic growth decreases with age and economic growth has limited abilities to increase employment outcomes for highly educated people and women older than 25 years of age. Analysing the FDI's impact on the heterogeneous output–employment relationship, we find that a higher FDI level in the host country is associated with lower employment reaction to economic growth in most of the analysed cases.

The rest of the paper is organised as follows: Section 2 summarises empirical evidence on the heterogenous output–employment relationship and discusses the impact of FDI on employment sensitivity to economic growth; Section 3 presents the applied methodology: the model, estimation strategy and data; Section 4 discusses the main results; Section 5 concludes the paper.

2. Literature Review

2.1. Output–Employment Relationship

The output–employment relationship analysis is the alternative of the so-called employment version of Okun law (International Monetary Fund 2010). Okun (1962) was the first who described the reverse relationship between output and unemployment based on the statistical data of the United States. The main idea of the Okun law is that 1% of economic growth is associated with a decrease in unemployment by 0.3 p.p. Although the relationship is known as a law, it is also criticised for its instability over time and heterogeneity across countries as they differ across the level of development and other macroeconomic characteristics. Since the relationship between output and unemployment is negative, the economic growth impact on employment is supposed to be positive (Mihajlović and Marjanović 2021). The output–employment analysis could be more valuable for researchers as the statistical data of employment are more detailed and allow analysis of the relationship between output and employment according to age, gender, education, part-time/full-time work, skilled/unskilled jobs, economic structure, etc. (Kapsos 2006).

While the relationship between economic growth and unemployment is measured by the Okun coefficient, the output–employment relationship is mainly defined as output–employment sensitivity (Seyfried 2014; Mihajlović and Marjanović 2021) or output–employment elasticity (Anderson 2016; Dauda and Ajeigbe 2021). According to Kapsos (2006) and Ezzahidi and El Alaoui (2014), output–employment elasticity shows how much employment growth is related to the 1% of economic growth. The most desirable level of output–employment elasticity ranges between 0 and 1 (Ghazali and Mouelhi 2018), indicating that economic growth is associated with both employment and labour productivity growth (Dahal and Rai 2019). The main results of empirical studies analysing the output–employment relationship are summarised in Table 1.

Table 1. Empirical studies of the output–employment relationship.

Reference	Analysis Period	Analysed Country	Output–Employment Elasticity
Kapsos (2006)	1991–1999; 1995–1998; 1999–2003	160 countries	0.34; 0.38; 0.30
Seyfried (2007)	1990–2006	Canada, France, Germany, Italy, United States, United Kingdom	0.14–0.33
Herman (2011)	2000–2010	European Union	0.37
Furceri et al. (2012)	1991–2009	167 countries	South Asia (0.99); North America (0.81); West Europe

			(0.64); East Europe (0.23); Middle East/North Africa (0.1); Sub-Saharan Africa (0.02)
Seyfried (2014)	1999–2012	Portugal, Ireland, Italy, Greece, Spain	0.22–1.45
Hartwig (2014)	1992–2013	Switzerland	0.3–0.4
Richter and Witkowski (2014)	1995–2010	Europe and Central Asia region, Western Europe, EU-10, CIS countries	0.18; 0.44; 0.32; 0.12
Ezzahidi and El Alaoui (2014)	1991–1999; 2000–2011; 1991–2011	Morocco	0.74; 0.38; 0.46
Slimane (2015)	1991–2011	90 developing countries	Highest for Comoros (1.667); Gabon (1.334); Cote d'Ivoire (1.263); modest in Bosnia (0.05); Ukraine (0.09); and China (0.10); negative for Serbia (−0.101); Belarus (−0.112) and Romania (−0.238)
Burggraeve et al. (2015)	1960–2014	10 individual EU countries, the Euro area and the United States	0.304–1.302
Ali et al. (2018)	1990–2010	11 Sub-Saharan Africa, 9 Latin American countries	Sub-Saharan Africa (from 0.3 to 0.6); Latin America (from 0.5 to 1.1)
El-Hamadi et al. (2017)	1970–2012	Marocco	0.637 in a long-run. 0.588 in a short-run
Dahal and Rai (2019)	1998–2018	Nepal	0.649
Thuku et al. (2019)	1992–1996; 2004–2008; 2009–2016	Kenya	1.28; 0.5; 0.38
Adegboye et al. (2019)	1991–1999; 2000–2009; 2010–2014	Sub-Saharan Africa	0.16; 0.36; 0.45
Mkhize (2019)	2000–2012	South Africa	0.45
Ben-Salha and Zmami (2021)	1970–2017	6 Gulf Cooperation Council countries	0.4–0.6
Mihajlović and Marjanović (2021)	2000Q1–2008Q4; 2009Q1–2019Q4	9 Central and South-East European countries	0.2

The analysis of empirical studies (Seyfried 2007; Herman 2011; Furceri et al. 2012; Seyfried 2014; Hartwig 2014; Ezzahidi and El Alaoui 2014; Dahal and Rai 2019; Thuku et al. 2019; Adegboye et al. 2019; Mkhize 2019; Ben-Salha and Zmami 2021; Mihajlović and Marjanović 2021) shows that economic growth effect on employment in most of the cases is positive but heterogeneous. The output–employment elasticities range from being negative in Serbia, Belarus and Romania (Slimane 2015) or relatively small in countries such

as Germany (Seyfried 2007), Greece, Ireland and Italy (Seyfried 2014), and regions such as Africa, Sub-Saharan Africa (Furceri et al. 2012), Europe and Central Asia (Richter and Witkowski 2014), to being higher than one in Spain (Seyfried 2014; Burggraeve et al. 2015). Some research shows that output–employment elasticities in the same country can vary across different periods, showing the tendencies of output–employment elasticities to become higher (Adegboye et al. 2019) or lower (Thuku et al. 2019). We can find only several studies where the impact of economic growth on employment is estimated for a group of European countries with output–employment elasticities equal to 0.32 in EU-10 (Richter and Witkowski 2014), 0.37 in European Union (Herman 2011) and 0.57 in Euro area (Burggraeve et al. 2015).

Some research also estimates how economic growth affects the employment of demographic groups differenced by gender and age (Kapsos 2006; Anderson and Braunstein 2013; Anderson 2016; Adegboye et al. 2019). Kapsos (2006) estimated that women's output–employment elasticity was higher than men's in all three periods in 160 studied economies, but the opposite result was found in Japan. The author also confirmed that the elasticity of youth employment was significantly lower than the overall employment elasticity. Anderson and Braunstein (2013) found that the intensity of gender-specific employment growth varies between countries and over time. The authors confirmed higher female employment reaction to output changes for the global and the OECD group samples in all analysed periods. Still, results were different in estimating gender-specific output–employment relationships in countries which do not belong to the OECD. The main findings showed that the output–employment elasticities of males and females do not significantly differ. The results of Anderson's (2016) research also confirmed higher women's employment elasticity than men's in 80 countries. The same conclusions about the higher females' employment sensitivity to economic growth were confirmed by Majid and Siegmann (2021) in the case of Pakistan. Adegboye's et al. (2019) estimations show similar output–employment elasticities for both genders and lower employment reaction to economic growth for youth compared to other demographic groups. Differences in output–employment elasticities across age or gender can be related to their different education attainment level. Education is particularly important for the participation rate of women in the labour market (Fitzenberger et al. 2004) as it decreases the employment gap between women and men (Jaba et al. 2015) and increases employability (OECD 2013), which is very important for youth. Since some studies of the output–unemployment relationship confirm that education is an important factor in determining the heterogeneous output–unemployment relationship and showing that unemployment reaction to economic fluctuations is higher for less educated people (Askenazy et al. 2015; Kadiša et al. 2021), we cannot find similar research in the context of output–employment relationship.

As highlighted in the scientific literature, the heterogeneous output–employment relationship also may appear due to other factors such as different responses to employment in periods of economic recession and expansion (Burggraeve et al. 2015; Butkus et al. 2022), specific economic characteristics of each country (Pattanaik and Nayak 2014; Slimane 2015; Burggraeve et al. 2015; El-Hamadi et al. 2017; Ali et al. 2018; Dahal and Rai 2019; Thuku et al. 2019; Mkhize 2019; Ben-Salha and Zmami 2021), institutional (Kapsos 2006; Furceri et al. 2012; Richter and Witkowski 2014; Ali et al. 2018; Ben-Salha and Zmami 2021) and demographic factors (Furceri et al. 2012; Anderson and Braunstein 2013; Pattanaik and Nayak 2014; Slimane 2015; Anderson 2016; Ben-Salha and Zmami 2021; etc.). This research aims to analyse how one of the economic factors, foreign direct investment, affects gender-, age- and educational attainment level-specific employment reaction to economic growth.

2.2. FDI Impact on Output—Employment Relationship

The technological dissemination aspect of economic openness is usually assessed through the FDI which reflects the country's financial openness. FDI is one of the factors determining the increase in labour productivity, integration into international supply chains, boosting export, innovation, job creation and spreading of know-how (OECD 2019). According to Hale and Xu (2016), FDI brings capital and technology to the targeted industries and companies, affecting labour demand and thus labour structure, employment, average productivity and wage level. The FDI's impact on economic growth and employment separately is widely discussed. However, literature analysing the effect of FDI on the output–employment relationship is scarce. Following the literature which analyses the relationship between the FDI, economic growth and employment nexus, we assume that FDI could affect employment reaction to economic growth directly and indirectly. The scientific literature emphasises that the direct effect of FDI occurs when a foreign multinational company transfers its capital and creates jobs by company founding (Mucuk and Demirsel 2013). The indirect effect is observed when FDI firstly increases labour productivity growth and when it stimulates aggregate demand and demand for the labour force in local companies (Yousfi and Benziane 2020; Boumediene et al. 2021). This is the most common view, meaning that FDI would increase GDP and have positive effects on employment (Estrin 2017).

As it is expressed by Malik (2019), FDI is a factor that diverts the creation of new jobs from agriculture to other more productive sectors, meaning that FDI is closely related to productivity growth as well as output–employment elasticity. According to the methodology presented by Kapsos (2006), for a given amount of output growth, any increase in employment growth is associated with an equal and opposite decrease in labour productivity growth. From this point of view, FDI-driven productivity growth should lead the decreasing output–employment elasticity. The same situation is expected when FDI is concentrated in capital-intensive economic sectors or foreign companies tend to replace the labour force with capital. Otherwise, if FDI-driven productivity growth would lead to an increase in wages or aggregate demand (Lipsey and Sjöholm 2005), according to Onaran (2008), Jude and Silaghi (2016) and Malik (2019), we should expect the increase in employment in the host country. Golejewska (2001) emphasises that FDI increases the average wage level and competition, leading to the bankruptcies of some local companies and causing short-term unemployment problems due to the lack of a highly skilled labour force which is usually required by foreign companies. Additionally, FDI brings not only technology but also knowledge, new management and work techniques (Golejewska 2001; Marelli et al. 2014), which could increase labour productivity through workforce training without an additional labour force, meaning that output growth could not generate employment. Generally, the positive effect of FDI on employment is observed when the number of new jobs created by FDI exceeds the number of layoffs and job losses related to FDI (Gohou and Soumaré 2012). The research results of Jude and Silaghi (2016) show that new technologies are associated with increased labour productivity and decreased employment, while the creation of new foreign companies is related to employment growth in the European Union countries. The negative impact of FDI on output–employment growth was confirmed by Slimane (2015) in a panel of 90 countries which can be explained by the fact that openness expressed as FDI allows firms to access more productive, advanced goods and technology, consequently, the reaction of employment to economic growth is decreasing. As it is highlighted by Mendoza-Velázquez et al. (2021), the impact of FDI on employment depends on the technological environment, social progress, production conditions and competition in the host country.

The impact of FDI on the output–employment relationship could vary across gender and age. Foreign companies use more advanced and technical skills-intensive technologies than local companies and therefore require a higher-skilled, mostly male workforce (Banerjee and Veeramani 2015). On the other hand, there is an increasing emphasis on the positive effect of FDI impact on women's employment, explained by their comparative

advantage in labour-intensive (Tang and Zhang 2017) and non-skill-intensive sectors such as manufacturing (Siegmann 2007; Sherif et al. 2022) and services. The empirical estimations show that FDI in various countries could increase both low-skilled and high-skilled employment (Onaran 2008; Saucedo et al. 2020). Juhn et al. (2014) stated that automation and computerisation of jobs reduce the need for physical strength, which was once the main comparative advantage of men in the labour market. According to the Heckscher–Ohlin model, increased demand for goods and services and higher competition due to international trade increase the demand for cheaper, unskilled labour (Vacaflores 2011; Ngouhouo and Nchofoung 2021. As Siegmann (2007) and Sherif et al. (2022) point out, women's work is less well-paid, so in certain highly competitive and labour-intensive industries, such as textiles and clothing, women have a higher relative demand than men. The research of Tang and Zhang (2017) and Kodama et al. (2018) shows that foreign capital companies prefer to employ women more than domestic companies, meaning that attracting foreign direct investment could help increase women's employment reaction to economic growth. The same conclusions can be made about the FDI's impact on youth employment reaction to economic growth. Young people lack work experience but learn quickly, adapt to changes and use new technologies more easily (Setyanti and Wahyudi 2021). Since young people are still in education, they are a cheaper labour force compared to older and more educated people, they could be a more attractive labour force to foreign companies.

Adegboye et al. (2019) analysed the impact of economic growth on male, female and youth employment in Sub-Saharan Africa, including FDI as one of the factors determining the heterogeneity of output–employment elasticities. The authors assumed that attracting FDI would lead to wage growth, thus affecting employment growth. The study's results confirmed that attracting FDI is associated with a higher employment response to economic growth for all analysed demographic groups. Different conclusions were made by Anderson and Braunstein (2013), who found a negative FDI impact on the output–employment relationship for both genders. This is related to the fact that FDI tends to be more about capital-intensive than domestic investment—even in labour-intensive sectors. However, no statistically significant differences between genders were found. We also found several studies which analysed the impact of FDI on the output–unemployment relationship. Kadiša et al.'s (2021) study shows that FDI weakens the effect of economic growth on unemployment. The highest effect of inward FDI on the unemployment reaction to output growth was found for young and uneducated people, as FDI brings technologies that substitute the least skilled labour force. The smallest effect is observed for female and highly educated employed groups. Durech et al. (2014) did not find a statistically significant impact of FDI on the output—unemployment relationship in the Czech Republic and Slovakia.

The literature review showed that the relationship between the economic growth, employment and FDI nexus could vary across different demographic groups and their educational attainment level. In this study, we try to expand the existing literature and analyse gender-, age- and educational attainment level-specific output–employment relationship and how this relationship changes due to different levels of inward FDI in a country.

3. Methodology

This study follows the basic idea postulated in Okun's (1962) seminal work on the relationship between production and unemployment in the United States. According to Okun's law, economic growth should lead to a decrease in unemployment and an increase in employment. Studies, depending on the research aims, prefer to use the gap model (Ball et al. 2017; Butkus and Seputiene 2019; Louail and Riache 2019; Duran 2022) or a first differences model (Blázquez-Fernández et al. 2018; Goto and Bürgi 2021) for estimation of economic growth impact on unemployment. However, research on the output–employment relationship (Slimane 2015; Ali et al. 2018; Thuku et al. 2019; Mkhize 2019) usually follow the methodology represented by Kapsos (2006) and applies a log-linear specification to estimate the output–employment elasticities. Islam and Nazara (2000) explained

that log-linear regression is more suitable for estimating output–employment elasticity compared to arithmetic elasticity coefficient, as it is applicable for panel data and cross-country comparisons. Since we aim to analyse how economic growth affects employment dynamics, we apply a first differenced version of Okun's equation and use GDP and employment variables in their first differences. By differencing these variables, additionally, we eliminate the country-specific fixed effects from the model and expect to solve the problem of unobserved heterogeneity in the data.

Our research follows the studies of Slimane (2015), Maza (2022), etc., and consists of two phases. First, we analyse the impact of economic growth on employment growth using the equation given below (see Equation (1)):

$$\Delta lnE_{i,t} = \alpha + \beta \cdot \Delta lnY_{i,t} + \theta_t + \varepsilon_{i,t}, \quad (1)$$

where $\Delta lnE_{i,t}$ is the log difference of the number of the employed population (measured as a thousand persons employed) between period t and $t-1$ in a country i. $\Delta lnY_{i,t}$ is the log difference of the output (measured as GDP at constant 2015 prices, million euro) between t and $t-1$ in a country i. The parameter β measures output–employment elasticity, which we expect to be with a positive sign. α is the intercept, θ_t measures the time-varying effects, $\varepsilon_{i,t}$ is defined as the idiosyncratic error.

Differently from the other output–employment research, we also analyse the gender-, age- and educational attainment level-specific output–employment relationship. For that purpose, we use the employment of different genders (total, male and female), ages (15–64, 15–24, 25–39, 40–64) and education attainment levels following the International Standard Classification of Education (ISCED). ISCED 0–2 includes less than primary, primary and lower secondary education; ISCED 3–4: upper secondary education and post-secondary non-tertiary education; ISCED 5–8: short-cycle tertiary education, bachelor's, master's, doctoral or equivalent level education.

In our research, we aim to expand the existing literature and analyse how the gender, age- and the educational attainment level-specific output–employment relationship depends on the FDI level in the host country. Our second step is to apply Equation (2), which is modified by including the multiplicative term between GDP growth and inward FDI (*iFDI*) level.

$$\Delta lnE_{i,t} = \alpha + \beta_1 \cdot \Delta lnY_{i,t} + \beta_2 \cdot ln\left(iFDI_{i,t}\right) + \beta_3 \cdot \Delta lnY_{i,t} \cdot ln\left(iFDI_{i,t}\right) + \theta_t + \varepsilon_{i,t}, \quad (2)$$

where $ln(iFDI_{i,t})$ is the log of inward FDI stock level (measured as % of GDP) in country i at the period t. Other terms are the same as in Equation (1). Since we include the multiplicative term $\Delta lnY_{i,t} \cdot ln\left(iFDI_{i,t}\right)$ into the regression model, the output–employment relationship becomes conditional, i.e., mediated by *iFDI* level. For the correct interpretation of estimation results, we apply the equation suggested by Friedrich (1982). Equation (3) is used to estimate the conditional effect of economic growth on employment.

$$\Delta lnE_{i,t} = \alpha + \beta_2 \cdot \Delta lnFDI_{i,t} + \left[\beta_1 + \beta_3 \cdot ln\left(iFDI_{i,t}\right)\right]\Delta lnY_{i,t} + \theta_t + \varepsilon_{i,t}, \quad (3)$$

where $\left[\beta_1 + \beta_3 \cdot ln\left(iFDI_{i,t}\right)\right]$ is a slope coefficient, that shows the conditional effect of economic growth on employment at the different *iFDI* levels. As Butkus et al. (2021) explained, not only the slopes but also the standard errors of the estimated slope coefficients become conditional and, in our case, vary according to the level of *iFDI*. Standard errors of the slope coefficients are estimated using Equation (4).

$$S_{(\beta_1+\beta_3 \cdot lni(FDI)_{i,t})} = \sqrt{var\ (\beta_1)\ +\ ln(iFDI)_{i,t}{}^2 \cdot var\ (\beta_3) + 2 \cdot ln(iFDI)_{i,t}\ \cdot\ cov(\beta_1, \beta_3)}, \quad (4)$$

For the estimation of statistical significance, t values for the conditional output–employment relationship moderated by the *iFDI* level are calculated using Equation (5).

$$t = \frac{\beta_1 + \beta_3 \cdot ln(iFDI_{i,t})}{S_{\beta_1 + \beta_3 \cdot ln(iFDI_{i,t})}} \quad (5)$$

Following the previous research on the output–employment relationship (Furceri et al. 2012; Pattanaik and Nayak 2014; Richter and Witkowski 2014; Slimane 2015; Mkhize 2019), we use the pooled ordinary least square estimation. Heteroskedasticity and autocorrelation consistent (HAC) robust standard errors are included in regression models to avoid effects of serial correlation and heteroscedasticity in the error term. Data covers the unbalanced panel of 25 EU countries from 2000 to 2020. Two countries (Cyprus and Malta) were excluded from the sample due to extremely high *iFDI* levels. Data on GDP and employment were collected from Eurostat, on *iFDI* from UNCTAD (the United Nations Conference on Trade and Development) databases. Descriptive statistics of selected variables are presented in Appendix A.

4. Estimation Results and Discussion

This section summarises the estimation results of the research using the methodology presented above. Table 2 shows estimated gender-, age- and educational attainment level-specific output–employment elasticities based on Equation (1).

Table 2. Economic growth impact on employment.

Education	Gender	Age			
		Total	**15–24**	**25–39**	**40–64**
ISCED 0–8	Total	0.3027 ***	0.6574 ***	0.3178 ***	0.2433 ***
		(0.0550)	(0.1837)	(0.0791)	(0.0453)
	Obs.	498	498	498	498
	Male	0.3985 ***	0.7706 ***	0.4007 ***	0.3393 ***
		(0.0684)	(0.1905)	(0.0860)	(0.0572)
	Obs.	498	498	498	498
	Female	0.2003 ***	0.5197 **	0.2228 ***	0.1446 **
		(0.0505)	(0.1924)	(0.0760)	(0.0572)
	Obs.	498	498	498	498
ISCED 0–2	Total	0.3630 *	0.9544 ***	0.7389 **	0.0781
		(0.1767)	(0.2883)	(0.2946)	(0.1545)
	Obs.	498	498	498	498
	Male	0.5349 **	0.8984 ***	0.9118 **	0.2229
		(0.2148)	(0.3018)	(0.3337)	(0.1678)
	Obs.	498	496	498	498
	Female	0.0707	0.7420 *	0.3478	−0.1096
		(0.1365)	(0.3757)	(0.2424)	(0.2105)
	Obs.	498	464	493	498
ISCED 3–4	Total	0.2649 ***	0.6347 ***	0.2263 **	0.2068 **
		(0.0689)	(0.1837)	(0.0839)	(0.0789)
	Obs.	498	498	498	498
	Male	0.3185 ***	0.7164 ***	0.2810 ***	0.2668 ***
		(0.0701)	(0.1690)	(0.0845)	(0.0816)
	Obs.	498	498	498	498
	Female	0.1998 **	0.5262 **	0.1391	0.1387
		(0.0745)	(0.2392)	(0.0929)	(0.0891)
	Obs.	498	498	498	498
ISCED 5–8	Total	0.1462	0.2558	0.2048	0.0636
		(0.0866)	(0.2643)	(0.1289)	(0.0955)

	Obs.	498	494	498	498
Male	0.2039 **	0.1913	0.1905	0.1867 *
	(0.0750)	(0.3969)	(0.1237)	(0.0946)
	Obs.	498	450	498	498
Female	0.1059	0.1307	0.2138	−0.0242
	(0.1069)	(0.2381)	(0.1439)	(0.1264)
	Obs.	498	481	498	498

Note: ***, **, * show statistical significance at 1%, 5% and 10%, levels, respectively. The HAC robust standard errors are represented in brackets.

Analysing the effect of economic growth on employment generation, we find that economic growth significantly increases total, male and female employment in all age groups. Our estimations show that 1% of economic growth tends to increase employment by 0.30 % in 25 EU countries. Such a coefficient is similar to the one postulated in the seminal Okun (1962) output–unemployment research. Similar output–employment elasticities are found in previous research conducted by Richter and Witkowski (2014) in the EU-10 countries (0.32), Burggraeve et al. (2015) in individual countries such as Germany (0.30) and Italy (0.32), by Hartwig (2014) in Switzerland (0.31), etc. The highest output–employment elasticities are estimated for males compared with total and female employment and for youth regardless of gender. According to estimation results (see Table 2), an increase in GDP by 1% is associated with an employment increase of 0.66% for youth, 0.77% for young males and 0.52% for young females. Our results are in contrast with previous research (Kapsos 2006; Anderson and Braunstein 2013; Anderson 2016; Majid and Siegmann 2021), where higher output–employment elasticities are identified for females. However, part of the results are in line with others, who find the highest responsiveness of unemployment to economic fluctuations for youth (Hutengs and Stadtmann 2014; Blázquez-Fernández et al. 2018; Ahn et al. 2019; Liotti 2021 Butkus et al. 2020) and for males compared to females (Dixon et al. 2017).

There are several possible reasons determining higher youth employment sensitivity to economic growth. Young people usually do not have the work experience or education that older workers have, their salary is lower, so are their dismissal costs, and they more often work on short-term contracts or prefer seasonal jobs (Dunsch 2015; Dietrich and Möller 2016; Ball et al. 2017). Higher employment reaction to the economic growth of males compared with females can be explained by the low female participation rate in the labour market due to maternity leave and other domestic obligations (Lewandowska-Gwarda 2018; Ahn et al. 2019) or men's work in cyclically sensitive sectors such as manufacturing and construction (Kim and Park 2019; Liotti 2021). Generally, as Hutengs and Stadtmann (2014), we can state that the ability of economic growth to generate job opportunities decreases with a person's age.

Employment reaction to economic growth also varies across different levels of educational attainment. Our estimations show that economic growth has limited abilities to increase the employment of highly educated people. These results are in line with Askenazy et al. (2015) in the research on EU-15 employment/unemployment reaction to economic growth or Butkus et al. (2020) in the research on the output–unemployment relationship in the EU. Differently, we find that the reaction of employment to economic growth is more robust for uneducated young and middle-aged males or young males with secondary and upper secondary education. According to Butkus et al. (2020), highly educated employees are more valuable to companies due to their knowledge and experience, so their employment reaction to economic fluctuations is lower compared with those less educated. Economic growth in 25 EU countries also has a positive and statistically significant impact on the employment of young females with secondary and upper secondary education. Thus, the abilities of economic growth to increase the employment of females older than 25 years remain limited.

In our study, we also analyse how *iFDI* is changing the effect of economic growth on employment generation. Estimation results of *iFDI* impact on the output–employment relationship are presented in Table 3. To understand the conditional effect of *iFDI* on the output–employment relationship, conditional output–employment elasticities and confidence intervals were estimated (Appendix B).

According to estimation results made regardless of educational attainment level (Figure A1), we find that *iFDI* has a weak but negative impact on the output–employment relationship. It means that the inflow of FDI into the country weakens possibilities for growth to increase employment. When the iFDI level is higher than 451% of GDP, economic growth effect on employment becomes insignificant. These results are in line with Anderson and Braunstein (2013), Slimane (2015) and Kadiša et al. (2021), who also identified a negative FDI impact on economic growth and the employment/unemployment relationship. Reflecting on our estimation results, we can state that a higher *iFDI* level in 25 EU countries is associated with increased labour productivity more than with job creation. The negative impact of FDI on the output–employment relationship is usually related to the implementation of new technologies, which allows for increasing labour productivity without additional labour force or bankruptcies of local companies due to increased competition (Jude and Silaghi 2016; Malik 2019).

As we are analysing the *iFDI* impact on the gender-specific output–employment relationship (Figure A2), we can state that both male and female employment reaction to economic growth is weakly affected. Economic growth has a statistically significant impact on female employment growth when *iFDI* ranges between 15% of GDP to 312% of GDP, while the output–employment relationship for males is statistically significant until the *iFDI* level reaches 494% of GDP. Estimated conditional output–employment elasticities differentiated by age (Figures A1 and A2) show that *iFDI* has the highest impact on youth employment. Although in most of the analysed cases, *iFDI* decreases employment reaction to economic growth, we find that *iFDI* has a positive impact on 40–64 year old female employment reaction to economic growth, which is statistically significant when the iFDI level is higher than 55% of GDP. First of all, as it was explained by Tang and Bethencourt (2017) and Kodama et al. (2018), foreign companies more often employ women compared to local companies. Secondly, a positive *iFDI* impact on a female output–employment result can be related to a higher concentration of women in labour-intensive economic sectors or their lower salaries compared with men (Siegmann 2007; Tang and Bethencourt 2017; Sherif et al. 2022).

Table 3. Estimation results of inward FDI impact on the output–employment relationship based on Equation (2).

Age	**Total**			**15–24**			**25–39**			**40–64**		
Gender	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
ISCED	0–8											
β_1	0.4463 **	0.6157 ***	0.2459	1.6890 ***	1.6663 ***	1.7159 **	0.5965 **	0.7617 **	0.4034	0.1919	0.4021 **	−0.0834
	(0.1962)	(0.1944)	(0.2192)	(0.5510)	(0.4592)	(0.7262)	(0.2190)	(0.2114)	(0.2410)	(0.2064)	(0.1922)	(0.2537)
β_3	−0.0420	−0.0584	−0.0195	−0.2605 *	−0.2230 *	−0.3057	−0.0804 *	−0.0994 *	−0.0573	0.0070	−0.0190	0.0485
	(0.0449)	(0.0485)	(0.0468)	(0.1423)	(0.1163)	(0.1855)	(0.0517)	(0.0529)	(0.0539)	(0.0442)	(0.0449)	(0.0529)
Obs.	494	494	494	494	494	494	494	494	494	494	494	494
ISCED	0–2											
β_1	0.4251	0.9268 *	−0.3840	1.3947	1.4815	1.2084	1.7813 ***	2.3125 ***	0.7205 *	−0.1971	0.2927	−0.7971
	(0.4747)	(0.4877)	(0.4959)	(0.9433)	(0.8796)	(1.0544)	(0.4296)	(0.5285)	(0.3751)	(0.5005)	(0.4980)	(0.6065)
β_3	−0.0192	−0.0988	0.1057	−0.1323	−0.1647	−0.1446	−0.2600 *	−0.3477 **	−0.0952	0.0622	−0.0192	0.1598
	(0.1144)	(0.1208)	(0.1130)	(0.2537)	(0.2130)	(0.2469)	(0.1260)	(0.1437)	(0.0926)	(0.1003)	(0.1020)	(0.1129)
Obs.	494	494	494	494	492	460	494	494	489	494	494	494
ISCED	3–4											
β_1	0.5592 **	0.5275 **	0.6150 *	1.7275 ***	1.6180 **	1.8762 **	0.4138	0.4155	0.3924	0.4864	0.4917 *	0.4968
	(0.2639)	(0.2423)	(0.3048)	(0.5794)	(0.5925)	(0.6785)	(0.2905)	(0.2784)	(0.3314)	(0.3028)	(0.2650)	(0.3781)
β_3	−0.0734	−0.0498	−0.1068	−0.2717 *	−0.2187	−0.3424 **	−0.0523	−0.0362	−0.0733	−0.0676	−0.0522	−0.0895
	(0.0626)	(0.0572)	(0.0723)	(0.1440)	(0.1492)	(0.1571)	(0.0630)	(0.0628)	(0.0683)	(0.0745)	(0.0644)	(0.0932)
Obs.	494	494	494	494	494	494	494	494	494	494	494	494
ISCED	5–8											
β_1	0.2405	0.2922	0.1491	1.9241 *	1.7882 *	1.8124	0.5245	0.5612	0.4495	−0.1815	−0.0652	−0.3673
	(0.3096)	(0.2880)	(0.3667)	(1.0456)	(0.9177)	(1.1864)	(0.3731)	(0.3970)	(0.4342)	(0.3720)	(0.2996)	(0.4796)
β_3	−0.0360	−0.0343	−0.0237	−0.4101	−0.3890	−0.4173	−0.0942	−0.1080	−0.0728	0.0472	0.0505	0.0704
	(0.0615)	(0.0623)	(0.0700)	(0.2851)	(0.2492)	(0.3339)	(0.0675)	(0.0764)	(0.0859)	(0.0818)	(0.0675)	(0.1045)
Obs.	494	494	494	489	441	475	494	494	494	494	494	493

Note: ***, **, * show statistical significance at 1%, 5%, and 10%, levels, respectively. The HAC robust standard errors are represented in brackets.

When we analyse the impact of *iFDI* on the output–employment relationship in terms of educational attainment level (see Figures A3–A8), we find that *iFDI* has the highest negative impact on the employment of highly educated (ISCED5–8) youth. However, this impact is statistically significant when the *iFDI* level is relatively small (lower than 33% of GDP). Our estimations also show that *iFDI* decreases employment reaction to economic growth for all those who have upper secondary and post-secondary non-tertiary education regardless of gender or age. It also significantly decreases the output–employment elasticities of youth regardless of their education, meaning that the attraction of *iFDI* does not help to solve the problem of the high youth unemployment rate in European Union countries. As it was mentioned by Banerjee and Veeramani (2015), foreign companies tend to use more advanced technologies that require higher qualifications, specific skills, and experience, which young people usually do not have.

Despite a higher level of *iFDI* being associated with decreased output–employment elasticity of uneducated and highly educated young or middle-aged people, surprisingly, it tends to increase output–employment elasticity of 40–64 year old uneducated and highly educated females or highly educated males. As mentioned above, the higher demand for the uneducated 40–64 year old female labour be explained by their concentration in labour-intensive sectors that do not require special skills, their lower salaries compared with men and higher experience compared with uneducated youth. The positive impact of *iFDI* on highly 40–64 year old educated male and female employment reaction to economic growth can be explained by higher experience and special skills useful for successful foreign companies' integration, the appliance of new technologies and working methods, employee training, etc. Although our estimation results show some abilities of *iFDI* to increase output–employment elasticities of 40–64 year old uneducated and highly educated females or highly educated males, in our case, this relationship remains statistically insignificant at any level of *iFDI*.

5. Conclusions

The research on economic growth's impact on employment/unemployment has gained importance since The Great Recession and now has increased relevance due to the coronavirus crisis, the war in Ukraine and its consequences. The gender gap in employment and the low employment rate of youth is a serious problem in the European Union that requires detailed analysis. This paper aims to expand the existing literature in several ways. Differently from the other output–employment researchers, we analysed the impact of economic growth on gender-, age- and educational attainment level-specific output–employment relationship. While other researchers usually tend to analyse the impact of FDI on economic growth or employment separately, we analysed how the gender-, age- and educational attainment level-specific output–employment relationship depends on the different levels of FDI in the host country. Since other research concentrates on individual countries and we did not find any similar research considering FDI impact on gender-, age- and educational attainment level-specific output–employment relationship in the European Union, our study was designed in the context of 25 EU countries.

Our results confirm that economic growth significantly increases the employment of total, male and female employment in all age groups, regardless of their educational attainment level. Comparing the reaction of employment to the economic growth according to gender, we found higher output–employment elasticity for men, compared to the total and female employment response to economic growth. Age-specific output–employment elasticity estimations show that youth employment elasticity is higher compared to other age cohorts. Additionally, empirical results suggest that employment reaction to economic growth decreases with age. Since other output–employment research confirms the higher employment reaction to economic growth for females and for the youth cohort, our estimations are more in line with output–unemployment studies. Estimations based on the different levels of educational attainment show that the employment of uneducated young and middle-aged males or young males with secondary and upper secondary

education reacts significantly to output changes. However, economic growth has limited ability to create jobs for highly educated people.

Analysis of FDI impact on the output–employment relationship regardless of educational attainment level shows that FDI has a weak but negative impact, meaning that it reduces the employment reaction to economic growth. A relatively high level of FDI has an insignificant impact on the output–employment relationship, suggesting that a higher FDI level increases labour productivity more than employment growth. Our results also show that the employment reactions of males and females to economic growth are weakly influenced by FDI. The highest but negative impact of FDI was recorded for youth employment, meaning that the attraction of FDI does not help to solve the problem of the high youth unemployment rate in the EU. Additionally, we found little evidence of FDI increasing the employment reaction to economic growth for females older than 40 years. In terms of educational attainment, we find that FDI has the highest negative impact on the employment of highly educated youth. Although our estimations are made in the context EU, the methodology used for the estimations allows for adapting the empirical results for individual countries depending on their FDI level.

Since all the countries are different considering their economic, social, demographic, institutional and other characteristics, we can also assume that the impact of FDI on the output–employment relationship is heterogeneous across countries. Our results show that FDI impact on gender-, age- and educational attainment level-specific output–employment relationship is associated with productivity growth more than with employment growth. For that reason, we considered expanding this research by splitting the sample into two different groups of countries by their productivity growth along with sectoral distribution of FDI. The methodology used for empirical estimations allowed us to analyse how the output–employment relationship depends on one macroeconomic variable. However, in the real world, several macroeconomic characteristics could influence the output–employment relationship at the same time. The scientific literature widely discusses the institutional environment as one of the important factors affecting the heterogeneous output–employment relationship, explaining that a more rigid labour market is associated with lower employment reactions to economic fluctuations. Since there is a lack of research analysing how the output–employment relationship depends on different levels of labour market regulation and foreign direct investment level at the same time, this field remains to be explored in our future research.

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Appendix A

Table A1. Summary statistics of selected variables.

Education	Gender	Age	Mean	Min	Max	Standard Deviation
Employment Growth, Percentage Change						
ISCED 0–8	Total	15–64	0.52	−13.09	11.00	2.35
		15–24	−1.37	−29.28	58.68	7.83
		25–39	−0.28	−10.93	29.23	2.93
		40–64	1.53	−12.13	7.65	2.30
	Male	15–64	0.34	−17.18	13.34	2.67
		15–24	−1.17	−33.33	50.00	8.20
		25–39	−0.37	−14.26	27.71	3.14
		40–64	1.24	−14.71	11.09	2.55
	Female	15–64	0.76	−8.96	10.50	2.36
		15–24	−1.68	−23.83	70.91	8.74
		25–39	−0.21	−12.26	31.17	3.17
		40–64	1.95	−12.85	11.50	2.63
ISCED 0–2	Total	15–64	−2.64	−27.57	39.47	7.07
		15–24	−2.91	−57.58	75.56	14.34
		25–39	−2.87	−33.76	89.64	10.51
		40–64	−2.33	−37.50	45.61	7.99
	Male	15–64	−2.15	−31.93	48.26	7.71
		15–24	−2.57	−50.00	57.63	14.51
		25–39	−2.17	−32.20	105.92	11.62
		40–64	−1.77	−40.44	58.88	9.16
	Female	15–64	−3.14	−28.02	45.16	7.70
		15–24	−2.37	−51.85	157.14	19.54
		25–39	−3.69	−49.06	66.33	12.77
		40–64	−2.76	−42.05	65.48	9.24
ISCED 3–4	Total	15–64	0.41	−15.30	37.56	3.97
		15–24	−1.13	−32.21	38.33	8.51
		25–39	−1.29	−18.36	32.96	4.49
		40–64	2.22	−12.16	57.26	4.66
	Male	15–64	0.50	−16.92	31.51	4.03
		15–24	−0.74	−32.14	51.72	9.78
		25–39	−0.87	−19.92	33.72	4.74
		40–64	2.04	−15.71	39.78	4.43
	Female	15–64	0.31	−16.72	44.72	4.43
		15–24	−1.35	−37.78	55.40	10.22
		25–39	−1.86	−23.02	32.16	5.26
		40–64	2.54	−15.11	78.23	5.86
ISCED 5–8	Total	15–64	3.69	−41.42	69.54	6.01
		15–24	3.48	−56.67	310.17	22.68
		25–39	3.3	−36.12	71.43	6.86
		40–64	4.24	−48.81	67.86	6.41
	Male	15–64	3.17	−45.89	66.14	6.35
		15–24	4.84	−57.69	514.93	33.48
		25–39	3.10	−43.69	67.82	7.47
		40–64	3.42	−50.43	63.64	7.01

Female	15–64	4.29	−38.16	74.34	6.48
	15–24	3.09	−50.00	228.99	21.59
	25–39	3.69	−30.47	76.12	7.38
	40–64	5.27	−47.66	78.05	7.26
Inward foreign direct investment stock, % of GDP		60.89	9.16	856.30	67.86
Gross domestic product growth, percentage change		3.82	2.03	−14.84	25.18

Appendix B

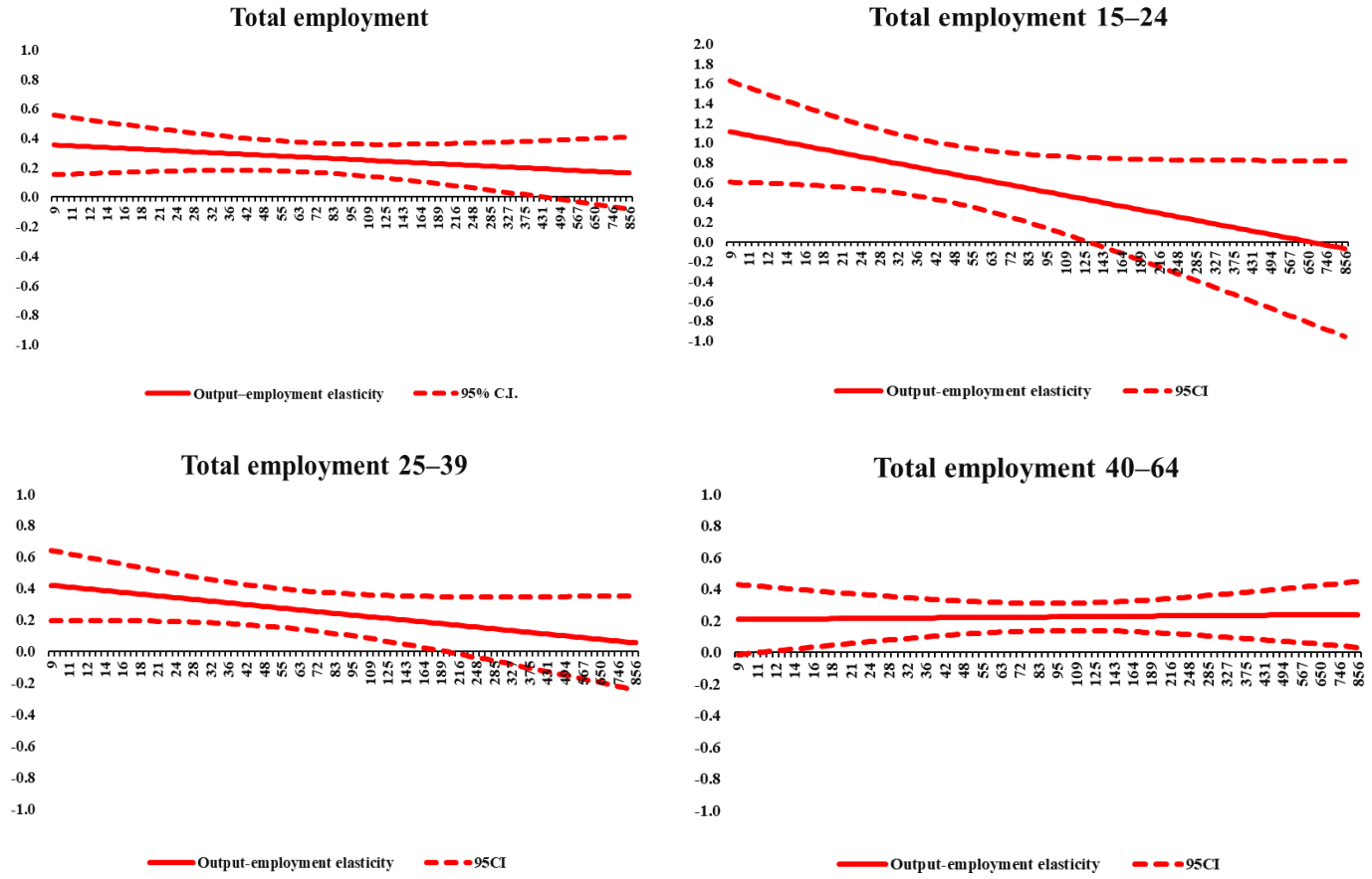
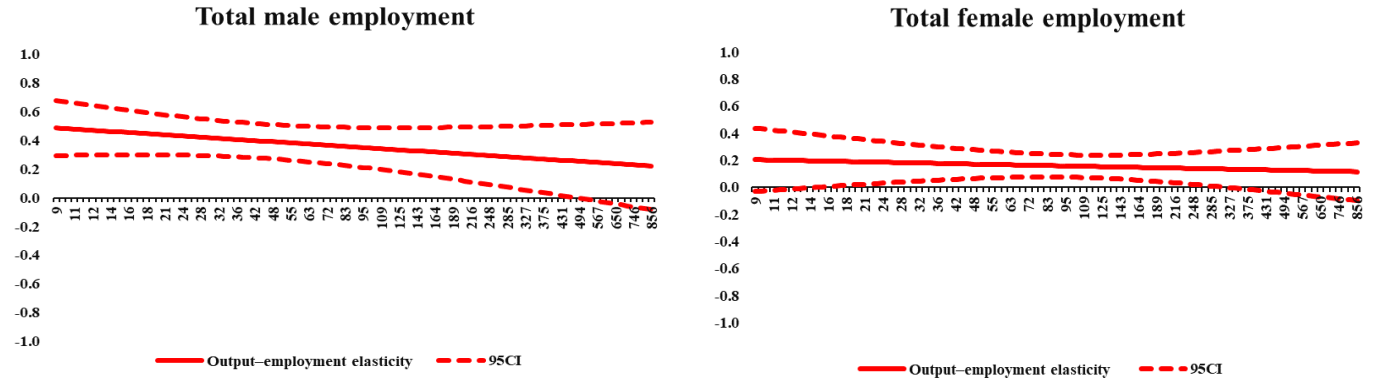


Figure A1. Inward FDI impact on age-specific output–employment relationship for all educational attainment levels combined. Note: the horizontal axis represents the iFDI level, %, vertical axis represents output–employment elasticity.



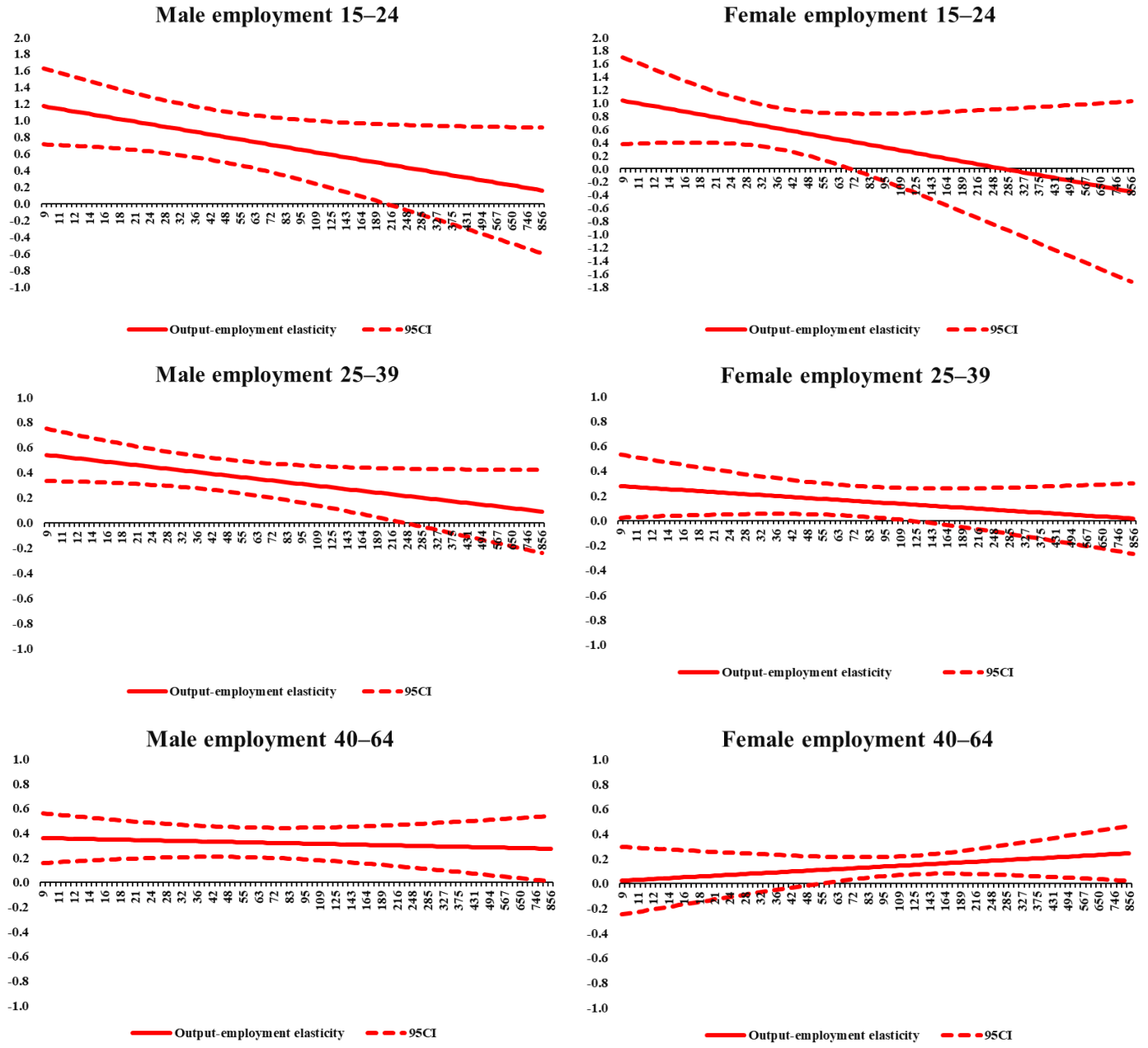


Figure A2. Inward FDI impact on gender- and age-specific output–employment relationship for all educational attainment levels combined. Note: the horizontal axis represents the iFDI level, %, vertical axis represents output–employment elasticity.

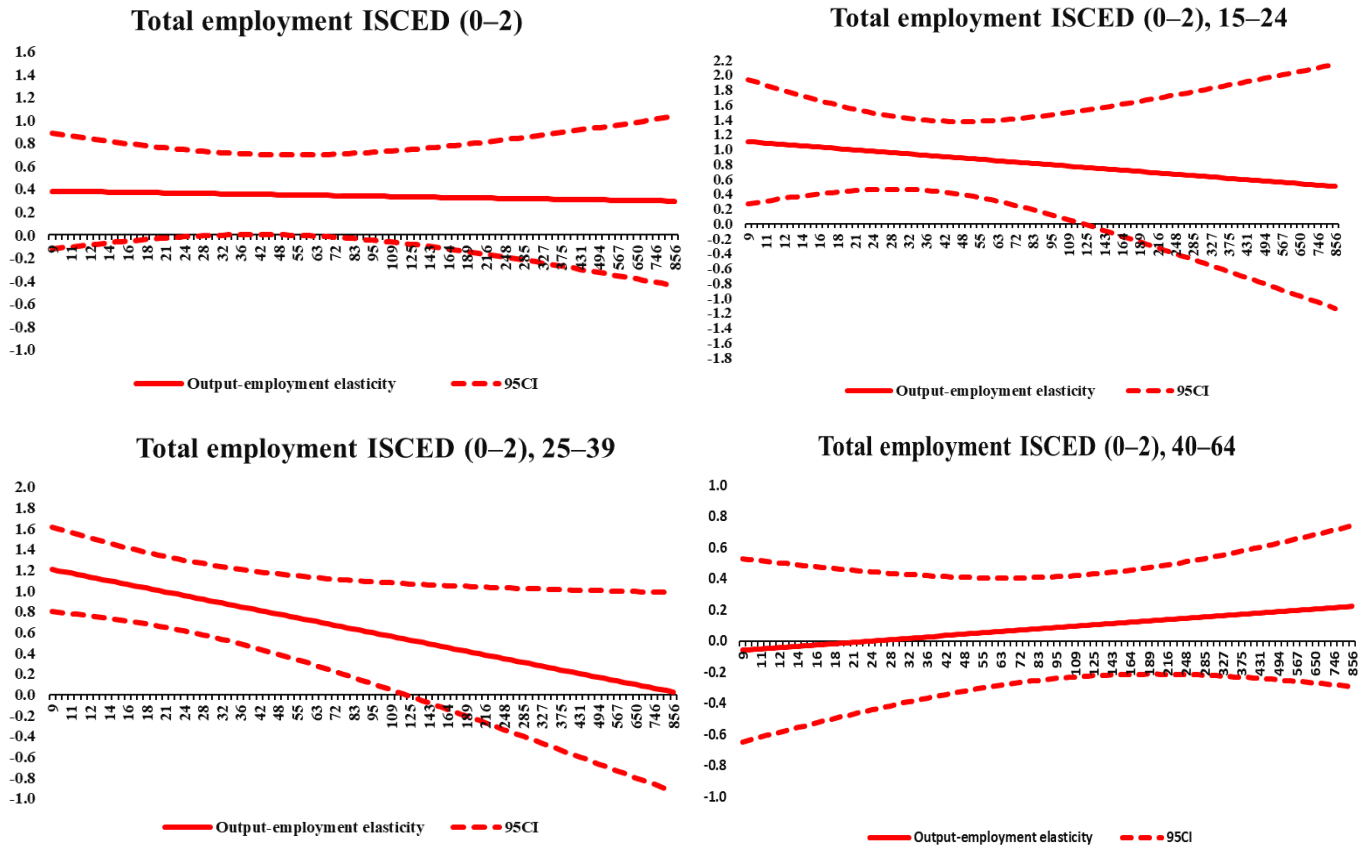
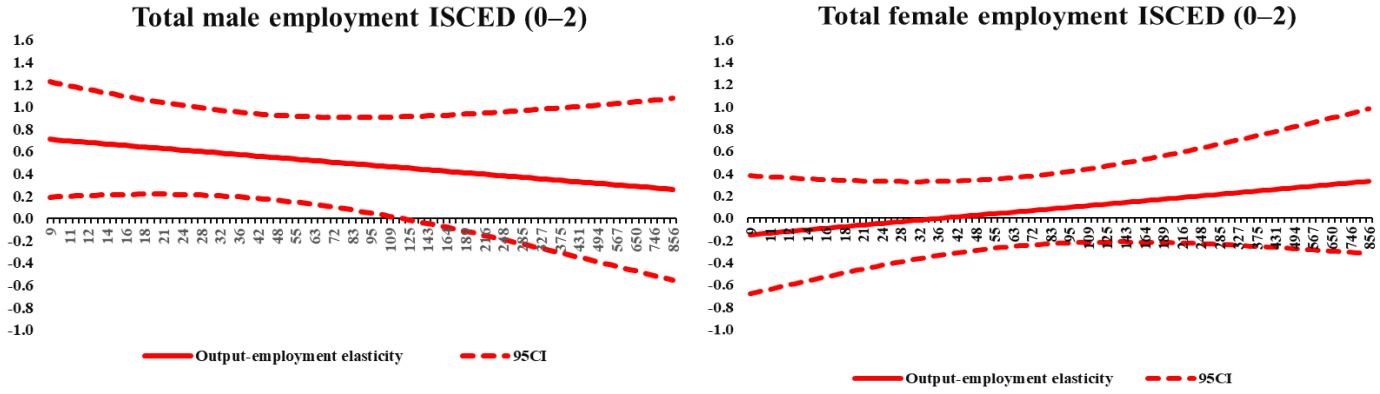


Figure A3. Inward FDI impact on age-specific output–employment relationship ISCED (0–2). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.



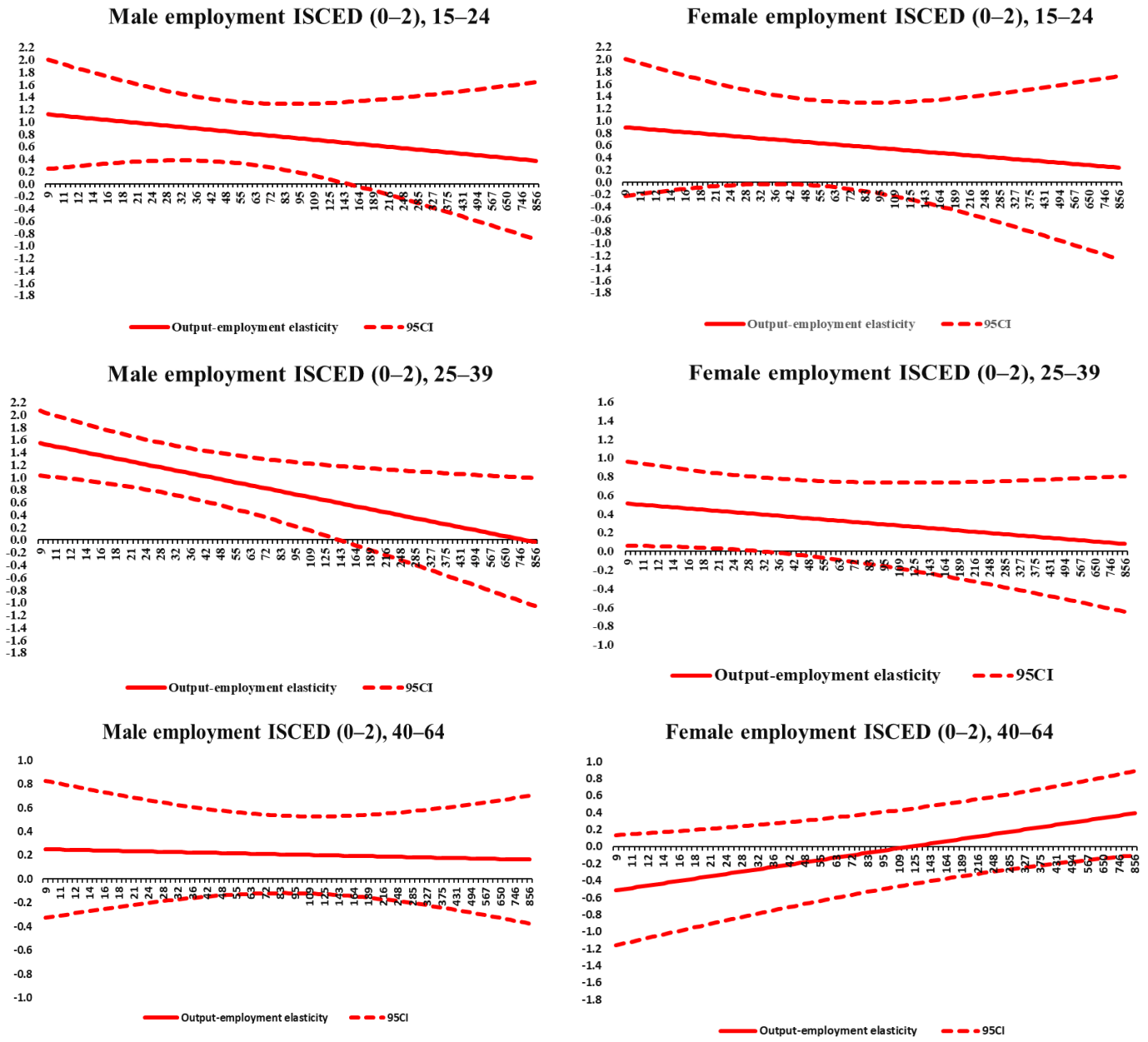
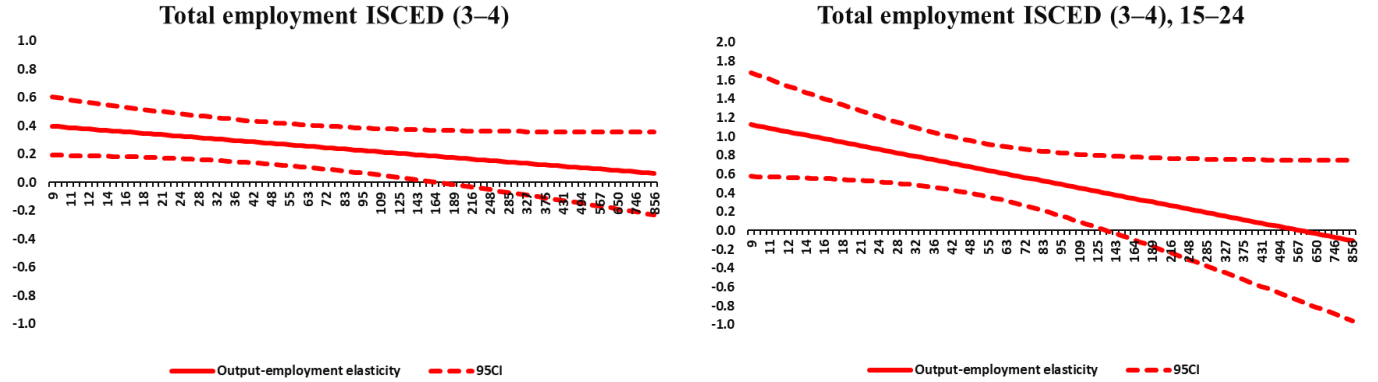


Figure A4. Inward FDI impact on gender- and age-specific output–employment relationship ISCED (0–2). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.



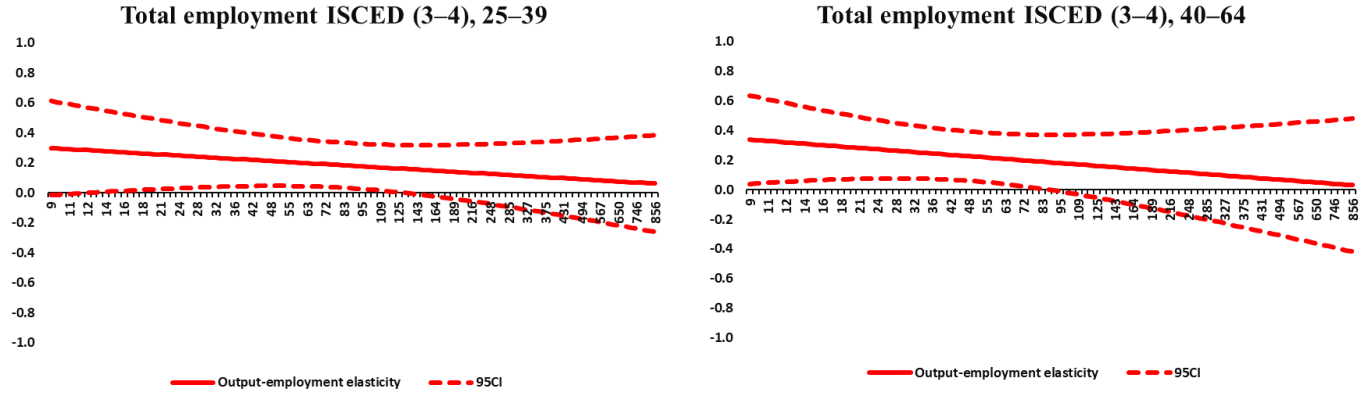
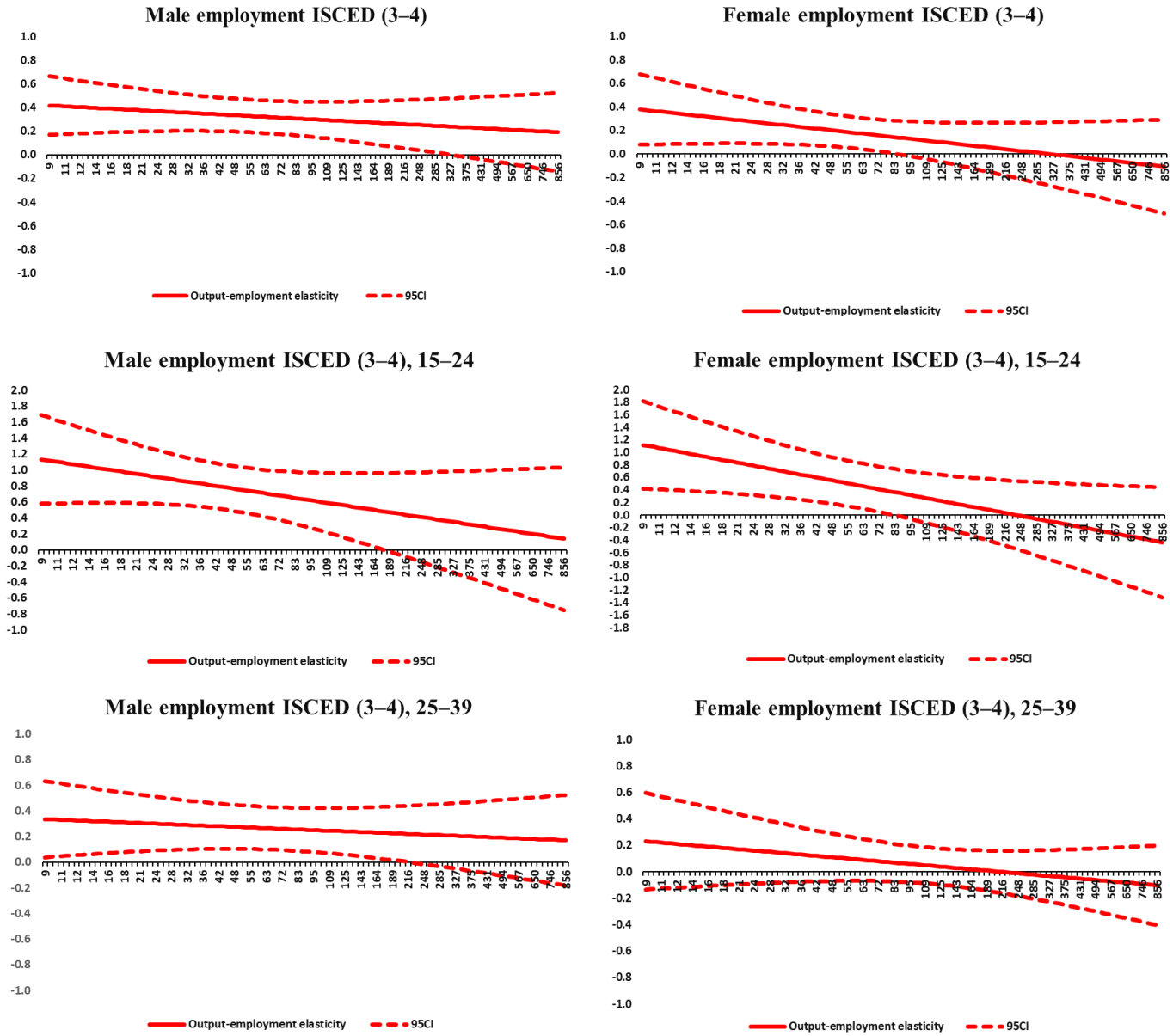
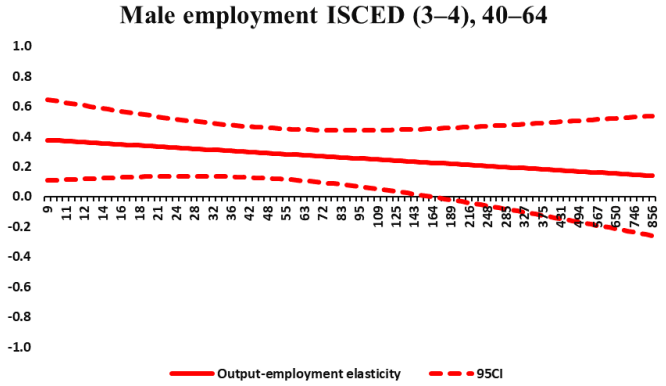


Figure A5. Inward FDI impact on age-specific output–employment relationship ISCED (3–4). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.





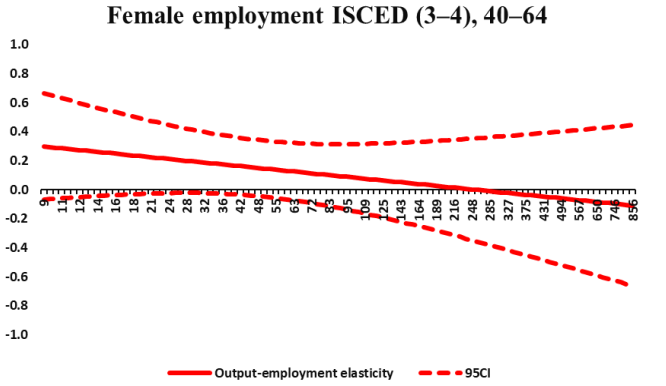
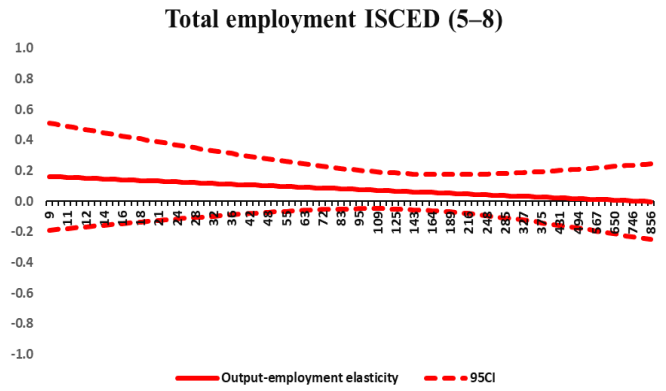
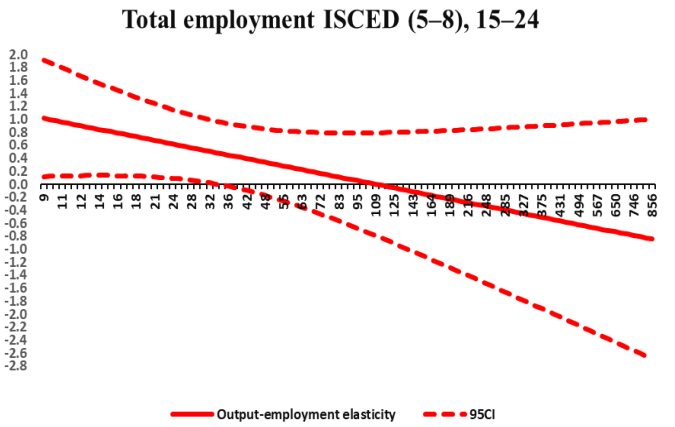
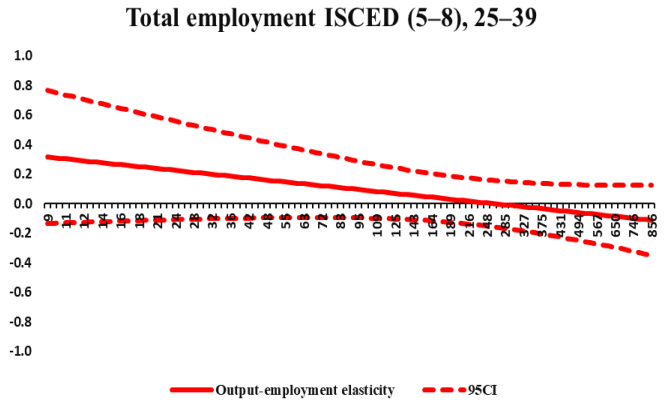


Figure A6. Inward FDI impact on gender- and age-specific output–employment relationship ISCED (3–4). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.







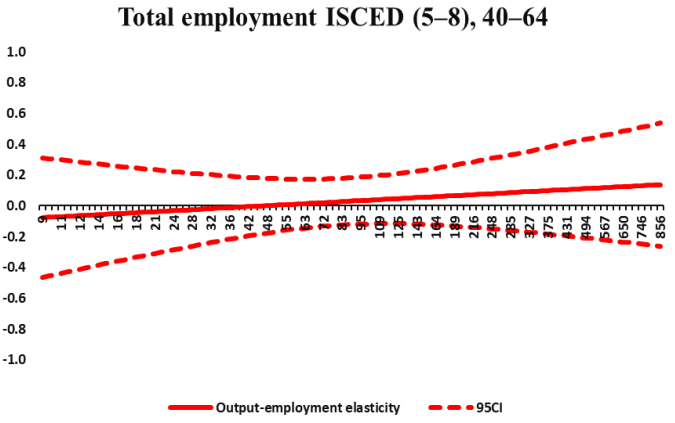


Figure A7. Inward FDI impact on age-specific output–employment relationship ISCED (5–8). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.

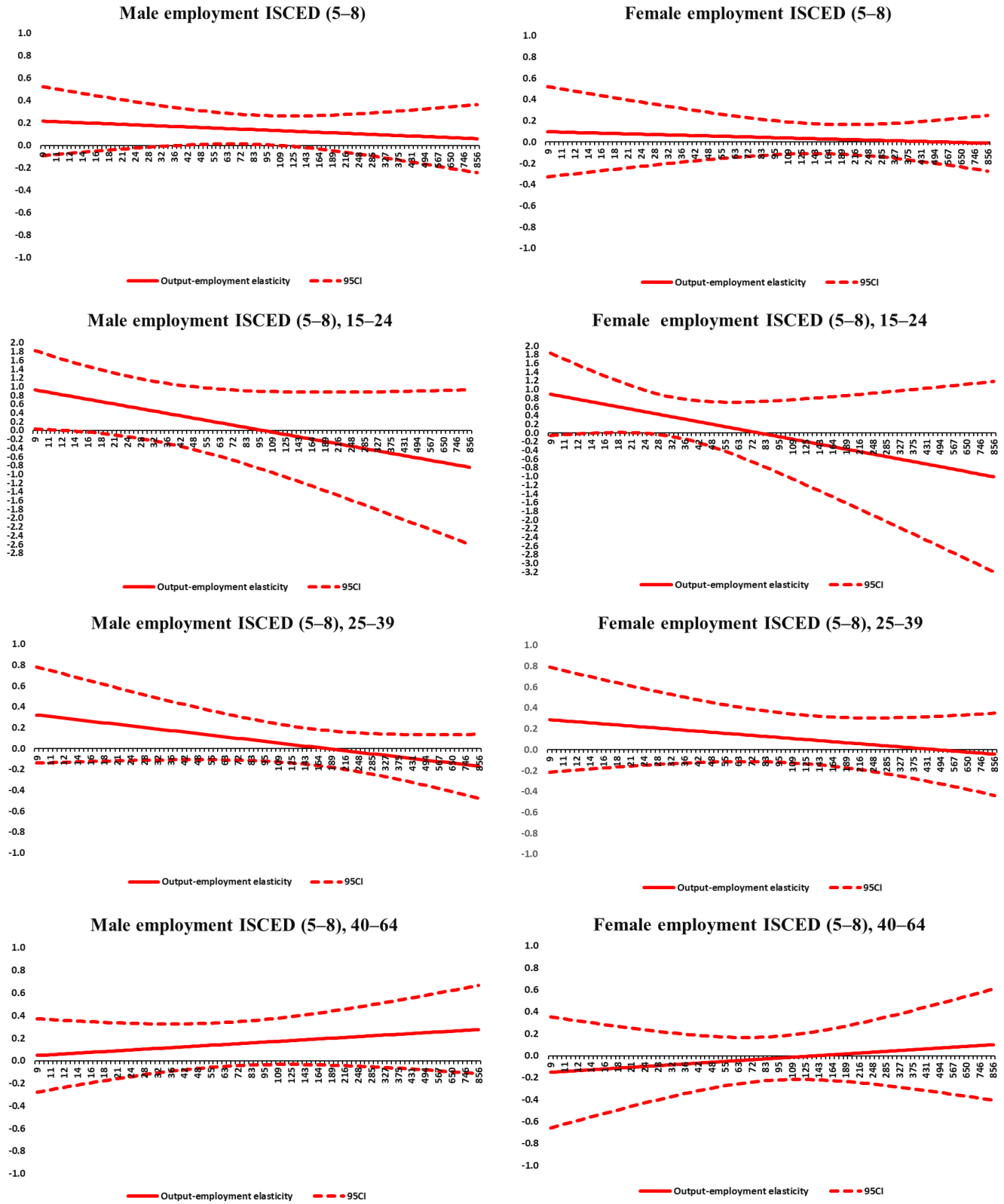


Figure A8. Inward FDI impact on gender- and age-specific output–employment relationship ISCED (5–8). Note: the horizontal axis represents the iFDI level, %, the vertical axis represents output–employment elasticity.

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