Wage and fiscal policy re-examined. An assessment of employment and productivity using Italian regional data

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Abstract

Traditional economic policy prescriptions proposed to address the Italian North-South divide mainly suggest that, in order to reduce unemployment and stimulate productivity, downward wage flexibility should be guaranteed and the wage-setting model decentralized to sub-national labour markets. Contrarily, the Keynesian view suggests that higher wages and demand stimuli can engender positive effects on productivity and employment. Applying Panel Structural VAR modelling to Italian regional data (1995-2019), we evaluate how wages and government expenditure impact productivity and employment dynamics. We find that a rise in both government spending and real wages have long-lasting, positive effects on productivity and employment, even when considering centre-northern and southern regions separately.

Keywords: Wage policy, Fiscal policy, Labour market, Labour productivity, Panel SVAR, Regional development, Italy

JEL Codes: E24, H70, J3

1. Introduction

The political and scholarly debate on how to promote economic development and reduce unemployment in Italy does not cease to produce theoretical and empirical contributions. Such a concern is especially motivated by the slow growth scenario that has characterised the country over the last thirty years, only worsened by the economic crises of 2008 and 2020.

One further matter of long-standing concern comes from the blatant territorial divide in terms of economic performance and living conditions between the North and the South of the country (Viesti, 2021). Regions of southern Italy continue to be disproportionately affected by high rates of unemployment and inactivity. In the past decade, the local unemployment rate (15-74) has been among the highest of both the EU27 and the Euro areas, especially among young people in the 15-24 age band (the latter peaked at 55.9% in 2014). Inactivity is also still pervasive in Italy, with rates as high as 34.5% among people aged 15-64 at the national level – the absolute highest among EU27 countries in 2022. In the South of Italy, people outside the labour force account for almost half of the working age population (45.4%).[1] South-North disparities in terms of GDP growth and labour productivity dynamics are significant as well and do not cease to widen (Author et al., 2021a).

Traditional economic policy prescriptions proposed to address such issues mainly rely on the influential hypothesis that, in order to reduce unemployment and stimulate productivity, downward wage flexibility should be guaranteed and the wage-setting model decentralized to sub-national labour markets (Boeri et al., 2021; Carmeci and Mauro, 2022). However, in the literature there is no consensus on whether flexible labour markets can lead to the expected positive outcomes. Contrarily, according to the Keynesian perspective, higher wages and demand stimuli can engender positive effects on productivity and employment (Author et al.,

[1] Sources: Istat, Rilevazione sulle forze di lavoro (http://dati.istat.it/) and Eurostat, Unemployment by sex and age, annual data (indicator UNE_RT_A) and Persons in the labour force (indicator LFSI_EMP_A). Data last extracted on May 7, 2023.

2023). While this perspective can offer new insights into reducing the South-North divide, it is often less explored and remains empirically underinvestigated at the regional level.

To fill this gap, this paper aims to assess the impact of demand and wages on labour productivity and employment dynamics in Italy. To do this, we apply advanced econometric techniques based on Panel Structural Vector Autoregressive models (P-SVAR) modelling to Italian regional data provided by the Italian National Institute of Statistics (Istat) for the 1995-2019 period. The current paper presents a twofold advancement compared to the current literature on regional economic development in Italy. First, differently from the relevant scholarly literature (see Author et al., 2021b; Deleidi et al., 2021; Destefanis et al., 2022; Lucidi, 2023, among others) and building on a suitable methodology for identifying exogenous demand and wage shocks, our paper assesses the impact of government spending on productivity and employment dynamics rather than focusing solely on its effects on output. That helps to shed light on a current and very popular debate in the economic sciences revolving around the role of fiscal policy and wage flexibility in stimulating both productivity and employment. Second, by using regional-level time series data, we assess the impact of an increase in public spending and wages at macro-area level to compare the richer Centre-North with the lagging-behind South. This allows us to address the long-standing debate on the North-South divide, offering insights into the impacts of public spending and wages across these regions. The existing literature often focus separately on the aspects analysed in an integrated manner in this paper. Some authors analyse the effects of wages on employment and productivity separately, while others attempt to assess the effects of changes in government spending on the same variables. The novelty of this paper lies precisely in integrating the reciprocal effects of these variables by modelling them jointly thanks to the use of appropriate econometric techniques. Our findings show that expansionary fiscal policies and a rise in real wages persistently stimulate both productivity and employment. Such evidence is confirmed

both at the national level and the sub-national level – i.e., by considering centre-northern and southern regions separately. Overall, our analysis suggests that the government should carry out spending-based expansionary fiscal policies and promote a rise in real wages to foster regional economic development.

In what follows, we discuss how different theoretical perspectives understand the role of real wages and aggregate demand in influencing labour productivity and employment dynamics (Section 2). Then, we present the data and methods used to inform the empirical analysis (Section 3). In Section 4, we illustrate the main findings of our analysis, which we discuss, in light of the premises just stated, in Section 5.

2. Literature and empirical review: An overview

2.1 The effect of wages and aggregate demand on labour productivity

Labour productivity dynamics are thought to be influenced by different causes, depending on the theoretical perspective assumed. One of the main relationships discussed in the literature is the one connecting wages and labour productivity. Marginalist economics posit that real wage equals the marginal productivity of labour, so it can only increase if labour productivity increases, while any friction preventing wage adjustment to productivity causes non-optimal employment and productivity outcomes. Hence, downward flexibility in wages is advised to achieve higher employment levels and productivity and income growth. This is a popular economic policy prescription in contemporary European economies, including Italy. It is based on the assumption that centralised bargaining systems (Manasse and Manfredi, 2014) and too high wages in regions with lower productivity (Boeri et al., 2021; Carmeci and Mauro, 2022) cause stagnant productivity growth and widespread unemployment. Standard marginalist models have been partially modified with the notion of efficiency wage, according to which paying higher-than-market wages can increase workers' effort, especially if workers

can be covered by unemployment benefits. In sum, these models assume inverse causality in the wage-productivity relationship, moving from the former to the latter, implying that a certain wage level would be beneficial and stimulate productivity (Shapiro and Stiglitz, 1984). Outside marginalist economics, drawing on the work of Sylos Labini (1993), a recent stream of literature assumes that higher real wages lead firms to both (i) increase their propensity to innovate to maintain or increase their market shares by raising investment and strengthening the mechanization process (defined as the *Ricardo* or *mechanization effect*); and (ii) use the labour force more efficiently by reorganizing production processes (i.e., the *organization effect*) (Fontanari and Palumbo, 2022). Empirical studies support this perspective by confirming the validity of the Sylos Labini equation in developed countries (Carnevali et al., 2020), in the US (Fontanari and Palumbo, 2022), and at the Italian regional level (Guarini, 2009).

A further theoretical discussion centres on the idea that productivity is influenced by demand dynamics. In the post-Keynesian approach, demand determines output – hence, productivity growth – according to the Kaldor-Verdoorn law (Kaldor, 1966; Verdoorn, 1949), which posits that technical progress is endogenously driven by output growth in the long-run due to static and dynamic economies of scale and demand-induced investment in innovative production techniques. Empirical studies confirm the Kaldor-Verdoorn law's validity using panel and time series econometric techniques. Author et al. (2023) highlight the role of demand in stimulating productivity at the macroeconomic level, while others validate it at the sectoral (Carnevali et al., 2020), and regional (Author et al., 2021a) level.[2]

2.2 The effect of wages and aggregate demand on employment

[2] For a thorough theoretical and empirical review on the Kaldor-Verdoorn law, see Author et al. (2023).

The debate on the impact of wages on employment is central in economic science. Marginalist economists argue that the flexibility of the capital-labour ratio ensures that involuntary unemployment can be reversed through a reduction in real wages up until the market-clearing level, corresponding to a full employment equilibrium. This perspective, still dominant, advises against minimum wage legislation due to its potential adverse effect on employment levels. Recent developments acknowledge the possibility of involuntary unemployment due to market imperfections – such as the existence of labour market institutions and trade unions – and a downward rigidity of real wages (OECD 1994).[3] Lately, this argument has notably influenced analyses of European labour markets, especially referred to lagging regions like Southern Italy (Boeri et al., 2021; Carmeci and Mauro, 2022). However, the empirical literature on the relationship between labour market reforms, wages, and employment provides mixed results on the matter. From an empirical standpoint, some studies suggest that a more flexible labour market enhances employment outcomes, as flexible wages allow firms to reduce costs without layoffs, especially during economic downturns (Gomes et al., 2013). Cipollone and Guelfi (2006) report a negative long-run employment elasticity to wages in a panel of Italian firms. On the other hand, Elsby (2009) argues that nominal wage rigidity under zero inflation has minimal impact on unemployment, while Reizer (2022) finds that wage flexibility increases employment volatility. However, the evidence on this relationship is mixed (Brancaccio et al., 2020). Similarly, the empirical literature on the elasticity of labour demand also shows varied results. Some studies suggest that even small wage changes can affect employment, indicating elastic labour demand. Borjas (2003) supports this view, finding a downward-sloping labour demand curve in the US. However, Beaudry et al. (2018) observe a negative relationship between employment and wages at the industrial and

[3] For a discussion and a critical review of monetarist, real business cycle, and new-Keynesian theoretical models, see, among others, Stirati (2016).

city levels, with smaller effects at the city level due to search externalities. This research agenda also ties into the minimum wage debate (Fields, 1994; Card, 1999). Card and Krueger (1995) find no negative employment effects following minimum wage increases in the fast-food sector, while Katz and Autor (1999) observed minimal or no impact on employment from minimum wage boosts in the US. Dube et al. (2016) suggest that raising the minimum wage can increase employment, whereas Neumark and Wascher (2007) report negative effects on employment, particularly for low-skilled workers. Studies on the Italian economy yield mixed results as well. Daruich et al. (2022) find that labour market reforms in Italy lowered real wages without boosting employment. Ammermüller et al. (2010) found no link between wage flexibility and unemployment at the regional level in Italy, while Destefanis and Pica (2011) identified an inverse relationship between wages and unemployment across Italian regions. Similarly, Liotti (2020) argues that increased labour market and wage flexibility negatively impact youth and adult employment.

A different theoretical viewpoint is provided by the literature on how demand affects employment dynamics. Marginalist theory, which relies on the concept of diminishing marginal productivity, argues that the flexibility of prices for goods and production factors naturally restores full employment equilibrium. According to this theory, stimulating demand only temporarily reduces unemployment and leads to accelerating inflation, with the economy eventually returning to its natural unemployment rate.[4] The new-Keynesian framework agrees with this, acknowledging nominal rigidities and suggesting that aggregate demand can boost employment only in the short term. Conversely, hysteresis theory contends that aggregate demand can have long-term effects on employment, particularly after a recession (Tervala and Watson, 2022). However, in this case, the long-term impact of aggregate demand is attributed

[4] According to the monetarist approach, in the short-run demand stimulus influences employment solely in the case of exceptional depressed time – i.e., the 'Keynesian case'.

to specific rigidities in wage formation, influenced by labour market institutions or the persistence of long-term unemployment.

The empirical literature related to this conceptual framework also presents conflicting findings. Monacelli et al. (2010) report that fiscal spending reduces the unemployment rate by approximately 0.6 percentage points and increases the employment rate by about 1.5% in the US. Tagkalakis (2013) shows that austerity policies in Greece led to reduced output and a cumulative increase in the unemployment rate of 1.9 percentage points over two years. In evaluating the American Recovery and Reinvestment Act (ARRA), Popp et al. (2020) find minimal short-term employment gains, with 15 new jobs created for every $1 million spent. In the Italian context, Giordano et al. (2007) observe that a 1% increase in public consumption results in a 0.2 percentage point rise in employment on impact, peaking at 0.5 percentage points after four quarters. Conversely, Fazzari et al. (2020) demonstrate, for the US economy, that fiscal stimulus has a positive effect on employment in both the short- and long-run.

3. Data and methods

3.1 Data

The data we use in our analysis is from the Italian Regional Accounts Dataset (version December 2020) provided by the Italian National Institute of Statistics (Istat), covering all Italian NUTS-2 regions over the period 1995-2019. Variables include: (i) the total general government expenditure (G), calculated as the sum of public consumption and public investment as in Author et al. (2021b); (ii) real wages per worker measured either as in Annual Work Unit (AWU), which is the full-time equivalent employment (W), or in gross compensations per employee (W_e); (iii) labour productivity, expressed either in AWU (p), or measured using the value-added per person employed (p_e); (iv) the unemployment rate for the population aged 15+ (Un) and the employment rate for the population aged 15-64 (Emp).

All variables were converted in real terms using the GDP deflator and – excluding the employment and unemployment rates – in log-levels. Details and sources of variables included in the analysis are reported in Table A1 in the Appendix, while summary statistics are provided in Table A2.

Using the abovementioned variables, we estimate four different models to increase the robustness of our findings: Model 1 $[W; G; Un; p]$; Model 2 $[W; G; Emp; p]$; Model 3 $[W\_e; G; Un; p\_e]$; and Model 4 $[W\_e; G; Emp; p\_e]$. Findings for Models 1 and 2, based on measure of productivity and wages per hour worked, are reported and discussed in section 4, while results from Models 3 and 4, based on measures of productivity and wages per employee, are available in the Appendix (Table A1).

3.2. Methods

To quantify the effect that real wages and government expenditure produce on labour market dynamics and innovation, we make use of P-SVAR modelling (Pedroni, 2013). As a first step, we estimate a reduced-form panel VAR(n) as in equation (1):

$$y_{i,t} = A_i(L)y_{i,t-n} + \varepsilon_{i,t} \tag{1}$$

where y is the vector of considered variables, $A_i(L)$ is a polynomial of lagged coefficients and ε is the error term of the reduced-form panel VAR. A P-SVAR is obtained by imposing a suitable identification strategy to the reduced-form panel VAR(n) as in equation (2):

$$B_{0i}y_{i,t} = B_i(L)y_{i,t-n} + w_{i,t} \tag{2}$$

where B_{0i} represents the matrix of contemporaneous coefficients, B_i is the matrix of lagged coefficients, and $w_{i,t}$ is the vector of structural shocks.[5]

To obtain structural shocks, an identification strategy needs to be imposed on B_{0i}. P-SVAR modelling allows to estimate $w_{i,t}$ by imposing suitable restrictions on the B_{0i} matrix. Restrictions on B_{0i} are derived from the economic theory (Kilian and Lütkepohl, 2017).[6] Once restrictions are imposed and structural shocks estimated, impulse response functions (IRFs) are computed to quantify the dynamic effects produced by a shock on the variables included in the model. IRFs are estimated over a period of 10 years and reported with 95% confidence interval bands estimated by bootstrapping standard errors. All models include two lags for each variable estimated through the GTOS (general-to-specific) criteria (Pedroni, 2013). Additionally, we estimate the cumulative effects – computed by dividing the cumulated response of selected variables to the corresponding impulses (Author et al., 2021b) – showing the (long-lasting) response of productivity and unemployment or employment rates per unit increase in government spending and real wage.

The shocks are identified using a recursive identification based on short-run zero restrictions, whereas matrix B_{0i} is based on a Cholesky factorization, as shown in equations (3–6):

Model 1:
$$B_{0i}y_{i,t} = \begin{bmatrix} - & 0 & 0 & 0 \\ - & - & 0 & 0 \\ - & - & - & 0 \\ - & - & - & - \end{bmatrix} \begin{bmatrix} W_{i,t} \\ G_{i,t} \\ Un_{i,t} \\ p_{i,t} \end{bmatrix} \quad (3)$$

[5] All variables are taken at levels to preserve any cointegrating or long-run relationship that may exist among the considered variables (Kilian and Lütkepohl, 2017).
[6] For an in-depth study of SVAR modeling and a discussion of the strengths and weaknesses of this methodology, interested readers can refer to the book by Kilian and Lütkepohl (2017).

Model 2:
$$B_{0i}y_{i,t} = \begin{bmatrix} - & 0 & 0 & 0 \\ - & - & 0 & 0 \\ - & - & - & 0 \\ - & - & - & - \end{bmatrix} \begin{bmatrix} W_{i,t} \\ G_{i,t} \\ Emp_{i,t} \\ p_{i,t} \end{bmatrix} \quad (4)$$

Model 3:
$$B_{0i}y_{i,t} = \begin{bmatrix} - & 0 & 0 & 0 \\ - & - & 0 & 0 \\ - & - & - & 0 \\ - & - & - & - \end{bmatrix} \begin{bmatrix} W\_e_{i,t} \\ G_{i,t} \\ Un_{i,t} \\ p\_e_{i,t} \end{bmatrix} \quad (5)$$

Model 4:
$$B_{0i}y_{i,t} = \begin{bmatrix} - & 0 & 0 & 0 \\ - & - & 0 & 0 \\ - & - & - & 0 \\ - & - & - & - \end{bmatrix} \begin{bmatrix} W\_e_{i,t} \\ G_{i,t} \\ Emp_{i,t} \\ p\_e_{i,t} \end{bmatrix} \quad (6)$$

where '−' indicates an unrestricted parameter and '0' represents a zero restriction. Identification strategies in (3-6) are all based on the same theoretical reasoning. First, real wages are not affected contemporaneously by other variables in the model as they are determined by a bargaining process influenced by various institutional factors. This process is subject to information delays due to the staggered release of relevant data. As a result, trade unions and labor market institutions cannot react immediately to information that is not yet available to them. Additionally, wages tend to be affected by rigidities – both real and nominal – and the process of wage adjustment is slow. Wages are not strictly related to business cycle fluctuations since in the Italian context the wage bargaining process occurs periodically rather than ceaselessly (Stirati, 2016). Real wage rigidities are also becoming a key factor to explain the unemployment-inflation link in New-Keynesian models (Blanchard and Galì, 2007). For instance, according to Holden and Wulfsberg (2009), a certain degree of real wage rigidity exists in OECD countries, especially those associated with more stringent employment protections. However, the idea of an exogenous distribution or a not mechanical relationship

between income distribution and labour productivity is also a key feature of Classical economics (Stirati, 1994; Fontanari et al., 2024). According to this approach, the income distribution among profit and wages is determined by the bargaining power of different social classes, customs and social norms regarding the fairness of remunerations (Stirati, 1994; Levrero, 2013) rather than by changes in capital and labour productivity (Paternesi Meloni and Stirati, 2023). Thus, a real wage shock can arise from trade union activities or worker disputes, as well as from legal measures like the implementation of a minimum wage.

Second, government expenditure is the second-ordered variable that is not influenced contemporaneously by unemployment or employment rates and labour productivity. The underlying idea, commonly used in the fiscal policy literature (Kilian and Lütkepohl, 2017; Author et al. 2021b), is that government expenditures are not affected by the macroeconomic variables in the contemporaneous relationship because there exist both an information delay in releasing data and an implementation lag before a discretionary fiscal policy is designed, approved, and implemented (Kilian and Lütkepohl, 2017). Conversely, we allow for feasible effects of wage dynamics contemporaneously on government expenditure, as government expenditure, particularly government consumption, includes wages paid to public sector employees.[7] Third, unemployment or employment rates can be affected contemporaneously both by real wages and government expenditure. While wages may influence labour market dynamics by influencing the costs that firms need to pay to employ workers, government expenditure – by affecting the level of demand – may influence the number of workers employed in production activities. Finally, labour productivity may be affected contemporaneously by all the variables included in the model. Particularly, while wages and government expenditure can capture the Ricardo and Smith or Verdoorn effects, changes in the

[7] As a robustness check, we estimate all models by ordering government expenditure as the first variable and wages as the second variable. An additional robustness check has been conducted by estimating all models for the pre-crisis period, specifically from 1995 to 2008. These findings are consistent with those reported in the sections below and are available upon request.

volume of employees may determine changes in productivity dynamics by varying the denominator of labour productivity. The use of government expenditure to capture demand shock and then assess its effect on productivity is in line with recent contributions showing how the use of GDP dynamics cannot provide an adequate justification for supporting the Verdoorn perspective (Author et al., 2023).

To consider variability in the studied variables at the sub-national level, Models 1-4 will be estimated on a panel data set including observations for Italian NUTS-2 regions between 1995 and 2019. Then, we will consider centre-northern and southern regions separately to assess whether discretionary policies aimed at increasing government expenditure and wages are more effective in stimulating productivity and the labour market performance in the two macro-areas considered.

4. Findings

In this section, we show both the IRFs and the estimated cumulative effects of Models 1 and 2 by focusing on the effect of government spending and real wages on unemployment and employment rates and on labour productivity.

IRFs computed considering all NUTS-2 regions (Figure 1) show that shocks in G and W and the corresponding responses of p, Un, and Emp are highly persistent and significantly positive throughout the whole 10-year period. Specifically, a rise in G and W leads to an increase in labour productivity and employment rates, and a fall in the unemployment rate. The same finding applies to IRFs computed for Italian macro-areas separately (Figures 2 and 3). Both the Centre-North and the South of Italy show a positive and highly-persistent response of labour productivity, employment and unemployment rates to fiscal and wage policy shocks throughout the time span considered.

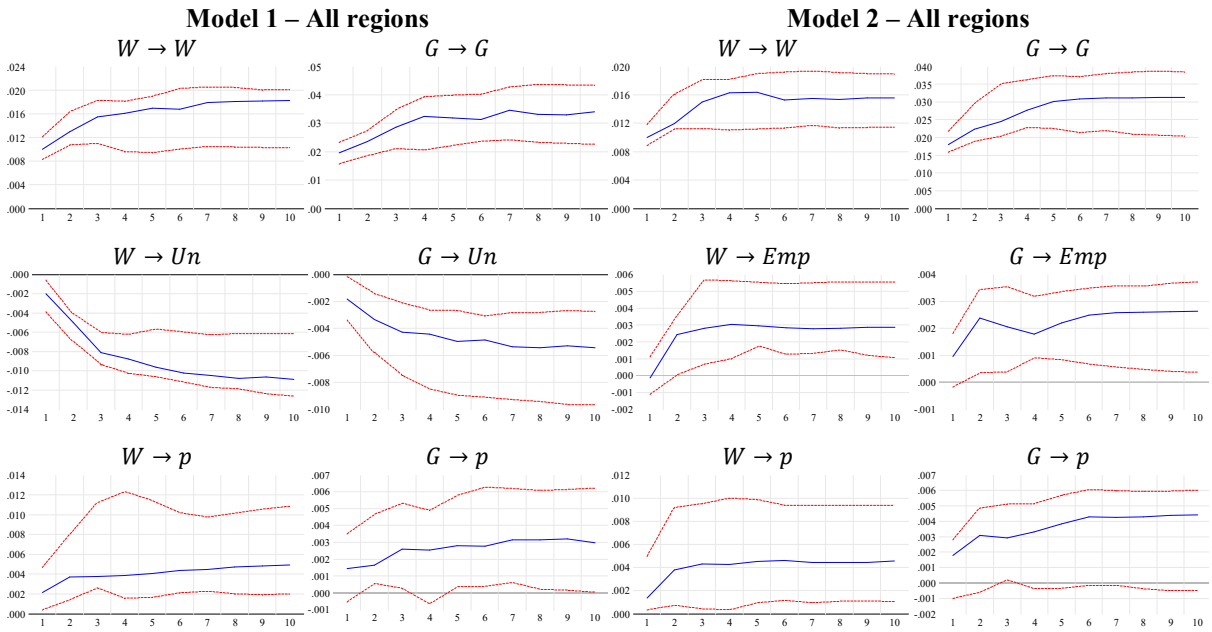

Figure 1. Impulse response functions (IRFs), Models 1 and 2, All regions. Responses to structural shocks are reported with two standard error bounds (95% confidence interval).

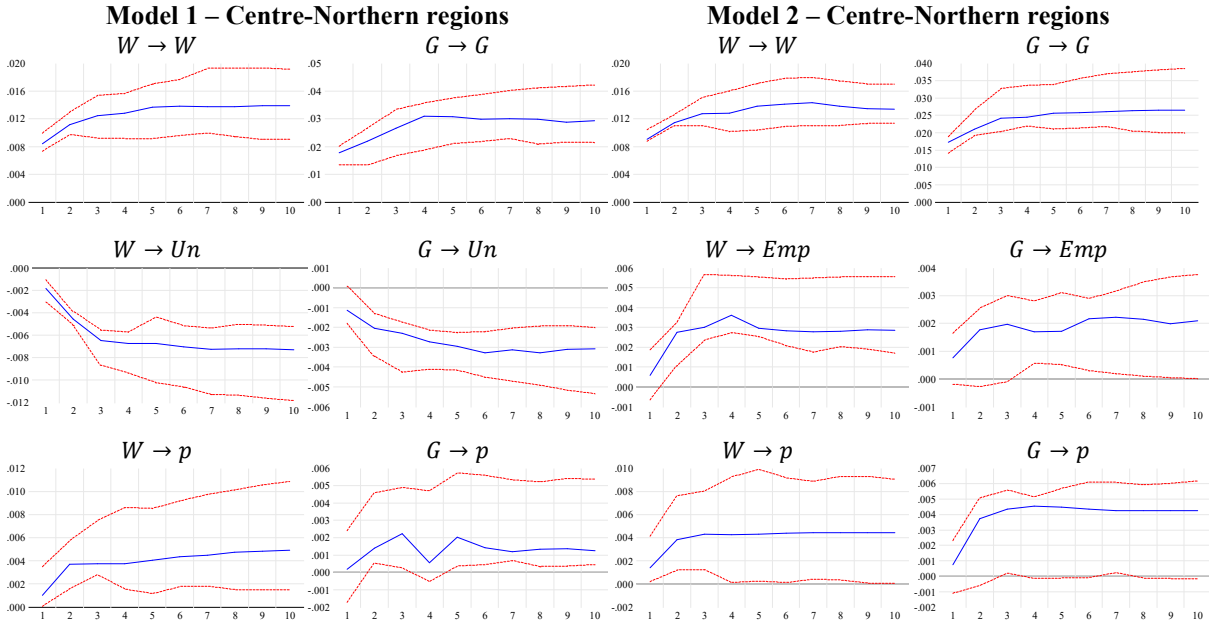

Figure 2. Impulse response functions (IRFs), Models 1 and 2, Centre-Northern regions. Responses to structural shocks are reported with two standard error bounds (95% confidence interval).

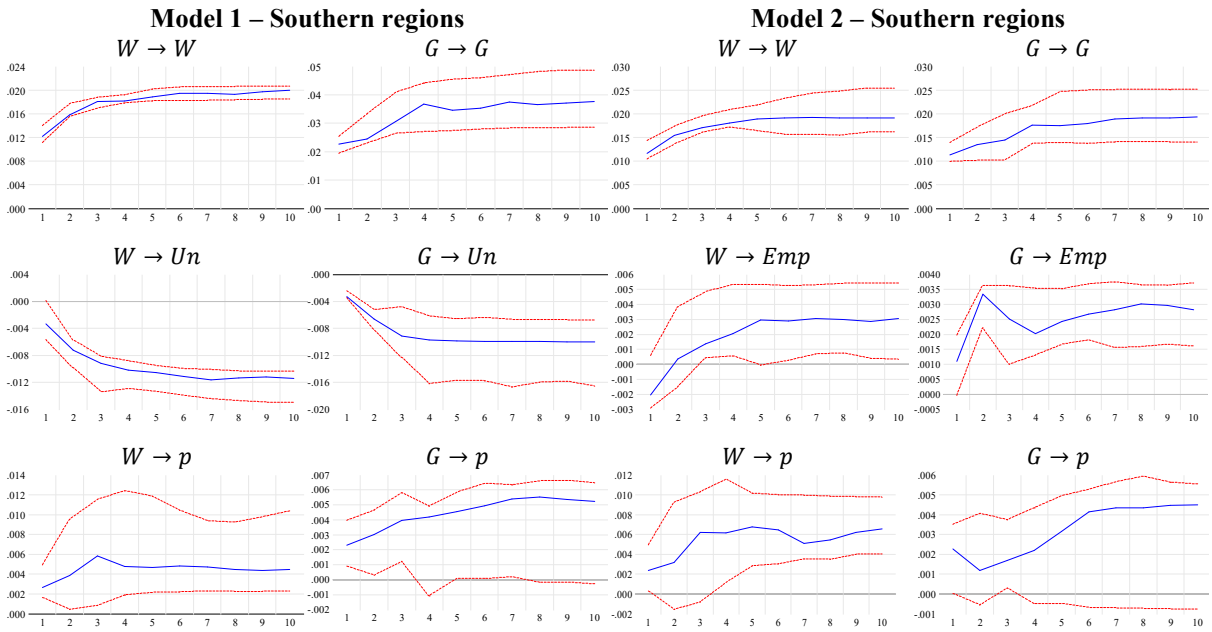

Figure 3. Impulse response functions (IRFs), Models 1 and 2, Southern regions. Responses to structural shocks are reported with two standard error bounds (95% confidence interval).

Such evidence is even more clearly delivered by looking at the cumulative effects for each year, from 1 to 10, and especially at the average effect for the whole 10-year period, all shown in Table 2. When looking at Model 1 and considering all regions, an increase in real wages lowers the unemployment rate by an average of -0.52%. Such an effect is stronger in southern regions (-0.53%) than in the Centre-North (-0.48%). The positive effect of wages on productivity is confirmed both at the national level (considering all NUTS-2 regions) and considering southern and centre-northern regions separately. Specifically, a rise of 1% in real wages engenders a positive average effect on productivity by 0.25% on average in all Italian regions, 0.30% in the Centre-North, and 0.25% in the South. An increase in government expenditure leads to a reduction in unemployment rates and a rise in labour productivity. Particularly, a positive public spending shock reduces unemployment rates by -0.15% on average in all Italian regions. This effect is stronger in southern regions than in centre-northern ones, by attaining values of -0.26% and -0.10%, respectively. When looking at the Verdoorn effect, a positive fiscal policy shock raises productivity in all Italian regions by 0.09%, and by 0.05% and 0.13% in the Centre-North and in the South, respectively.

In Model 2, we assess the effect of shocks in G and W on the employment rate. The latter provides a clearer picture of labour market dynamics compared with the unemployment rate since it considers the whole population aged 15+ and it is less subject to cyclical changes in the labour force. Overall, estimates from Model 2 confirm the evidence found in Model 1 – i.e., a rise in wages and government expenditure improves both employment and productivity dynamics. A rise of 1% in real wages increases employment rates by 0.17% on average considering all regions; by 0.21% in the regions of the Centre-North, and by 0.10% in the South of Italy. Thus, as far as the employment rate is considered, the effect of wages on employment is stronger in centre-northern regions than in southern ones. Productivity is instead boosted by 0.27% as a national average, by 0.31% in the Centre-North of Italy, and by 0.30 in the South. Hence, the effect on productivity is in line with those obtained for Model 1.

Finally, examining the effect of government expenditure on employment and productivity reveals that a 1% increase in government spending boosts employment rates by an average of 0.08% both across all regions and when considering centre-northern and southern regions separately. Contrary to Model 1, the increase in labour productivity is more pronounced in the Centre-North (0.16%) compared to the South (0.10%), with an overall increase of 0.13% when considering the full sample of all regions. These findings indicate that policies aimed at increasing government expenditure and wages positively affect productivity and labour market dynamics. The results remain robust even when aalysing centre-northern and southern regions separately. Additionally, the cumulative effects estimated with Models 3 and 4 (Table 3) further support these conclusions.

Table 2. Cumulative effects estimated for Models 1 and 2.

	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	Av.
Model 1											
Response of Unemployment Rate (Un) to Real Wages (W)											
All regions	**-0.20**	**-0.38**	**-0.52**	**-0.55**	**-0.57**	**-0.61**	**-0.59**	**-0.60**	**-0.59**	**-0.60**	-0.52
Northern regions	**-0.22**	**-0.41**	**-0.52**	**-0.53**	**-0.49**	**-0.51**	**-0.53**	**-0.52**	**-0.52**	**-0.52**	-0.48
Southern regions	**-0.28**	**-0.46**	**-0.51**	**-0.56**	**-0.56**	**-0.57**	**-0.60**	**-0.59**	**-0.57**	**-0.57**	-0.53
Response of Labour Productivity (p) to Real Wages (W)											
All regions	**0.21**	**0.29**	**0.24**	**0.24**	**0.24**	**0.26**	**0.25**	**0.26**	**0.27**	**0.27**	0.25
Northern regions	**0.12**	**0.33**	**0.30**	**0.29**	**0.30**	**0.31**	**0.33**	**0.34**	**0.35**	**0.35**	0.30
Southern regions	**0.22**	**0.25**	**0.32**	**0.26**	**0.25**	**0.25**	**0.24**	**0.23**	**0.22**	**0.22**	0.25
Response of Unemployment Rate (Un) to Government Expenditure (G)											
All regions	**-0.09**	**-0.14**	**-0.15**	**-0.14**	**-0.16**	**-0.15**	**-0.16**	**-0.16**	**-0.16**	**-0.16**	-0.15
Northern regions	**-0.06**	**-0.09**	**-0.09**	**-0.09**	**-0.10**	**-0.11**	**-0.10**	**-0.11**	**-0.11**	**-0.11**	-0.10
Southern regions	**-0.14**	**-0.27**	**-0.30**	**-0.26**	**-0.29**	**-0.28**	**-0.27**	**-0.27**	**-0.27**	**-0.27**	-0.26
Response of Labour Productivity (p) to Government Expenditure (G)											
All regions	0.07	**0.07**	**0.09**	0.08	**0.09**	**0.09**	**0.09**	**0.10**	**0.10**	**0.09**	0.09
Northern regions	0.01	**0.06**	**0.08**	0.02	**0.07**	**0.05**	**0.04**	**0.05**	**0.05**	**0.04**	0.05
Southern regions	**0.10**	**0.12**	**0.13**	0.11	**0.13**	**0.14**	**0.14**	0.15	0.14	0.14	0.13
Model 2											
	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	Av.
Response of Employment Rate (Emp) to Real Wages (W)											
All regions	-0.01	**0.20**	**0.19**	**0.19**	**0.18**	**0.18**	**0.18**	**0.18**	**0.18**	**0.18**	0.17
Northern regions	0.06	**0.24**	**0.24**	**0.28**	**0.21**	**0.20**	**0.19**	**0.20**	**0.21**	**0.21**	0.21
Southern regions	-0.18	0.02	**0.08**	**0.11**	**0.16**	**0.15**	**0.16**	**0.16**	**0.15**	**0.16**	0.10
Response of Labour Productivity (p) to Real Wages (W)											
All regions	**0.14**	**0.32**	**0.29**	**0.26**	**0.28**	**0.30**	**0.29**	**0.29**	**0.28**	**0.29**	0.27
Northern regions	**0.15**	**0.33**	**0.34**	**0.33**	**0.31**	**0.31**	**0.31**	**0.32**	**0.33**	**0.33**	0.31
Southern regions	0.20	0.21	0.36	**0.34**	**0.36**	**0.34**	**0.27**	**0.29**	**0.33**	**0.34**	0.30
Response of Employment Rate (Emp) to Government Expenditure (G)											
All regions	0.05	**0.11**	**0.08**	**0.06**	**0.07**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	0.08
Northern regions	0.04	0.08	0.08	**0.07**	**0.07**	**0.08**	**0.09**	**0.08**	**0.08**	**0.08**	0.08
Southern regions	**0.05**	**0.14**	**0.10**	**0.06**	**0.07**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	0.08
Response of Labour Productivity (p) to Government Expenditure (G)											
All regions	0.10	0.14	**0.12**	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.13
Northern regions	0.04	0.18	**0.18**	0.19	0.18	0.17	**0.16**	**0.16**	0.16	0.16	0.16
Southern regions	**0.11**	0.06	**0.07**	0.07	0.09	0.12	0.12	0.12	0.12	0.12	0.10

Notes: Significant estimates are in bold (95% confidence interval). Coefficients are estimated at different years, from 1 to 10 years. The average effect is estimated across ten years.
Source: Own elaborations of Istat data (1995-2017).

Table 3. Cumulative effects estimated for Models 3 and 4.

Model 3											
	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	Av.
Response of Unemployment Rate (Un) to Real Wages (W)											
All regions	**-0.33**	**-0.46**	**-0.58**	**-0.54**	**-0.53**	**-0.54**	**-0.56**	**-0.56**	**-0.55**	**-0.56**	-0.52
Northern regions	**-0.34**	**-0.46**	**-0.58**	**-0.59**	**-0.60**	**-0.60**	**-0.60**	**-0.60**	**-0.59**	**-0.59**	-0.55
Southern regions	**-0.37**	**-0.45**	**-0.55**	**-0.53**	**-0.51**	**-0.54**	**-0.58**	**-0.59**	**-0.57**	**-0.56**	-0.53
Response of Labour Productivity (p) to Real Wages (W)											
All regions	**0.34**	**0.40**	**0.48**	**0.43**	**0.41**	**0.46**	**0.42**	**0.40**	**0.41**	**0.44**	0.42
Northern regions	**0.60**	**0.64**	**0.57**	**0.55**	**0.51**	**0.55**	**0.55**	**0.53**	**0.54**	**0.54**	0.56
Southern regions	**0.22**	**0.25**	**0.22**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	0.19
Response of Unemployment Rate (Un) to Government Expenditure (G)											
All regions	-0.08	**-0.12**	**-0.12**	**-0.10**	**-0.10**	**-0.11**	**-0.10**	**-0.10**	**-0.11**	**-0.11**	-0.10
Northern regions	-0.02	**-0.05**	**-0.07**	**-0.08**	**-0.09**	**-0.10**	**-0.10**	**-0.10**	**-0.10**	**-0.09**	-0.08
Southern regions	**-0.15**	**-0.22**	**-0.28**	**-0.26**	**-0.24**	**-0.26**	**-0.27**	**-0.26**	**-0.26**	**-0.26**	-0.25
Response of Labour Productivity (p) to Government Expenditure (G)											
All regions	0.02	0.07	**0.07**	0.04	0.06	**0.05**	**0.05**	0.05	0.05	0.05	0.05
Northern regions	-0.01	**0.08**	**0.07**	**0.04**	0.08	**0.04**	**0.07**	0.06	**0.05**	**0.05**	0.05
Southern regions	**0.09**	**0.04**	**0.06**	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05
Model 4											
	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	Av.
Response of Employment Rate (Emp) to Real Wages (W)											
All regions	0.14	**0.31**	**0.38**	**0.38**	**0.36**	**0.37**	**0.37**	**0.37**	**0.36**	**0.37**	0.34
Northern regions	**0.19**	**0.35**	**0.46**	**0.40**	**0.40**	**0.41**	**0.40**	**0.40**	**0.40**	**0.40**	0.38
Southern regions	-0.10	**0.16**	**0.34**	**0.32**	**0.27**	**0.28**	**0.30**	**0.30**	**0.29**	**0.29**	0.24
Response of Labour Productivity (p) to Real Wages (W)											
All regions	**0.44**	**0.53**	**0.45**	**0.44**	**0.46**	**0.46**	**0.47**	**0.47**	**0.47**	**0.48**	0.47
Northern regions	**0.69**	**0.63**	**0.58**	**0.50**	**0.52**	**0.52**	**0.51**	**0.51**	**0.51**	**0.52**	0.55
Southern regions	0.26	**0.24**	**0.33**	**0.23**	**0.26**	**0.25**	**0.26**	**0.25**	**0.26**	**0.27**	0.26
Response of Employment Rate (Emp) to Government Expenditure (G)											
All regions	**0.02**	0.06	**0.05**	**0.05**	**0.05**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	0.04
Northern regions	**0.02**	0.04	**0.04**	**0.04**	**0.03**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	0.03
Southern regions	**0.03**	0.06	**0.05**	**0.06**	**0.05**	**0.05**	**0.06**	**0.06**	**0.05**	**0.05**	0.05
Response of Labour Productivity (p) to Government Expenditure (G)											
All regions	0.03	**0.06**	**0.07**	0.08	0.07	0.06	**0.06**	**0.06**	0.06	0.06	0.06
Northern regions	-0.06	**0.07**	**0.08**	**0.08**	**0.08**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	0.06
Southern regions	**0.13**	0.02	0.05	0.07	0.04	0.06	0.06	0.05	0.05	0.05	0.06

Notes: Significant estimates are in bold (95% confidence interval). Coefficients are estimated at different years, from 1 to 10 years. The average effect is estimated across ten years.
Source: Own elaborations of Istat data (1995-2019).

5. Conclusion and policy implications

This paper aimed at assessing the impact of wages and public spending on labour productivity and employment dynamics in Italy. The contribution of our analysis to the literature is twofold. First, applying time-series econometric techniques based on P-SVAR modelling to regional data from Istat (1995-2019), we evaluated the impact of wages and public expenditure by considering productivity and labour market outcomes instead of focusing solely on the effects on output, as typically done in the literature on fiscal multipliers. Such an approach is unprecedented and adds to the current scholarly debate on the role of wage and fiscal policies in promoting productivity and employment in contexts of slow economic growth. Second, using regional data, we were able to assess how productivity and employment dynamics respond to wage and demand stimuli in the Centre-North and the South of Italy comparatively. Our findings show that both government spending and real wages have longlasting, positive effects on productivity and employment. Such evidence is confirmed both at the national level and when considering the Centre-North and the South of Italy separately.

Our results challenge the commonly held view that downward wage flexibility is crucial for boosting productivity and employment, particularly in regions with stagnant productivity growth and high unemployment, such as the South of Italy (Boeri et al., 2021; Carmeci and Mauro, 2022). Indeeed, not only do our findings indicate that increased wages and expanded public expenditure enhance both productivity and employment throughout Italy; interestingly, they also emphasise that the South benefits more than the Centre-North from expansionary fiscal and wage policies in terms of labour market dynamics, particularly concerning the unemployment rate (Models 1 and 3). However, southern regions exhibit lower employment multipliers than centre-northern ones when analysing the employment rate (Models 2 and 4). This suggests that the impact of an increase in public spending and wages varies based on the local labour market structure. These insights have important policy implications. In the South of Italy, the unemployment rate might reduce more than proportionally compared with the

enhancement of the employment rate due to the lower elasticity of the denominator of the former indicator – i.e., the labour force does not absorb inactive people even when the labour market dynamics are more favorable.

Analogously, southern regions see either a comparable or an even stronger response of labour productivity to a rise in public spending compared with centre-northern Italy. Thus, the Kaldor-Verdoorn law is confirmed at the national level and particularly in the South. Finally, a rise in real wages also impacts positively labour productivity throughout the country, especially in the Centre-North. Overall, this evidence supports the introduction of basic income measures and minimum wage schemes as effective strategies to enhance both labor productivity and employment, particularly in areas where such support is most needed. Further research utilizing Italian regional data will assess how the composition of government spending impact labour productivity and labour market variables.

In sum, our results suggest that the Italian government should implement spending-based expansionary fiscal policies and promote a rise in wage in light of their ability to generate positive and persistent effects on productivity and employment levels. In the case of a two-tier economy like that of Italy, where the aim of economic policy is to alleviate territorial disparities and mitigate regional divergence (IMF, 2020), such interventions should be fine-tuned according to the targeted territory by carefully considering its specificities and structural characteristics. These policies can be both effective and cost-efficient. Specifically, recent literature (Author et al. 2021b) indicates that public investment spending yield high multipliers, which entail substantial effects on economic activity and, consequently, on tax revenues, thereby mitigating the burden of such expenditures on public finances. Increasing private sector wages, on the other hand, imposes no direct cost on public finances while boosting revenues from pension contributions without significant negative effects on employment and with very

positive effects on aggregate demand, especially in the South. Strengthening guaranteed minimum income schemes can yield similar benefits.

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Appendix

Table A1. Description of variables and data sources.

Variable	Description	Source
G	Government expenditures, market prices, millions of Euro, annual data	Istat (Conti e aggregati economici territoriali)
W_e	Gross compensation per employee, annual data	Istat (Conti e aggregati economici territoriali)
W	Gross compensation per Annual Work Unit (full time equivalent), annual data	Istat (Conti e aggregati economici territoriali)
p_e	Value added per person employed, annual data	Istat (Conti e aggregati economici territoriali)
p	Value added per Annual Work Unit (full time equivalent), annual data	Istat (Conti e aggregati economici territoriali)
Un	Unemployment rate (15+), annual data	Istat (Conti e aggregati economici territoriali)
Emp	Employment rate (15-64), annual data	Istat (Conti e aggregati economici territoriali)
Y_DEF	GDP deflator (2010 =100), annual data	AMECO

Table A2. Summary statistics

	Emp	Un	G	p_e	p	W_e	W
Mean	0.567903	0.098673	17877.09	60676.58	60760.54	25631.31	27718.48
Median	0.594477	0.087536	12432.57	60930.11	61137.09	25558.96	27647.21
Maximum	0.706921	0.245334	57667.06	78804.84	76862.91	30271.03	33995.58
Minimum	0.389136	0.025431	1456.376	45718.49	44447.01	20750.17	22287.51
Std. Dev.	0.090023	0.052948	13304.27	7858.493	8444.202	2264.961	2748.003
Skewness	-0.479675	0.776098	0.869402	0.072004	-0.046227	0.098859	0.118969
Kurtosis	1.857186	2.804551	3.150613	1.935554	1.808514	2.025494	2.059841
Jarque-Bera	42.67219	46.91063	58.38399	22.11418	27.37360	18.95111	18.02650
Probability	0.000000	0.000000	0.000000	0.000016	0.000001	0.000077	0.000122
Sum	261.2354	45.38936	8223459.	27911228	27949849	11790401	12750503
Sum Sq. Dev.	3.719770	1.286805	8.12E+10	2.83E+10	3.27E+10	2.35E+09	3.47E+09