Employment Intensity of Economic Growth in Southern Europe: Evidence from Multidimensional Panel Data

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Abstract

This paper examines the employment intensity of economic growth in Southern Europe during the so-called "post-crisis" recovery years. A labor demand estimation model based on multidimensional panel data from 2010 to 2019 was utilized. Findings from our macroeconomic analysis of eight different industries refute the predictions of neoclassical labor theory in the region. The results further indicate the presence of jobless growth in the areas of overall employment, full-time employment, and overall employees. They also signal that economic growth may have created job opportunities in part-time and youth employment, and among temporary employees, rather than full-time jobs. The paper links these findings to particular characteristics of the regional labor market, discusses their

implications for understanding unemployment and formulates recommendations for future policy.

Keywords: economic growth, jobless growth, employment intensity, multidimensional panel data, Southern Europe

JEL classification: O47, J23, O52, C23

1 Introduction

Employment-related economic indicators provide powerful insights into the overall macroeconomic performance. As well as indicating the wider economy's ability to generate employment opportunities, fluctuations in variables such as unemployment or labor force participation rates also signal labor market responses to macroeconomic shocks and major institutional changes. One indicator which has received relatively little attention in the literature is the employment intensity of economic growth; in other words, the rate at which employment grows when output increases. Although empirical evidence that economic growth tends to be positively associated with employment exists, this relationship is neither automatic nor pre-determined. More precisely, not all growth is equally employment-intensive, and in some cases, the employment intensity of growth can be low and may decline despite a positive growth rate.

Despite vast literature on jobless growth, the responsiveness of employment to economic growth has been surprisingly neglected with few exceptions (Abdioglu & Albayrak, 2017; Bartosik & Mycielski, 2017; Crivelli et al., 2012; Döpke, 2001; Ghazali & Mouelhi, 2018; Kannan & Raveendran, 2009; Mkhize, 2019; Perugini, 2009; Slimane, 2015). Moreover, existing studies concentrate on the direction of the two macroeconomic variables although revealing the capability of economic growth in generating new employment opportunities and investigating the reasons behind any inability (if it exists) is at least as crucial. Determining why output growth does not consistently generate employment is a complex task

that requires careful investigation of the subject and the application of empirical methods. This may explain—despite the wide array of literature on the interaction between economic growth and labor markets—the relative scarcity of studies dealing with the employment intensity of economic growth.

To fill this gap, the present study examines whether regional characteristics related to the employment performance of economic growth can be inferred for the Southern European countries of Croatia, Cyprus, Greece, Italy, Portugal, Slovenia and Spain through a labor demand estimation model utilizing multidimensional panel data covering the 2010–2019 period, often described as the "post-crisis recovery years". In particular, our paper contributes to the literature regarding the region it focuses on, the specific characteristics of the interval (i.e., the post-crisis recovery period) covered, and the multidimensional panel data analysis we employed. To the best of our knowledge, no industry-specific analysis has yet addressed the issue from a macro perspective and no other study in the literature employs multidimensional panel data to examine employment intensity of economic growth. This methodology surpasses other empirical strategies by enabling our analysis to cover various countries and industries (in addition to the time perspective), which in return makes it possible to reach region-specific outcomes by taking into account and controlling for industry and country-specific characteristics at the same time. We analyze eight industries, including those that traditionally generate employment, such as construction and services. Unlike our approach, the few industry-level analyses in existence have not considered aggregation. In addition, although the post-Eurozone crisis has changed Southern Europe substantially, no empirical study of the employment intensity of growth in the region has been conducted: the major cause of labor market fluctuations in the region is assumed to be their rigidity.

Our analysis first compares the impact of economic growth and compensation on labor demand in Europe and Southern Europe. Focusing on data from the latter region, we then test the impact on part-time, full-time and youth employment, employees and temporary employees to determine whether these impacts vary

according to employment type. The findings challenge neoclassical labor theory yet—quite remarkably—validate the view that compensation lags behind productivity in Southern Europe. They clarify the unanticipated link between compensation and labor demand in the region and provide a basis for policy recommendations. We also find that the employment intensity of growth for overall and full-time employment, as well as employees, indicates the presence of jobless growth in the post-crisis period. Equally, however, we show that economic growth can create job opportunities in part-time, temporary and youth employment, albeit with low elasticity measures.

The remainder of the paper is structured as follows: section two presents the background and the empirical literature review, while section three describes methodological framework and data. The fourth and fifth sections present and discuss the empirical findings, respectively, with conclusions provided in the paper's final section.

2 Background and Empirical Literature

2.1 Economic Growth and Employment

The interaction between output growth and labor market can be studied using different approaches including Okun's Law and employment intensity of economic growth. Both are used extensively to investigate jobless growth or the job-creation effect of output expansion in economies. While Okun's Law examines growth and unemployment (or employment gap) interaction in magnitude (Abou Hamia, 2016; Hanusch, 2012), employment intensity of economic growth measures the extent of employment creation resulting from output growth (Mkhize, 2019; Upender, 2006). Thus, the latter approach aims to measure the magnitude of economic performance transformed into employment generation.

Theoretically, higher output is expected to result in higher employment (and lower unemployment) by expanding job opportunities. However, such a mechanism

is not always guaranteed, particularly during crises and post-crisis periods. The inability of economic growth in creating employment is known as jobless growth (Altman, 2003; Martus, 2015)—or jobless recovery— and examination of this phenomenon is essential to fully understand economic growth and labor market interactions in an economy.

The inability of economic growth to create employment may depend on various factors. In the first place, there is the Luddite theory that explains the job-destruction effect of technological progress. According to the Luddites, advancements in technology make some portion of the human labor force redundant, and thus, the human workforce is replaced with machines (Annala & Gu, 2018). Abraham (2019) points out the role of the replacement of labor with capital to explain growth without employment. That is, jobless growth occurs when economic growth induces the use of capital to a larger extent compared to labor. Such a substitution effect delinks output expansion from employment. Besides, policies that aim to increase the level of investment in economies are pivotal for employment generation because higher capital generation is affected through investments. Capital-intensive goods are also subject to international trade, and globalization can, accordingly, be counted as another factor that influences employment creation of output growth. Jaimovich and Siu (2012) also attribute a central role to technological progress in creating economic growth without employment. Their study considers the skill structure of jobs and accentuates the replacement of middle-skill jobs as a result of technological advancement to explain jobless growth (cited in Graetz & Michaels, 2017).

Another argument for the existence of jobless growth asserts that it appears during the development phase of economies. Lewis' (1954) two-sector model explains that the emergence of a newly developing sector attracts surplus labor from the traditional sector. Because the newly developing sector is capital intensive, the contribution of labor to output is of lower magnitude compared to the traditional sector. In addition to this, employment in the traditional sector declines. Thus, developing economies may experience jobless growth during their structural

transformation periods (Abraham, 2019; Bhalotra, 1998). Bhalotra (1998), examining Indian manufacturing industry in his study, considers job security provisions, unregistered employment, and rising wages among the reasons for jobless growth. Wolnicki et al. (2006) count higher economic convergence and higher mobility of workers among the main reasons for jobless growth. According to Martus (2015), jobless growth occurs because of two reasons. First, as an issue regarding the organization of work, rising innovation practices of firms may result in economic growth that does not generate employment. Martus (2015) sums up structural processes that consist of various factors related to macroeconomic policy as the second reason that leads to jobless growth. The study also affirms how skills mismatch affects jobless growth concerning the two reasons he mentions. In his following work, Martus (2016) also demonstrates that the 2001 recession altered the way jobless growth takes place, i.e., while it used to be cyclical before the recession, it has been structural ever since.

Acknowledging the essence of seeking jobless growth in an economy, focusing solely on the direction of the relationship between the two macroeconomic variables may result in neglecting how sensitive employment is to economic growth. In other words, employment intensity serves as the employment elasticity of economic growth (Kannan & Raveendran, 2009; Mkhize, 2019; Upender, 2006). Such a focus in studies also examines the reasons for either low or negative link between growth and employment, enabling a full examination of the matter from various perspectives. Accordingly, not only the theoretical relationship is validated, but also the strength of the link between output expansion and newly created employment opportunities and the reasons behind are examined using such an approach. Employment intensity of economic growth can be modeled using a labor demand model that is derived using different mathematical settings, including Constant Elasticity of Substitution (CES) and Cobb-Douglas production functions at the macro level (Akkemik, 2007; Mkhize, 2019; Onaran, 2008; Upender, 2006). The current study utilizes the Cobb-Douglas production

function-based labor demand model in its empirical strategy and provides further explanations on the setting of the empirical analysis in section 3.

2.2 Empirical Literature

Employment intensity of economic growth serves as an important proxy to reflect the ability of output growth to generate new jobs, and thus helps to understand why employment often lags behind growth. The topic attracts interest in literature but there is still room for further research as the empirical studies remain limited in number.

Among the previous empirical work, Bhalotra (1998) and Kannan and Raveendran (2009) examine jobless growth in India by focusing on the manufacturing industry. Bhalotra (1998) uses a panel of 18 disaggregated industries in 15 states in India to investigate the relevant relationship between 1978 and 1987. Employing panel data econometrics methodology, the study finds that raising output results in higher capital, whereas it does not support employment (measured in hours). Kannan and Raveendran (2009) also examine jobless growth in Indian manufacturing by covering a more recent period, from 1981 to 2005. The study tests the presence of jobless growth in various sub-industries and provides empirical evidence that while growth is employment-generating in some of the industries, it is not in others. Like Bhalotra (1998), Kannan and Raveendran (2009) also conclude that output expansion results in higher capital, whereas it does not generate employment in Indian manufacturing. One major distinction between these two studies is that the latter measures the extent of employment-creation of output growth, i.e., employment elasticity, in the relevant industry. Martus (2016) investigates jobless growth in the U.S. between 2001 and 2014 using quarterly data and finds out that it stands as a fundamental issue for the nation. The study also reveals that structural factors have a major impact on employment and economic growth.

Other studies that examine employment intensity of economic growth are Bartosik and Mycielski (2017), Döpke (2001), Slimane (2015), Crivelli et al.

(2012), Perugini (2009), Ghazali and Mouelhi (2018), Mkhize (2019), and Abdioğlu and Albayrak (2017). Bartosik and Mycielski (2017) suggest a positive relationship between the adoption of temporary contracts and the employment elasticity of growth in Poland, finding that the employment elasticity decreased while the share of temporary contracts increased. Döpke (2001) finds that the wage-setting process, the share of the service sector, and labor market flexibility are the key factors that affect employment intensity of growth. Varying estimates across countries in Slimane's (2015) work reveal that employment elasticities tend to be higher in more advanced and closed countries and that they increase as urbanization level and the share of the services sector in the economy increase. Crivelli et al. (2012) evaluate the influence of macroeconomic policies on employment elasticity for a selected group of 167 countries and find that there is a significant and positive relationship between the two. For the period between 1970 and 2004, estimates made by Perugini (2009) validate economic growth coupled with employment since the mid-1990s in Italy after a period of jobless growth. Working with Tunisian sectoral data, Ghazali and Mouelhi (2018) find low-productive sectors to be high- and increasingly-employment intensive. Mkhize (2019) investigates the employment intensity of growth in eight different sectors in South Africa, excluding the agricultural industry. Employing cointegration analysis and OLS methodology, the study covers the years from 2000 to 2012 quarterly and confirms jobless growth in South Africa for the time period examined. Abdioğlu and Albayrak (2017) question the existence of jobless growth in Turkey between 1988–2015 and estimate employment elasticities for various industries including agriculture, manufacturing, transportation, construction, etc., as well as the whole economy. Empirical findings from the OLS estimations show that the employment generation capacity of output growth is positive yet low in most of the sectors in Turkey during the examined period.

A close look at the empirical literature shows that the existing studies either concentrate on a country, a group of countries or a specific industry. However, jobless growth may prevail in a certain economy and/or a certain industry

which implies that analyses focusing on one of these dimensions may fail in fully grasping the phenomenon in all its forms in an economy. While industry-level analyses cannot utterly reflect the employment-creation impact of output growth, aggregate-level analyses remain insufficient to show how industry-specific characteristics are crucial on the matter. Multidimensional panel data methodology can overcome all these issues by including more than two dimensions. Adopting this methodology in line with the main aim of this paper, we use countries (Southern Europe), various industries (eight) and the time period (2010–2019) to reach region-specific outcomes by taking into account and controlling for industry and country-specific characteristics at the same time. Despite the strength of the methodology, no study in the empirical literature, to the best of our knowledge, employs multidimensional panel data to investigate employment intensity of economic growth. Only Yerdelen Tatoğlu and İçen (2019) employ this methodology to investigate the relationship between unemployment and output growth to test the validity of Okun's Law in European regions at the NUTS2 level from 2008 to 2016 using annual data where the authors confirm the relevant law in all countries with diversified Okun's coefficients in the region.

This study stands out from the existing literature with its aim to fill multiple gaps in terms of the region it selects, the post-crisis period it covers, and by including various economies and industries at the same time, while utilizing a unique methodology (multidimensional panel data). The study is also a first in that it differentiates employment types in its empirical model into overall, full-time, part-time, and youth employment, in addition to temporary and overall employees, concentrating on a region with economies facing difficulties in their labor markets.

3 Methodology and Data

3.1 Labor Demand Model Extended to Multidimensional (3D) Panel Data

We use a multidimensional (three-dimensional – 3D) panel data model with two unit-dimensions and one-time section.

The general form of 3D models is presented in Eq. 1 (Yerdelen Tatoğlu, 2020):

$$Y_{ijt}=\alpha+\beta X_{ijt}+\mu_i+\gamma_j+\delta_t+u_{ijt}\,,\ i=1,\ldots,\ N;\ j=1,\ldots,\ M;\ t=1,\ldots,\ T \tag{1}$$

where i and j are the unit-dimensions and t is the time-dimension. Therefore, μ_i and γ_j denote unit specific and δ_t denotes time-specific effects. u_{ijt} is the error term. Eq. 1 can be differentiated according to the significance of unit and time-dimensions from the LR test.

We use a Cobb-Douglas production function-based labor demand model (Onaran, 2008) to examine the employment intensity of economic growth and we augment the model into a 3D form as presented in Eq. 2:

$$lnL_{ijt}=\beta_0+\beta_1 lnGVA_{ijt}+\beta_2 lnCOM_{ijt}+\beta_3 lnEXP_{ijt}+\mu_i+\gamma_j+\delta_t+u_{ijt} \tag{2}$$

where L is labor demand, GVA is gross value added as a measure for output, and COM is compensation. EXP is exports and it serves as a control variable in the model. i and j represent country and industry, respectively, and t denotes time. Therefore, μ_i, γ_j, and δ_t denote the country, industry, and time-specific effects, respectively and u_{ijt} is the error term. All the variables are in natural logarithms. Theoretically, output (gross value added) affects labor demand positively, while wages (compensation) affect labor demand negatively. In addition, the impact of exports on labor demand is expected to be positive.

Table 1: *Chi-square values (from LR-test vs. linear model)*

Model Effects:	**No Control Var.**				**With Control Var.**			
	Country, Industry, Time	***Country***	***Industry***	***Year***	***Country, Industry, Time***	***Country***	***Industry***	***Year***
Employment (Europe)	3356.63***	1023.92***	826.35***	0.00	1320.56***	492.82***	426.58***	0.00
Employment (SE)	818.63***	58.50***	671.92***	0.00	382.04***	110.21***	291.92***	0.00
PT Emp. (SE)	655.51***	16.73***	619.52***	0.00	300.34***	78.76***	279.72***	0.00
FT Emp. (SE)	802.37***	61.33***	630.99***	9.1e-13	348.80***	96.58***	257.76 ***	2.3e-13
Temp. Employees (SE)	788.53***	58.08***	417.90***	2.3e-13	314.26***	84.95***	104.98***	0.00
Employees (SE)	591.10***	61.90***	385.82***	2.3e-13	241.25***	98.30***	101.06***	4.0e-13
Youth Em. (SE)	868.72***	37.58***	706.34***	0.00	254.77***	25.20***	192.80***	0.00

Notes: *, **, *** indicate significance of effects at the 0.05, 0.01 and 0.001 levels, respectively. SE stands for Sothern Europe.

Source: Authors' own calculations.

We use various types of labor demand in our study. Thus, the variable L is differentiated into overall employment, part-time employment, full-time employment, and youth employment in addition to temporary and overall employees.

Following Yerdelen Tatoğlu (2020) and Matyas (1997), we analyzed multidimensional (3D) panel data (fixed and random effects) using a nested model with two unit-dimensions (country and industry) and one time dimension (annual). If unit dimensions are related to each other, the estimations may be biased in nested models. To avoid such a bias, we use the specification in Eq. 3, which differs from Eq. 2 in that the country and industry-specific effects are nested as shown by η_{ij} (Balazsi et al., 2018; Yerdelen Tatoğlu, 2020).

$$lnL_{ijt}=\beta_0+\beta_1 lnGVA_{ijt}+\beta_2 lnCOM_{ijt}+\beta_3 lnEXP_{ijt}+\eta_{ij}+\delta_t+u_{ijt} \quad (3)$$

As a next step, we tested for country, industry, and time-specific effects by comparing the LR test with the linear model (see Table 1) before estimating the fixed and random effects.

The findings from the LR test in Table 1 show that only country and industry-specific effects are significant, while the time-specific effects are insignificant. Accordingly, the model we utilize in this study is a 3D panel data with two-way effects (country and industry) and takes its final form in Eq. 4:

$$lnL_{ijt}=\beta_0+\beta_1 lnGVA_{ijt}+\beta_2 lnCOM_{ijt}+\beta_3 lnEXP_{ijt}+\eta_{ij}+u_{ijt} \quad (4)$$

We then estimate the model in Eq. 4 using fixed effects (FE) and random effects (RE). To use the within-group estimator of the FE model, a transformation is necessary to eliminate individual fixed effects from country and industry dimensions.

$$y_{ijt}=x'_{ijt}\beta+\gamma_{ij}+\varepsilon_{ijt} \quad (5)$$

$$\widetilde{y_{ijt}}=y_{ijt}-\overline{y_{ij}} \quad (6)$$

Eq. 5 shows the general form of the model specification for FE panel data model extended to a multidimensional setup and Eq. 6 shows the within transformation (Balazsi et al., 2017). Constant terms are dropped from FE models upon transformation. For RE models, the maximum likelihood estimator (MLE) is utilized. Because the Hausman test cannot be used in multidimensional panel data models, findings from both FE and RE estimates are generated and the coefficients are compared. If the coefficient values are very close to each other, this means the difference in coefficients is systematic. Therefore, RE estimates should be interpreted. Otherwise, the difference in coefficients is accepted to be systematic; thus, FE estimates should be chosen for interpretation (Yerdelen Tatoğlu, 2020).

3.2 Data

We examine the employment intensity of economic growth in Southern Europe[1]: Cyprus, Croatia, Greece, Italy, Portugal, Slovenia, and Spain over the 2010–2019 period.

We deflated the *lnGVA*, *lnCOM* and *lnEXP* (expressed in million euros) series using price index – implicit deflators. Employment (*lnEMP*), part-time employment (*lnEMP_PT*), full-time employment (*lnEMP_FT*), temporary employees (*lnEMPE_TEMP*), overall employees (*lnEMPE*), and youth employment (*lnEMP_Y*) are in thousand persons. For all the series, we used industry-level data extracted from the NACE Rev.2 A10 aggregation (European Commission, 2008). Due to the unavailability of some records, the study includes eight industries[2]. All variables are expressed in natural logarithms and the data were gathered from Eurostat (2022). Table 2 below summarizes the relevant statistics for each country.

1 Based on the ILO definition.

2 A. Agriculture, forestry, and fishing; C. Manufacturing; F. Construction; G+H+I. Wholesale and retail trade + transportation and storage + accommodation and food service activities; J. Information and communication; K. Financial and insurance activities; L. Real estate activities and M.+N. Professional, scientific and technical activities + administrative and support service activities.

Table 2: *Summary statistics by countries, Southern Europe, 2010–2019.*

Variable	Name	Obs.	Country Means						
			Greece	*Spain*	*Croatia*	*Italy*	*Cyprus*	*Portugal*	*Slovenia*
lnEMP	Employment	461	4.78	5.96	4.40	6.12	2.97	5.28	3.86
lnEMP_PT	PT Emp.	551	2.39	4.43	1.36	4.89	0.77	3.03	1.45
lnEMP_FT	FT-Emp.	465	4.76	5.89	4.29	5.96	2.82	5.12	3.73
lnEMPE_TEMP	Temp. Employees	513	2.61	4.91	2.60	4.65	0.62	3.69	1.88
lnEMPE	Employees	491	4.55	5.80	4.08	5.81	2.69	5.11	3.45
lnEMP_Y	Youth Emp.	469	2.29	3.61	2.14	3.82	0.82	3.12	1.50
lnGVA	G. Value Added	560	9.29	11.19	8.02	11.63	7.11	9.33	7.82
lnCOM	Compensation	560	7.63	10.08	6.97	9.90	5.93	8.26	6.79
lnEXP	Exports-EU	293	4.54	6.88	3.97	7.52	3.00	5.07	4.68

Source: Authors' own calculations.

4 Empirical Findings

Empirical findings from the multidimensional panel data model are presented in Tables 3, 4, 5, and 6. All the tables provide estimates for employment intensity of economic growth, as well as compensation and intra-EU exports. To empirically demonstrate that the Southern European economies display a particular characteristic, Table 3 compares the findings for the mentioned region to those for Europe, while Tables 4, 5, and 6 provide estimates specifically for the region of Southern Europe. Table 4 presents findings for part-time and full-time employment, Table 5 provides estimates for temporary and overall employees and Table 6 shows empirical findings for youth employment. All the tables include findings with FE and RE estimators. Because the differences in coefficients are systematic, FE estimates in all the findings are selected over RE estimations.

Labor demand theory holds that demand is positively associated both with real GVA and exports, while its relationship with real compensation is negative, as presented in Table 3. However, the results of our analysis challenge these expectations in two ways. First, an increase in compensation is associated with a rise in employment during the period in both Europe and Southern Europe, where the significance and magnitude of the estimated parameters were similar. Second, while the increase in GVA resulted in lower employment in both regions, the decrease was significant (i.e., a 1 percent increase in GVA results in a 0.102 percent drop in employment) in Europe, whereas such fluctuations did not affect the level of employment significantly in the continent's southern nations. These findings in Table 3 clearly show that the employment intensity of economic growth in Southern Europe shows a different pattern compared to that in Europe. Lastly, the impact of intra-EU exports on employment is estimated to be positive in both regions, but the magnitude of this impact was higher in Southern Europe as shown in Table 3.

Table 3: *Empirical Findings: Employment, Europe vs. Southern Europe, 2010–2019*

lnEMP	**Europe**				**Southern Europe**			
	FE-1	***RE-1***	***FE-2***	***RE-2***	***FE-1***	***RE-1***	***FE-2***	***RE-2***
lnGVA	-0.102***	0.194***	-0.131***	0.107**	-0.0462	0.311***	-0.0547	0.187**
	[0.0278]	[0.0235]	[0.0366]	[0.0336]	[0.0468]	[0.0490]	[0.0583]	[0.0582]
lnCOM	0.823***	0.560***	0.673***	0.615***	0.871***	0.523***	0.627***	0.603***
	[0.0252]	[0.0218]	[0.0376]	[0.0315]	[0.0400]	[0.0436]	[0.0610]	[0.0598]
lnEXP			0.127***	0.0496***			0.246***	0.0915***
			[0.0155]	[0.0119]			[0.0296]	[0.0260]
Constant		-1.285***		-1.149***		-1.959***		-1.899***
		[0.280]		[0.315]		[0.435]		[0.512]
N	1766	1766	959	959	461	461	244	244
r2_adj.	0.578		0.553		0.646		0.672	
p-value	0	0	2.08e-167	4.68e-229	1.38e-104	1.83e-114	9.64e-59	7.83e-85

Notes: Dependent variable is natural log. of employment. Standard errors in brackets. *, **, *** denote 0.05, 0.01, and 0.001 significance levels, respectively. *p*-values indicate probability values of F-test in FE models and of Wald test (chi-square) in RE models. FE models do not include constant parameters due to mean differencing. FE estimates are selected over RE estimates for interpretation, as the difference in coefficients is systematic.

Source: Authors' own calculations.

Table 4: *Empirical Findings: Part-Time vs. Full-Time Employment, Southern Europe, 2010–2019*

Dep.Var.s:	**lnEMP_PT (Part-time employment)**				**lnEMP_FT (Full-time employment)**			
	FE-1	***RE-1***	***FE-2***	***RE-2***	***FE-1***	***RE-1***	***FE-2***	***RE-2***
lnGVA	0.263***	0.0385	0.131	-0.236	-0.0427	0.343***	-0.0426	0.255***
	[0.0655]	[0.106]	[0.0830]	[0.133]	[0.0446]	[0.0466]	[0.0558]	[0.0567]
lnCOM	0.585***	0.331***	0.357***	0.494***	0.909***	0.537***	0.687***	0.608***
	[0.0543]	[0.0778]	[0.0848]	[0.124]	[0.0380]	[0.0413]	[0.0584]	[0.0591]
lnEXP			0.322***	0.179***			0.220***	0.0708**
			[0.0406]	[0.0538]			[0.0283]	[0.0259]
Constant		-0.346		-0.0154		-2.472***		-2.576***
		[1.014]		[1.258]		[0.417]		[0.478]
N	551	551	288	288	465	465	247	247
r2_adj.	0.476		0.543		0.689		0.706	
p-value	2.90e-78	0.00000207	6.99e-49	1.14e-118	1.73e-118	5.73e-138	3.76e-65	6.90e-102

Notes: Standard errors in brackets. *, **, *** denote 0.05, 0.01, and 0.001 significance levels, respectively. *p*-values indicate probability values of F-test in FE models and of Wald test (chi-square) in RE models. FE models do not include constant parameters due to mean differencing. FE estimates are selected over RE estimates for interpretation, as the difference in coefficients is systematic.

Source: Authors' own calculations.

Next, estimates were made for Southern Europe to determine whether the impact of economic growth on labor demand varied by employment type. As shown in Table 4, we found that GVA produced differing effects on part-time and full-time employment, with an increase in GVA leading to a rise in the former but not the latter. These findings show that output expansion generates part-time jobs, while the same is not true for full-time jobs. However, the intensity of growth in part-time employment was low in magnitude: a 1 percent rise in GVA yielded only a 0.263 percent increase in part-time employment. Compensation increased both part-time and full-time employment, as well as overall employment. In both models, intra-EU exports are estimated to have exerted a significant positive effect.

Table 5 presents findings that compare employment types differentiated into temporary and overall employees. Similar to the findings obtained from the estimates of the part-time model, the impact of growth on temporary employees is estimated as significantly positive, yet low in magnitude. However, the value-added parameter in this model exerted stronger effects than in the part-time employment model: a 1 percent increase in GVA produces a 0.468 percent increase in temporary employees. Table 5 also shows that higher GVA was associated with declining overall numbers of employees during the period. Accordingly, these findings reveal that while output expansion can generate temporary employees, it results in a decline in overall employees. Table 5 also shows that temporary employees increased as a result of compensations and intra-EU exports. Thus, the effects of compensation and exports on temporary employees are in line with the findings from previous estimates.

Table 5: *Empirical findings: Southern Europe, temporary employees vs. employees, 2010–2019*

Dep.Var.s:	**lnEMPE_TEMP (Temporary employees)**				**lnEMPE (Employees)**			
	FE-1	***RE-1***	***FE-2***	***RE-2***	***FE-1***	***RE-1***	***FE-2***	***RE-2***
lnGVA	0.468***	0.703***	0.209**	0.515***	-0.127***	0.108**	-0.161***	-0.00513
	[0.0613]	[0.0772]	[0.0721]	[0.106]	[0.0332]	[0.0420]	[0.0374]	[0.0488]
lnCOM	0.480***	0.121**	0.437***	0.0364	1.060***	0.674***	0.991***	0.719***
	[0.0579]	[0.0446]	[0.0676]	[0.0570]	[0.0284]	[0.0368]	[0.0378]	[0.0462]
lnEXP			0.290***	0.148***			0.139***	0.0811***
			[0.0316]	[0.0397]			[0.0179]	[0.0201]
Constant		-4.584***		-2.936**		-1.672***		-1.415***
		[0.755]		[0.894]		[0.365]		[0.420]
N	513	513	271	271	491	491	265	265
r2_adj.	0.551		0.661		0.845		0.884	
p-value	4.86e-90	3.20e-35	2.35e-63	1.13e-17	5.37e-199	4.57e-148	8.94e-123	1.31e-115

Notes: Standard errors in brackets. *, **, *** denote 0.05, 0.01, and 0.001 significance levels, respectively. *p*-values indicate probability values of F-test in FE models and of Wald test (chi-square) in RE models. FE models do not include constant parameter, due to mean differencing. FE estimates are selected over RE estimates for interpretation, as the difference in coefficients is systematic.

Source: Authors' own calculations.

Table 6: *Empirical findings: Southern Europe, youth employment, 2010–2019*

Dep. Var.:	lnEMP_Y (Youth employment)			
	FE-1	***RE-1***	***FE-2***	***RE-2***
lnGVA	0.547***	0.836***	0.431***	0.737***
	[0.0583]	[0.0584]	[0.0727]	[0.0807]
lnCOM	0.221***	-0.0499	0.0952	-0.0208
	[0.0550]	[0.0372]	[0.0685]	[0.0539]
lnEXP			0.261***	0.0384
			[0.0327]	[0.0399]
Constant		-5.194***		-4.744***
		[0.629]		[0.664]
N	469	469	242	242
r2_adj.	0.504		0.610	
p-value	3.46e-72	1.99e-63	2.97e-49	7.51e-43

Notes: Standard errors in brackets. *, **, *** denote 0.05, 0.01, and 0.001 significance levels, respectively. *p*-values indicate probability values of F-test in FE models and of Wald test (chi-square) in RE models. FE models do not include constant parameters due to mean differencing. FE estimates are selected over RE estimates for interpretation, as the difference in coefficients is systematic.

Source: Authors' own calculations.

Table 6 presents findings from the final model that includes findings for youth employment, indicating that higher GVA was related to higher youth employment. Even though the employment elasticity of growth was not high, it remained higher than in the estimated models including part-time employment and temporary employees. A 1 percent increase in GVA yielded a 0.547 percent rise in youth employment, which was also positively impacted by compensations and intra-EU exports.

The findings of this study reveal crucial matters in its examination of employment intensity of economic growth in Southern Europe between 2010 and 2019 – also known as the post-crisis recovery period. The findings from the FE estimates show that economic growth (proxied by GVA) can successfully generate part-time jobs, temporary employees, and youth employment, rather than full-time jobs, overall employees, and total employment. These findings clearly show that output generation supports more vulnerable types of employment. In addition to these, GVA growth results in a decline in total employment in Europe,

whereas GVA growth does not affect total employment in Southern Europe. Thus, the responsiveness of employment to GVA shows a particular characteristic in the region of interest. Moreover, the findings exert some challenges for the compensation parameter by showing contradictions to the labor demand model of neo-classical theory. Accordingly, the next section provides a discussion on the matter.

5 Discussion

The main challenge to interpreting the results lies in the positive direction of the relationship between labor demand and compensation on the one hand, and its negative association with value added on the other. While these findings were unexpected, their robustness can be explained by taking a microeconomic perspective that reveals the assumptions related to labor markets and how they shaped the analysis. In other words, both contradictions can be explained by considering market-related characteristics, unobserved demand shocks, and the skill structure of labor and productivity issues. Conversely, the macroeconomic perspective suggests that higher labor income implies higher labor costs, while also raising aggregate demand and increasing employment due to the positive effects of consumption.

Simply put, a firm will employ more workers until the marginal product of the last hire equals the going wage rate. On the other hand, demand for labor increases if the productivity per unit of the labor force (at given wage levels) also grows, since the increase in production will raise firms' profits. This microeconomic link constitutes the basis for setting wages: as long as wage growth remains below that of productivity, demand for labor will rise. Empirical evidence exists for this mechanism, which may explain high unemployment levels in the post-crisis EU countries (Meager & Speckesser, 2011).

Indeed, there are two reasons why this mechanism may explain the positive relationship between compensation and labor demand (and also interpret its

negative relationship with GVA) that we detected for Southern Europe. First, previous research into whether and how increased productivity transforms into gains for workers has shown that workers are increasingly compensated with non-wage returns or rewards. In fact, studies exploring this question may generate measurement errors and misleading results because their estimations define labor income as wages rather than compensation (Feldstein, 2008). Therefore, compensation can be substituted for wages while moving on with the relevant microeconomic assumption, which is consistent with our analysis.

Second, several studies have revealed associations between labor productivity and compensations in a range of countries, including those of the EU (Brill et al., 2017; Mishel & Gee, 2012; Fleck et al., 2011). However, the links between growth in productivity and compensation must be examined more closely. Theodoropoulou (2019) finds that some EU economies with formerly high inflation rates—including Spain and Slovenia—experienced compensation growth rates lagging behind productivity growth after joining the EMU and/or meeting the accession criteria.

The same lag exists in terms of the time interval and the sample of our analysis and provides a clarification for our findings. During the post-crisis 2010–2019 period, increases in labor productivity outstripped compensation growth in all Southern European countries in our sample. Theodoropoulou (2019) demonstrated this by calculating real productivity per hour as the difference between deflated nominal GDP and compensation per hour using the GDP and private consumption deflators, respectively. Productivity exceeded compensations during the period, even in countries like Croatia and Cyprus where the reverse had previously held true outside times of crisis.

Data for Croatia and Cyprus, of the countries covered, show that from 1995 to the end of the 2010s, the average real hourly compensation was not only higher than the average real hourly productivity, but also continued to increase as the latter rose. For Portugal, Spain and Greece, one can observe a gap varying in size

but widening in all three cases, between hourly productivity and compensation from 2010 to 2020. Only two cases where the gap between the two variables tends to narrow, revealing that the productivity increase is passed on to compensation growth, are Italy and Slovenia (Theodoropoulou, 2019). Evidently, when post-2020 data becomes available, the situation needs to be reassessed for all countries to test for the pandemic specific conditions.

When GVA increased and employment declined in Southern Europe, this effect was limited and the relationship between the two is not significant. Despite the insignificance, unfolding this relationship a little more for clarification, one should turn back once again on the gist of the findings: compensations lagging behind labor productivity in the region. When considered alongside the relationship among labor productivity, compensation and employment described above, it can be concluded that the increase in GVA was dependent more on growth in productivity than on employment. This shows that when the two results, which can be considered unexpected because they challenge the assumptions of mainstream macroeconomic theories, are found together, they actually create a chain of economic links that is meaningful and compatible with the labor market dynamics of the region.

The findings further show that the positive effect of rising GVA on growth in part-time employment was of a relatively low magnitude, while it had no significant impact on full-time employment. This elicits the indifference of employment against growth also in terms of contracts, validating the findings of jobless growth in the region. Both unexpected findings flesh out the novelty and contribution of the analysis clearly vis-a-vis the existing scholarly debates.

6 Conclusion

Our empirical analysis of the intensity of growth in overall and full-time employment, and among employees, indicates that jobless growth occurred in Southern Europe during the post-crisis period. On the other hand, the findings also showed that economic growth created job opportunities for temporary employees and in part-time and youth employment, although elasticity measures were low. These findings suggest that economic growth after the 2008 crisis produced temporary rather than permanent jobs and part-time rather than full-time employment in the region. Such outcomes may point to precariousness of employment in the region.

Estimations of all models demonstrated a positive impact of compensation on employment, contradicting the expectations of neoclassical labor theory. This may be explained by increases in labor productivity outstripping those of compensation for all countries in our sample during the period.

This paper's focus on the interaction between output and employment provides the opportunity to further analyze the gap between productivity and compensation. Subsequent research may examine the employment intensity of growth among the youth of Southern Europe to determine whether economic growth increases precariousness of their employment. Overall, while aiming to underline the need for economic growth linked to employment, this study points to an array of further research topics such as fair wages, youth employment and the rise of temporary jobs.

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