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Public welfare spending and regional well-being:
an empirical analysis of Italy

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Abstract

In this paper, we investigate the relationship between public welfare spending and well-being, focusing on Italian NUTS-2 regions. In line with a broad strand of literature, we argue that public investment in health, social protection, and education is a lever to protect citizens from increasing social risks and to improve educational attainment and health, with consequent benefits for their quality of life and individual productivity. In order to analyse the level of well-being of the regions, we constructed a composite index which, following the conceptual framework of the Human Development Index, covers three dimensions: material living conditions, health, and education. We also developed a measure to assess the level of public investment in human development, including public spending on health, education, and social protection. Econometric analysis on a panel of 21 NUTS-2 regions confirms the hypothesis that public welfare spending can affect regional well-being by promoting human development.

Keywords: well-being, public welfare spending, human development,.

JEL codes: H50, I31, R11, R58, Z18

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1. Introduction

Since the seminal work of the Stiglitz-Sen-Fitoussi Commission (Stiglitz et al., 2009), there has been a gradual shift towards a different approach to analysing regional well-being. The central idea in the literature on well-being is that conventional economic measures, such as GDP per capita, provide only a partial insight into the complexity of a multifaceted phenomenon such as regional well-being (Di Berardino et al., 2016). As highlighted by Rodriguez-Pose and Tselios (2015), regions have different capacities to simultaneously address efficiency and equity, which requires a deeper understanding of how to reconcile higher economic growth with more inclusive and sustainable development. As a result, relying solely on market output statistics may lead to misperceptions in the analysis of well-being and its determinants (Stiglitz et al., 2009).

In the field of regional science, several studies have aimed to investigate regional well-being by adopting a multidimensional perspective and empirically investigating its economic, institutional, and socio-cultural determinants. Among the drivers of regional well-being investigated in the empirical literature, we find, for example, social capital (e.g., Calcagnini & Perugini, 2019; Terzo 2022; Terzo et al., 2023), place-based policies (e.g., Ferrara et al., 2022), public spending (e.g., Dellmuth, 2021; Valls Martinez et al., 2022), institutional quality (e.g., Ferrara & Nisticò, 2019; Peirò-Palomino et al., 2020), and industrial districts (e.g., Di Berardino et al., 2016). The present article aims to contribute to this strand of literature by investigating the impact of public welfare spending on regional well-being. Its innovative aspect is the elaboration of a measure to assess the public investment of the Italian regions in the promotion of human development by combining different public spending items that can be traced back to three domains: health, education, and social protection. The creation of such a measure allows us to assess whether a different orientation of the regions towards investment in human development can explain the traditional regional disparities in well-being observed in Italy. This is an attempt to introduce a measure of the quality of public spending that goes beyond the traditional distinction between gross fixed capital formation and public current expenditure, as proposed by Ferrari and Meliciani (2021), and Meliciani and Terzo (2024). To the best of our knowledge, this is a somewhat new perspective that has not yet been fully explored by empirical research in the field of regional science. In fact, the empirical literature mainly investigates the impact of regional public spending on economic convergence (e.g., Acconcia & Del Monte, 2000; Cosci et al., 1999; Daniele, 2009; Luintel et al., 2020 Rodriguez-Pose et al., 2012; Romagnoli & Mastronardi, 2020; Thanh et al., 2020).

We suggest that public welfare spending may be a crucial factor in promoting people's well-being. Supported by a large body of literature,² we argue that public welfare can support individual capabilities, namely the ability to function and make choices in an autonomous and deliberate manner (Sen, 1999). This approach is based on the idea that the provision of essential services and support through public programmes can reduce social inequalities by ensuring that everyone has access to vital resources such as education, health, and social protection. In addition, a robust public welfare system can help stabilise the economy by providing a safety net for those in financial need, thereby promoting social stability and the overall well-being of society. We test this conceptual framework through an empirical analysis conducted on a panel dataset of 21 Italian NUTS-2 regions for the period 2010-2020. We examine the Italian case because, as several works have shown (e.g., Calcagnini & Perugini, 2019; D'Urso et al., 2020; Ferrara & Nisticò, 2015; Terzo et al., 2023), there are large regional disparities in well-being, despite evidence of a convergence process in some domains (e.g., Ferrara & Nisticò, 2013; Chelli et al., 2023). It is therefore important to examine the factors that determine these disparities in order to provide policy-makers with useful insights for the design of effective regional cohesion policies. Moreover, due to its institutional and administrative characteristics, Italy is an interesting case to study in terms of public spending, as shown by the various studies that abound in the regional science literature (e.g., Del Monte et al., 2022; De Siano & D'Uva, 2017; Ferraresi et al., 2018; Grisorio & Prota, 2015).

The results of several econometric estimations are consistent with the conceptual framework outlined. Indeed, we find robust evidence of a positive correlation between the level of public welfare spending per capita and a measure of regional well-being that follows the conceptual framework developed for the construction of the UN Human Development Index (HDI). These results provide interesting insights that can guide public policy strategies, as they confirm that a greater allocation of resources to human development policies is crucial for promoting well-being. Indeed, a social investment approach can overcome the trade-off between equity and efficiency by creating a virtuous circle leading to human capital development (Garrizman et al., 2022; Morel et al., 2012; Hemerijck, 2017; Ronchi, 2023). Indeed, a better and healthier population can only contribute more to regional productivity and innovation.

The remainder of the paper is structured as follows. The next section presents a conceptual framework from which we derive the hypothesis to be tested empirically. Section 3 illustrates the methods of constructing the two key variables and carries out a descriptive analysis to assess their change over time and the spatial

² See, for instance, the recent works of Miranda-Lescano et al. (2023, 2024).

distribution. Section 4 presents the empirical framework and reports the results of the estimations. Section 5 provides some comments on the results of the empirical analysis. Finally, Section 6 concludes the paper.

2. Conceptual framework

In this Section, we outline, through a literature review, a conceptual framework in which we argue that public welfare spending can promote regional well-being by fostering human development. Designing such a conceptual framework is a preliminary step in deriving the hypothesis on which we will structure the empirical analysis that follows.

Fiscal policies have a profound impact on society, as they can play a key role in addressing economic and social inequalities and promoting collective well-being. As stated by the International Monetary Fund (2017) and reported by Miranda-Lescano et al. (2024, p.364), fiscal policies can act through four main channels: a) cash transfers (social protection spending); b) in-kind transfers (such as health and education spending); c) progressivity of the tax system; and d) indirect taxes and subsidies. In this work, we focus on the first two channels, i.e. cash transfers and in-kind transfers. We then examine the impact on regional well-being of public spending on social protection, education, and health, which we define as public welfare spending.

There is a large body of literature linking public welfare spending to economic growth (e.g., Beraldo et al., 2009; Cooray & Nahm, 2024; Crociata et al., 2020; Furceri & Zdzienicka, 2012; Haile & Niño-Zarazúa, 2018; Kim & Ahn, 2020). The underlying idea is that a healthy and educated worker is expected to contribute more to production than one who is uneducated and in poor health (Beraldo et al., 2009).

Going into more detail about this argument, we can claim that by funding public education, governments can make a significant contribution to the accumulation of human capital, which a large body of literature has shown to be a key determinant of regional economic performance (e.g., Faggian et al., 2019; Florida et al., 2008; Gennaioli et al., 2011; Manca, 2012). Indeed, the endogenous growth theory explains that human capital is not an exogenously determined factor, but rather an endogenous factor that can be accumulated through education, training, and work experience. Based on the theory of endogenous growth, several studies show that an increase in the level of education leads to an enhancement of productivity, which has a positive effect on long-term economic growth (e.g., Abington & Blankenau, 2013; Barro, 2001; Blankenau & Simpson, 2004; Blankenau et al., 2007). This is because more skilled and educated human capital is able to use physical capital more efficiently and productively (Lucas, 1988) and to develop innovations that can contribute significantly to economic prosperity.

Health spending also plays an important role in promoting economic growth, mainly by improving human capital. First and foremost, healthcare services can improve cognitive skills, thereby increasing the productivity of individuals. It stands to reason that more productive individuals are likely to earn higher incomes and thus have a positive impact on their material standard of living (Beraldo et al., 2008). In addition, health care services can influence life expectancy, resulting in a higher return on investment that incentivises individuals to invest in education (Kim & Ahn, 2020).

With regard to social protection spending, there are various channels through which it can affect economic activity. As argued by Furceri and Zdeniecka (2012), an increase in social spending can lead to an expansion of both public and private consumption. Moreover, some measures, such as active labour market policies, can have a positive impact on output by fostering employment. However, according to the authors, an increase in social spending can also be associated with distortionary policies (such as disability benefits and early retirement schemes) that can lead to a reduction in labour force participation, with obvious negative consequences for economic activity. Another important aspect to emerge from the above study is that social protection spending has an important counter-cyclical function. Therefore, in an era of increasingly frequent exogenous shocks, it can be a key tool to promote regional resilience, understood as the ability not only to withstand the impact of an adverse event (such as a financial crisis, war, environmental disaster), but also to embark on a process of adaptation that can lead to new virtuous paths of regional development (Boschma, 2016).

So far, we have explored the impact of public welfare spending on economic activity. However, as Sen (1999) argue, economic growth is only the means by which the ultimate goal of development can be achieved – i.e., the removal of the barriers that prevent people from being fully free to live their lives according to their aspirations. It is therefore necessary to broaden the perspective and argue how public welfare spending can promote human development, thus going beyond the human capital paradigm. Adopting the human development paradigm means conceiving of development as an extension of capabilities. Drawing on Sen's contribution, we can conceptualise capabilities as the set of functionings that reflects the freedom of individuals to choose between different life alternatives. These are essentially meaningful outcomes that people can achieve, such as being educated, living in good health, having an active social and community life. Public welfare spending can contribute to human development by expanding the range of opportunities available to people through the provision of services related to basic functionings – such as education and

health. This can ensure the expansion of capabilities and empower citizens to be agents of their own change.³ These assumptions have been empirically tested by several studies (see, for example, the recent contributions of Haile and Niño-Zarazúa, 2018; Meliciani & Terzo, 2024; Miranda-Lescano et al., 2023,2024; Paliova et al., 2019), which show that public social spending is generally positively correlated with countries' welfare levels. However, the empirical literature on regional disparities is still limited. An interesting attempt to empirically assess the impact of social spending on regional welfare, adopting the social investment perspective, is proposed by Dellmuth (2021). The author empirically shows how social spending has positive effects on employment growth and unemployment, while finding no significant effects on perceived health, infant mortality, and youth activity. Finally, the author finds negative effects of social spending on inequality. In the wake of this work, we intend to enrich a literature that is not yet fully established, given that most existing studies ignore within-country differences in levels of well-being and public spending. This is particularly important since there can be great heterogeneity within countries, both in terms of socioeconomic conditions and levels of public spending. Moreover, adopting the regional perspective can help to understand how decentralisation can actually be an effective factor in promoting competitiveness, welfare and equity, as shown by several studies (e.g., Diaz-Serrano & Rodriguez-Pose, 2012; Rodríguez-Pose & Muštra, 2022; Tselios & Rodriguez-Pose, 2022).

3. Key variables of interest

In this section we provide information on our main variables of interest, the regional well-being index and the public welfare spending variable. Our sample consists of a panel of 21 Italian NUTS 2 regions covering the period 2010-2020.⁴

The dependent variable is a composite index of regional well-being based on the conceptual framework of the Human Development Index (HDI). The HDI is an index published annually by the United Nations Development Programme (UNDP) to provide a tool for more effective evaluation of development policies beyond the traditional use of GDP. It is structured considering three key dimensions: a) health; b) knowledge; and c) material living conditions.

Following the structure of the HDI and adopting a formative approach in which the elementary indicators are seen as causes of the level of well-being, we develop an index whose dimensions and related indicators are

³ A recent work of Abreu et al. (2023) stresses how in regional policy-making processes the capability approach might better address the challenges of regional development, focusing on real opportunities, agency, and process.

⁴ According to the NUTS-2 classification, Italy is divided into nineteen regions and two autonomous provinces (Trento and Bolzano).

shown in Table 1.⁵ This index is structured in line with previous work in regional science that emphasises the importance of adopting a multidimensional approach (e.g., Murias et al., 2012; Terzo et al., 2023; Veneri & Murtin, 2019). With regard to the material living conditions dimension, we consider the gross disposable income of consumer households (INCOME), which is perhaps the most widely used proxy for economic well-being. Concerning the knowledge dimension, we include one of the most widely used proxies for human capital in the empirical literature, namely the percentage of persons aged 25-39 with tertiary education (ISCED 5, 6, 7 and 8) out of the total number of persons aged 25-39 (TERTIARY_EDUC). Finally, the health dimension consists of two traditional indicators: infant mortality rate (INFANT_MORT) and life expectancy at birth (LIFE_EXP).⁶ Following Di Bernardino et al. (2016), the synthetic index is obtained by taking the arithmetic mean of the elementary indicators normalised by the min-max technique. In the construction of the index, we consider an equal weighting scheme, which is empirically justified in the construction of well-being indices when there is no adequate information on the causal relationship between indicators (Nardo et al., 2005).⁷

Table 1. Composition of the index of regional well-being

Indicator	Description	Dimension
Gross disposable income of consumer households	Income available to households such as wages and salaries, income from self-employment and unincorporated enterprises, income from pensions and other social benefits, and income from financial investments.	Material living conditions
Tertiary education	Percentage of 25–39-year-olds with tertiary level education (ISCED 5, 6, 7 or 8) out of total 25–39-year-olds.	Knowledge
Infant mortality	Deaths in the first year of life per 1000 live births	Health
Life expectancy at birth	Average number of years a child can expect to live	

Note. All variables reported above have as source the Italian National Statistics Institute (ISTAT).

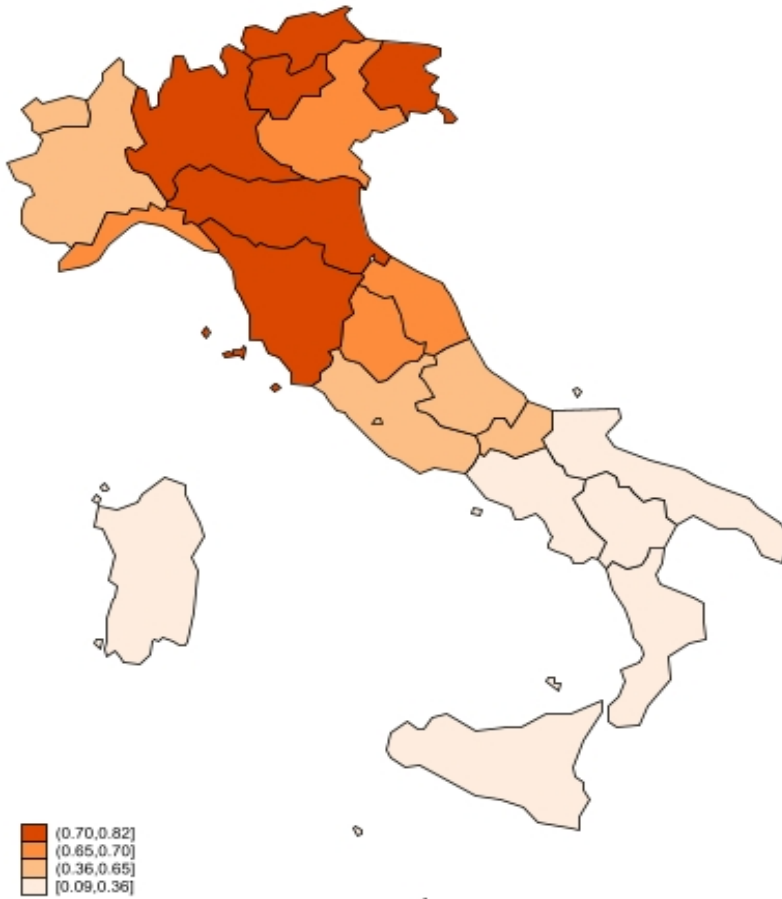
⁵ The construction of subnational human development indicators is found in some works, such as Di Bernardino et al. (2016), Hardeman and Dijkstra (2014), and Monni (2002).

⁶ With regard to the selection of the elementary indicators, we adopted the following procedure. First, in order to avoid subjective choices, we considered all indicators from the data warehouse "Equitable and Sustainable Wellbeing" (BES) of the Italian National Institute of Statistics (ISTAT) belonging to the domains "Economic well-being", "Education and training" and "Health". Next, we excluded all indicators for which no adequate time series were available. The remaining indicators were selected on the basis of a correlation analysis, selecting those that did not have a correlation of more than 80 percent with the other variables. Table A1 in Appendix shows the correlation matrix of elementary indicators.

⁷ To test the robustness of our index, we use different aggregation schemes, the Adjusted Mazziotta-Pareto Index (AMPI - Mazziotta & Pareto, 2018) and the geometric mean, which are non-compensatory methods. The indicators generated using different aggregation schemes are almost collinear. For this motivation, we keep the indicator aggregated by the arithmetic mean, as there is no significant difference between the compensatory and non-compensatory schemes. This suggests that there is not a high imbalance between the elementary indicators that would justify the adoption of a non-compensatory method.

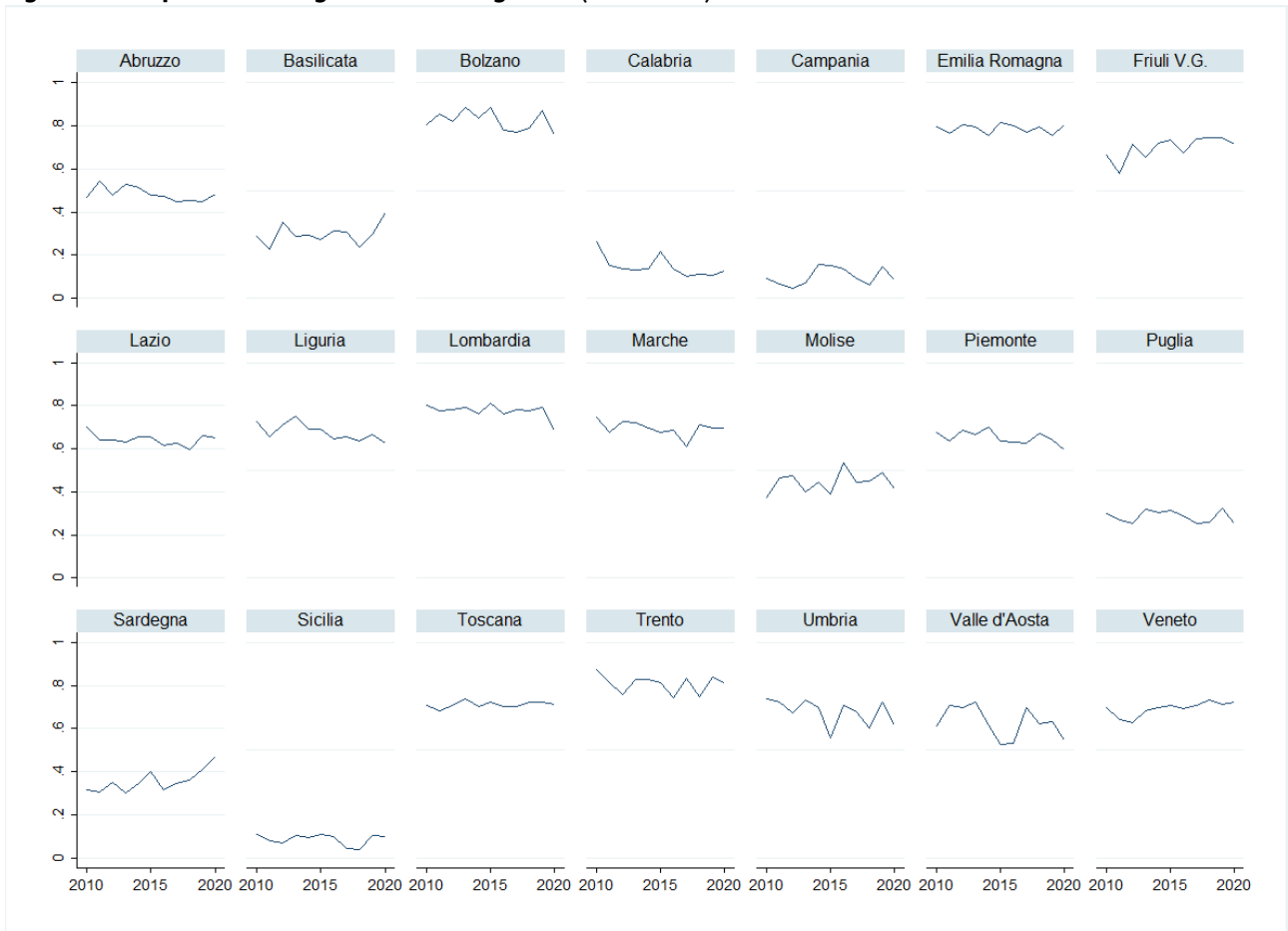
Figure 1 shows the quantile map of the regional well-being index (WELL_BEING), whose range varies from 0 to 1. This indicator, averaged over the period 2010-2020, shows a non-random spatial distribution, reflecting the traditional development disparities between the Centre-North and the South.

Figure 1. Regional well-being index (average 2010-2020)



Source. Our elaboration on ISTAT data

Figure 2 shows the index line plots for all regions. It is immediately apparent that there is considerable stability in territorial disparities over time, since human development is mainly determined by structural factors that are unlikely to change significantly over a time interval that is not as long as the one considered in this study.

Figure 2. Line plots of the regional well-being index (2010-2020)

Source. Our elaboration on ISTAT data

To construct a measure of public welfare spending, we identify an aggregate of public spending that, following Haile and Niño-Zarazúa (2018), considers specific items allocated to the following domains: health, education, and social protection. Based on the results of the previous literature review, we consider these domains as pivotal for the fostering of human development. Data on public spending in the regions are provided by the system of *Conti Pubblici Territoriali* (Public Territorial Accounts), which reconstructs all expenditure and revenue flows of public institutions at regional level. Specifically, this indicator consists in the aggregation of the spending items shown in Table 2, which also indicates the correspondence with the COFOG (Classification on the Function of Government) framework. Essentially, they can be grouped into five sub-domains: (i) health, (ii) social interventions, (iii) pension and wage integration, (iv) education, and (v) training.⁸

⁸ The economic spending categories used to define these spending domains are investment, capital transfers, and primary current spending.

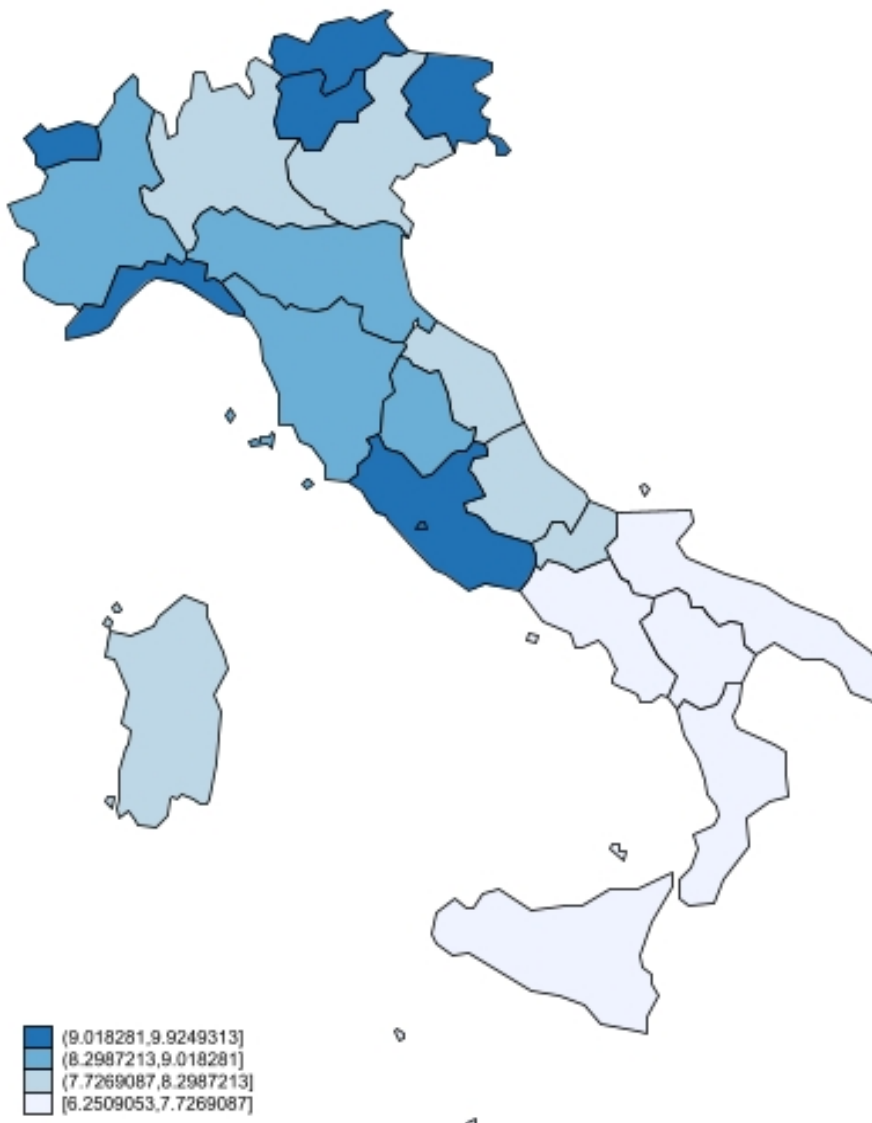
Table 2. Composition of the public welfare spending index

Spending item	Description	Domain
Education	Spending on: the administration, operation, and management of public schools and universities; school and university buildings; educational support services (transport, accommodation, meals, after-school activities, health and dental care); boarding schools; support for the right to education (book vouchers, school transport subsidies, canteens, boarding schools) provided by the various local authorities; measures to promote educational and scientific cooperation initiatives, exchanges, research, educational trips, studies, and school partnerships.	Education and training
Training	Spending on: vocational training and guidance, and the related construction and management of facilities and structures. It includes expenditure on technical and educational resources and aids; allocations to local authorities for the financing of activities to implement training policies; assistance for the implementation of Community programmes; contributions to encourage initiatives to promote an organic territorial rebalancing of operational vocational training structures with a view to improving their quality and efficiency.	
Health	Spending on: prevention, protection and care of health in general (medical and hospital services of a general, specialist and paramedical nature), and related facilities; public health services (disease detection services, prevention services, blood banks, etc.); operation of pharmacies and supply of pharmaceutical products, equipment and services; operation of social/health centres and zooprophyllactic institutes; support and financing of health activities (e.g. transfers to the National Health Fund); formulation and administration of government policy in the health sector; preparation and enforcement of regulations for medical and paramedical personnel and for hospitals, clinics and doctors' surgeries; activities of health commissions; spa facilities.	Health
Social interventions	Spending on activities relating to the administration, management and implementation of social protection measures in cases of insufficient economic resources or need (sickness and disability, old age and survivors, family, employment, housing, social exclusion), and the provision of benefits in cash or in kind in this context, if financed by general taxation; old people's homes and other residential establishments; provision of social services to persons in specialised institutions or at home.	Social protection
Social security and wage subsidies	Spending on: the administration, management, and implementation of social protection policies (sickness and disability, old age and survivors, family, employment, housing, social exclusion), and the provision of benefits in kind and in cash, where these are financed by contributions.	

Note. The source of the data is the *Conti Pubblici Territoriali* (CPT) system.

In Figure 3 we can see the quantile map of the indicator that we define as public welfare spending (WELFARE_SPEND), which is expressed in per capita terms to check how it is distributed within the population.⁹ Compared with the regional well-being index, the spatial distribution of the level of public welfare spending per capita appears to be less affected by the presence of spatial clusters of regions with similar values. In particular, among the regions with the highest values we find the autonomous regions (regions with special status) – such as Trentino Alto Adige, Valle d'Aosta, and Sardinia – which have greater discretionary powers over public spending than the ordinary regions.¹⁰

Figure 3. Public welfare spending index (average 2010-2020)



Source. Our elaboration on CPT data.

⁹ In order to facilitate comparisons between regions, this indicator is expressed in real terms by means of a standard deflation procedure using the GDP deflator (2015 = 100). Values are in thousands of euros.

¹⁰ A region with special status is a region of the Italian Republic that benefits from special forms and conditions of autonomy. Five Italian regions are designated as regions with special status by the Italian Constitution: Sicily, Sardinia, Valle d'Aosta, Friuli-Venezia Giulia, and Trentino-Alto Adige (consisting of the autonomous provinces of Trento and Bolzano).

Figure 4 shows line plots of per capita welfare spending for each region. In many regions, especially in the South, there is an increasing trend that seems to describe some sort of convergence process, although the Centre-North regions generally maintain higher levels of per capita spending. Note how in 2020, the year of the pandemic, spending increased in almost all regions to cope with the social emergency caused by the shock.

Figure 4. Line plots of the public welfare spending index (2010-2020)



Source. Our elaboration on CPT data

4. Empirical strategy and estimation results

To test the conceptual framework presented above, we define an empirical framework that aims to identify evidence pointing to the possibility of a causal link between public welfare spending and regional well-being. We therefore carry out an econometric panel analysis of the 21 Italian NUTS-2 regions (19 regions and the two autonomous provinces of Trento and Bolzano) for the period 2010-2020, which is particularly interesting to investigate in view of the fact that during this time frame there have been events, such as the pandemic that broke out in 2020 and the public debt crisis of 2010, that have had a profound impact on fiscal policy.

In this section, we therefore explain the methodological strategy used to address the objective of this work and illustrate the results of the econometric analysis.

4.1. Baseline model

We first estimate the following model:

$$WELL_BEING_{it} = \beta_0 + \beta_1 WELFARE_SPEND_{it} + \beta_2 X_{it} + \mu_t + \varepsilon_{it} \quad (1)$$

Where i represents the NUTS-2 regions, t the time periods, and β the parameters to be estimated. In equation (1), $WELL_BEING$ is the index of regional well-being, $WELFARE_SPEND$ the measure of public welfare spending, X a vector of control variables, μ_t the time dummies, and ε the error term.¹¹ Following Miranda-Lescano et al. (2023, 2024), we estimate the model with OLS based on panel-corrected standard errors (PCSE) that are robust to heteroscedasticity and cross-sectional dependence (Beck & Katz, 1995), which typically occurs between spatial observations. As pointed out by the above authors, the use of a within-estimator is widespread in panel analysis, allowing us to control for those unobserved geographical and socio-cultural factors that do not change over time, which can be a source of omitted variable bias. However, in our case, the dependent variable is quite stable over time since much of its variation is between-region rather than within-region.¹² In this scenario, using fixed-effects estimation entails incorporating factors that remain constant over time, potentially masking the influence of long-term confounding variables. Consequently, disentangling genuine causal effects from these additional factors becomes challenging. This could lead to biased results that may not reflect causal linkage. As a result, we do not consider the inclusion of regional fixed effects to be a priority. Nevertheless, we include the macro-regional dummies North and Centre (with the South as reference), in order to control for the heterogeneity resulting from the socio-cultural, geographical, institutional, and administrative features that characterise the Italian territory.¹³

As for the control variables, their selection is inspired by an analysis of two distinct branches of literature. The first concerns the regional determinants of well-being and economic development (e.g., Botzen, 2016; Liberati & Resce, 2022; Peiró-Palomino, 2019; Peiró-Palomino et al., 2020; Terzo 2022; Terzo et al., 2023) while the second the impact of public welfare spending on human development and its dimensions (e.g., Haile and Niño-Zarazúa, 2018; Meliciani & Terzo, 2024; Miranda-Lescano et al., 2023,2024; Paliova et al., 2019). Based on this

¹¹ The key independent variable is log-transformed (natural logarithm) to reduce skewness. This is a common procedure when dealing with per capita measures of public expenditure. See, for example, Rodríguez-Pose et al. (2016).

¹² The within standard deviation is 0.040 while the between standard deviation is 0.241.

¹³ With regard to the macro-regional dummies, the North dummy includes the NUTS-1 regions North-East and North-West, while the South dummy includes the NUTS-1 regions South and Islands.

analysis, we therefore consider the following variables useful to control the main socio-demographic, institutional, and economic features of regions:

- Dependency ratio, measured as the ratio of the non-working age population (0-14 years and 65 years and over) to the working age population (DEP_RATIO).
- Tertiary sector employed as a percentage of total employed (TERTIARY).
- Primary sector employed as a percentage of total employed (PRIMARY).
- Regional autonomy, a dummy variable that indicates the autonomous regions (AUTONOMOUS).
- Annual population growth (in %) (POP_GROWTH).¹⁴

With regard to the structural dependency ratio and population growth, we include them in the model to control for the socio-demographic characteristics of the regions. Considering anecdotal evidence, we expect a negative sign for the dependency ratio, since a larger share of the inactive population could have a negative impact on the accumulation of human capital, with a whole series of negative consequences for productivity, health, and innovative capacity – and thus for the overall well-being of regions. Otherwise, we expect a positive sign for population growth. In a context of demographic stagnation (Reynaud et al., 2018), population growth can have positive effects on human capital accumulation. With respect to the share of employees in the primary and tertiary sectors (we exclude the manufacturing sector to avoid a multicollinearity issue), they are useful for verifying the sectoral composition of economic activity, the impact of which on regional well-being is uncertain (Peirò-Palomino et al., 2020). Finally, regarding the autonomy of regions, the relative dummy variable is useful for capturing the impact of fiscal and political decentralization, for which there is no clear evidence in the literature (Peirò-Palomino et al., 2020).

Table 3 shows the results of different specifications of the baseline model. We first estimate the model by including only the main independent variable (Column I). In subsequent estimations, we progressively include continuous control variables (Column II), macro-regional dummies and the dummy for autonomous regions (column III), and finally time dummies (column IV). The estimation results are particularly encouraging. Our variable of interest has a positive and statistically significant coefficient in all cases. We thus have the first significant evidence that public welfare spending has a positive impact on regional well-being. The control variables are all statistically significant except for the dependency ratio, which loses significance in the last two

¹⁴ Table A2 in the Appendix provides a detailed description of the variables included in the model and the main descriptive statistics. Table A3 shows the correlation matrix of explanatory variables.

specifications. We can therefore be reasonably satisfied with this model as it has good explanatory power, which is also reflected in the value of the coefficients of determination.

Table 3. Estimation results I (OLS model)

	(I)	(II)	(III)	(IV)
WELFARE_SPEND	1.507*** (0.083)	1.081*** (0.059)	1.047*** (0.103)	1.120*** (0.095)
POP_GROWTH		0.013*** (0.001)	0.009*** (0.001)	0.010*** (0.002)
TERTIARY		-0.013*** (0.001)	-0.011*** (0.001)	-0.012*** (0.001)
PRIMARY		-0.018*** (0.002)	-0.011*** (0.002)	-0.012*** (0.002)
DEP_RATIO		0.008*** (0.002)	0.000 (0.002)	-0.001 (0.002)
NORTH			0.131*** (0.022)	0.111*** (0.021)
CENTRE			0.126*** (0.020)	0.109*** (0.019)
AUTONOMOUS			-0.054*** (0.009)	-0.059*** (0.009)
Time dummies	No	No	No	Yes
R ²	0.687	0.910	0.928	0.940
N. of regions	21	21	21	21
N. of observations	231	231	231	231

Notes: All regressions report PCSE in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

4.2 Extensions and robustness

The previous results, although satisfactory, should be treated with caution as there are some issues that may have biased the estimates. Indeed, despite the introduction of time and macro-regional dummies, there may still be an omitted variable bias. This means that we may have ignored some factors that could significantly affect the relationship between public welfare spending and regional well-being. Moreover, the possibility of simultaneous or reverse causality between the two variables of interest should not be neglected. Therefore, in order to verify the robustness of the results obtained so far with respect to endogeneity, we propose an instrumental variables estimation employing a two-stage least squares estimator (IV-2SLS).

In such a regression, the choice of instrumental variables is crucial. They must be exogenous, i.e. uncorrelated with the error term, and significantly correlated with the endogenous variable. Given the difficulty in identifying instruments that are truly exogenous, we instrument the endogenous variable with its time lag. As argued by Reed (2015), the use of internal instrumental variables is a fairly common and reliable practice when there is difficulty in identifying external instrumental variables that meet the exogeneity requirement. However,

lagged variables may still fail to meet this requirement if they are correlated with unobserved factors in our model (Bellemare et al., 2017). Therefore, following a common practice in several empirical studies, we lag the instrumental variable by 10 years (deep lag). In this way, we ensure the robustness of the exogeneity assumption even in the presence of serial correlation in the endogenous variables (Aresu et al., 2023; Crociata et al., 2020). Hence, although the choice of a deep lag implies a reduction in the estimation sample size, it allows us to deal with endogeneity more effectively.

Table 4. Estimation results II (IV-2SLS model)

Second stage	
(dep. variable: WELL_BEING)	
WELFARE_SPEND	1.436*** (0.137)
POP_GROWTH	0.009*** (0.002)
TERTIARY	-0.013*** (0.001)
PRIMARY	-0.013*** (0.002)
DEP_RATIO	-0.005** (0.003)
NORTH	0.068* (0.037)
CENTRE	0.070** (0.029)
AUTONOMOUS	-0.084*** (0.021)
Time dummies	Yes
R ²	0.934
First stage	
(dep. variable: WELFARE_SPEND)	
WELFARE_SPEND (lag)	0.804*** (0.074)
Control variables	Yes
Time dummies	Yes
Kleibergen-Paap rk Wald F statistic	116.710
Kleibergen-Paap rk LM statistic (p-value)	0.006
Anderson-Rubin Wald test (p-value)	0.000
R ²	0.897
N. of regions	21
N. of observations	231

Notes: All regressions report standard errors clustered by region in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

Table 4 shows the results of the IV-2SLS estimation, using standard errors clustered by region. The second stage estimation of the IV-SLS model confirms the results of the previous estimations, with our independent variable of interest having a coefficient with a positive sign and statistically significant at 1%. Regarding the control variables, the only difference with the previous estimation is that the variable DEP_RATIO assumes a

negative and statistically significant coefficient. Focusing on the estimation of the first stage, the instrumental variable turns out to be significantly correlated with the endogenous variable. The weak identification test (Kleibergen-Paap rk LM statistic) shows us that the instrument are not weak since the value of the F statistic (116.710) is well above the standard threshold of 10 indicated by Staiger & Stock (1997). Finally, the Anderson-Rubin test and the under identification test (Kleibergen-Paap rk LM statistic) confirm that the model is correctly identified. Thus, we can argue with reasonable confidence that we have effectively addressed the potential endogeneity that characterises the relationship between the level of public welfare spending and regional well-being.

Another important issue to address is spatial dependence, as this could be a source of bias in our estimates (Le Sage & Pace, 2009). For this reason, we also estimate spatial regression models. Using the baseline pooled OLS estimate previously presented, we perform the traditional tests to verify whether there is spatial autocorrelation in the residuals and to choose the most appropriate estimation procedure between the spatial autoregressive model (SAR) and the spatial error model (SEM) (Elhorst, 2010, 2014). The SAR consists in including the spatially lagged dependent variable as an additional regressor ($\rho W y$), while the SEM consists in spatially lagging the error term ($\varepsilon = u + W\varepsilon$). Regarding the choice of the spatial weighting matrix (W), we opt for two different options: a KNN matrix with 5 neighbours and an inverse-distance matrix with 350 km as cut-off. Table 5 shows the results of the spatial diagnostics. The Moran's index confirms the presence of a spatial autocorrelation in the residuals, while the LM tests indicate that the SAR is the most appropriate solution.¹⁵

Table 5. Diagnostics for spatial dependence

Test	Inverse-distance		KNN	
	Value	Probability	Value	Probability
Moran's I (error)	4.416	0.000	2.592	0.001
LM (Lag)	24.048	0.000	8.199	0.004
Robust LM (Lag)	20.031	0.000	8.258	0.004
LM (error)	4.017	0.045	0.468	0.494
Robust LM (error)	0.000	0.993	0.527	0.468

The results of the spatial model estimations obtained using the Maximum Likelihood (ML) estimator are shown in Table 6. In both cases, our main independent variable has a positive and statistically significant coefficient. Therefore, we can claim that our results are not biased by spatial dependence. Both the spatial autoregressive

¹⁵ We use two different matrices (both row-standardised) in order to verify whether the results are not sensitive to the choice of spatial weighting matrix. We show the estimates using a KNN matrix with 5 neighbours and an inverse-distance matrix with 350 km as cut-off, as they ensures the best-fitting model.

terms are positive and statistically significant in the respective models. Regarding the control variables, we do not observe any substantial changes with respect to the previous estimate.

Earlier, we argued that the fixed effects panel estimation was not the most appropriate choice given the characteristics of our key variables of interest. However, for robustness purposes, we intend to run traditional estimations with both fixed-effects (FE) and random-effects (RE).¹⁶ Looking at the results of the estimations in Table 7, the results are largely confirmed. In the FE estimation, we can see that the within R^2 is quite low. Thus, the model does not explain much of the variation in the dependent variable within units over time. This confirms the validity of our initial decision to opt for a pooled OLS estimation, although panel estimations both with FE and RE are useful for providing robustness to the evidence so far.

Table 6. Estimation results III (SAR model)

	(I) KNN	(II) Inverse-distance
WELFARE_SPEND	1.076*** (0.066)	0.977*** (0.067)
POP_GROWTH	0.011*** (0.002)	0.011*** (0.002)
TERTIARY	-0.011*** (0.001)	-0.010*** (0.001)
PRIMARY	-0.008*** (0.002)	-0.005*** (0.001)
DEP_RATIO	-0.000 (0.002)	-0.000 (0.002)
NORTH	0.070*** (0.024)	0.081*** (0.021)
CENTRE	0.080*** (0.022)	0.101*** (0.020)
AUTONOMOUS	-0.075*** (0.012)	-0.066*** (0.011)
W*WELFARE_SPEND	0.162*** (0.050)	0.262*** (0.048)
Time dummies	Yes	Yes
R ²	0.943	0.947
N. of regions	21	21
N. of observations	231	231

Notes: All regressions report standard errors in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

To complete the robustness analysis, we propose further econometric exercises, which results are reported in Appendix. First, we allow for the possibility that public welfare spending may have a lagged effect on regional well-being. Therefore, as can be seen in Table A4, we estimate the baseline model by lagging our independent

¹⁶ The Hausman test indicates that the FE procedure is preferable. However, for the sake of completeness, we also report the estimation of RE models.

variable of interest by one, two, and three years respectively. This is also useful for further verifying that our estimates are not biased by reverse causality.

Second, we consider the disaggregation of our variables of interest. The idea is to test whether public welfare spending affects not only overall regional well-being, but also its individual dimensions. We then estimate several models using as dependent variables the elementary indicators that constitute our regional well-being index. It is also useful to examine the impact of the different types of public welfare spending on regional well-being. Following the COFOG scheme, we therefore construct three measures of public spending on education (EDUC_SPEND), health (HEALTH_SPEND) and social protection (SOCPROT_SPEND).¹⁷ Tables A5 and A6 show the results of the estimations. The results provide further robustness to the evidence that public welfare spending and its components have a positive impact on regional well-being.

Table 7. Estimation results IV (FE and RE models)

	(I) FE	(II) RE
WELFARE_SPEND	0.371*** (0.089)	0.510*** (0.079)
POP_GROWTH	0.003* (0.002)	0.005** (0.002)
TERTIARY	-0.020*** (0.006)	-0.010*** (0.003)
PRIMARY	-0.010 (0.010)	-0.008 (0.006)
DEP_RATIO	0.023** (0.009)	0.008* (0.005)
NORTH		0.231*** (0.073)
CENTRE		0.221*** (0.070)
AUTONOMOUS		0.001 (0.047)
Time dummies	Yes	Yes
Within R ²	0.194	0.142
Between R ²	0.650	0.926
Overall R ²	0.638	0.904
N. of regions	21	21
N. of observations	231	231

Notes: All regressions report clustered standard errors in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

¹⁷ All these variables are log-transformed (natural logarithm).

4.3 Comments

The results of the empirical analysis confirm our initial hypothesis: public welfare spending can be a key determinant of regional well-being. This evidence is consistent with the large body of empirical literature, mostly cross-country, that has shown that public spending on health, education, and social protection can promote not only greater equity but also efficiency. However, such cross-country studies do not consider the heterogeneity of socio-economic conditions across countries. For this reason, investigating the relationship between public welfare spending and well-being at the sub-national level is a crucial step in advancing an empirical literature that, despite a large number of studies, is not yet fully mature. Our analysis can therefore help to provide new and important evidence on an emerging issue, particularly given the significant impact that the succession of external shocks has had on regional development disparities. The emergence of new forms of poverty and the widening of socio-economic inequalities can have a profound impact on regional development, undermining one of its fundamental pillars: social cohesion (Rodríguez-Pose, 2018). It is therefore essential to consider how public policies can promote equitable and sustainable well-being. To this end, it is necessary to propose research that provides concrete evidence to support policy decisions at regional and local levels.

Regarding the control variables, the results of the baseline model on the relationship between population growth and well-being are in line with the findings of, for example, the work of Peirò-Palomino (2019) on the determinants of regional well-being in OECD countries. Population growth can indeed have positive effects at the economic level, as it can stimulate aggregate demand. However, the results obtained are certainly not conclusive and more evidence is needed to understand the possible negative effects as well. With regard to the dependency ratio, the results are ambiguous and, thus, inconclusive. Finally, as regards the sectoral composition of the economy, the negative signs of the variables for the primary and tertiary sectors should be interpreted in relation to the industrial sector. Thus, our analysis seems to suggest how a greater weight of the industrial sector could lead to an improvement in regional well-being. This result is consistent, for example, with evidence from recent work by Muringani (2022) and Terzo et al. (2023). However, the effects of these variables on the different dimension of our composite index appear to be differentiated and therefore need to be investigated in more detail. Finally, the negative sign observed in different models with respect to the dummy variable of autonomous regions is evidence, which clearly requires further in-depth study to verify its robustness, that could confirm what Rodríguez-Pose and Ezcurra (2011) claim about the possibility that subnational governments could be more susceptible to being captured by local interests, leading to greater corruption, clientelism, and patronage, which can be detrimental for regional well-being.

5. Concluding remarks

This paper has aimed to investigate the role of public welfare spending in fostering the well-being of Italian NUTS-2 regions. Specifically, we examined how public investment in human development, measured by aggregating a variety of public spending items that can be traced back to the health, education, and social protection domains, can contribute to promoting both equity and efficiency, thereby positively affecting the socio-economic development outlook of regions. The hypothesis underlying this study is that public investment in welfare has the potential to support the development of human capabilities. This concept, inspired by the theory of Amartya Sen, emphasises the idea that the enhancement of individual capabilities has a positive impact on both equity, enabling individuals to reach their full potential and lead a decent life, and efficiency. This process not only fosters greater individual productivity, but also contributes significantly to overall economic growth and development.

The results obtained from a panel analysis of 21 Italian NUTS-2 regions for the period 2010-2020 are particularly interesting because they show how public intervention, if targeted at productive spending in the key sectors for human development that allow equity and efficiency to be reconciled, can be decisive in sustaining the well-being of regions, especially at a time when external shocks with significant social costs are becoming more frequent and are threatening social cohesion.

This study clearly has its limitations. Firstly, because it focuses on a single country. It is therefore difficult to generalise the results, given the political-administrative, socio-cultural, and economic peculiarities of Italy. However, as we pointed out several times, the analysis of the relationship between public welfare spending and well-being at the sub-national level is of major interest for the advancement of an empirical literature that is still mainly concentrated on cross-national disparities and does not consider the heterogeneity of socio-economic conditions that can be observed at the regional level. The second limitation of our study is that it is essentially a static analysis. It would be important, with a much larger time series available, to carry out a dynamic panel analysis that would allow us to understand how the evolution of public welfare spending has affected regional well-being disparities and convergence processes. Finally, another potential limitation is that welfare spending has a cost, and it would be interesting in future studies to examine the effect net of the tax burden. However, this limitation is less relevant in a regional context where the state acts as a redistributor of resources. In conclusion, neglecting these factors may limit the validity of our findings on the impact of public welfare spending on regional well-being and points to the need for further research to address these policy concerns more fully.

References

- Abington, C., & Blankenau, W. (2013). Government education expenditures in early and late childhood. *Journal of Economic Dynamics and Control*, 37(4), 854-874.
- Abreu, M., Comim, F., & Jones, C. (2024). A capability-approach perspective on regional development. *Regional Studies*, 1-13.
- Acconcia, A., & Del Monte, A. (2000). Regional development and public spending: the case of Italy. *Studi economici*, 72(3), 5-24.
- Akçomak, I. S., & Ter Weel, B. (2009). Social capital, innovation and growth: Evidence from Europe. *European Economic Review*, 53(5), 544-567.
- Aresu, F., Marrocu, E., & Paci, R. (2023). Public capital and institutions' quality in the Italian regions. *Journal of Regional Science*, 63(5), 1284-1308.
- Barro, R. J. (2001). Human capital and growth. *American economic review*, 91(2), 12-17.
- Beck, N., & Katz, J. N. (1995). What to do (and not to do) with time-series cross-section data. *American political science review*, 89(3), 634-647.
- Bellemare, M. F., Masaki, T., & Pepinsky, T. B. (2017). Lagged explanatory variables and the estimation of causal effect. *The Journal of Politics*, 79(3), 949-963.
- Beraldo, S., Montolio, D., & Turati, G. (2009). Healthy, educated and wealthy: A primer on the impact of public and private welfare expenditures on economic growth. *The Journal of Socio-Economics*, 38(6), 946-956.
- Blankenau, W. F., & Simpson, N. B. (2004). Public education expenditures and growth. *Journal of development economics*, 73(2), 583-605.
- Blankenau, W. F., Simpson, N. B., & Tomljanovich, M. (2007). Public education expenditures, taxation, and growth: Linking data to theory. *American Economic Review*, 97(2), 393-397.
- Boschma, R. (2017). Towards an evolutionary perspective on regional resilience. In *Evolutionary Economic Geography* (pp. 29-47). Routledge.
- Botzen, K. (2016). Social capital and economic well-being in Germany's regions: An exploratory spatial analysis. *Region*, 3(1), 1-24.
- Calcagnini, G., & Perugini, F. (2019). Social capital and well-being in the Italian provinces. *Socio-Economic Planning Sciences*, 68, 100668.
- Chelli, F. M., Ermini, B., Gallegati, M., & Gentili, A. (2023). Investigating Regional Disparities in Italy's Well-Being Since Unification (1871-2011). *Italian Economic Journal*, 9(2), 697-722.
- Cooray, A., & Nam, Y. S. (2024). Public social spending, government effectiveness, and economic growth: an empirical investigation. *Applied Economics*, 1-15.
- Cosci, S., Di Cagno, D., & Meliciani, V. (1999). Gli effetti della spesa pubblica sulla crescita delle regioni italiane. *Rivista italiana degli economisti*, 4(2), 213-238.

- Crociata, A., Odoardi, I., Agovino, M., & Sacco, P. L. (2020). A missing link? Cultural capital as a source of human capital: Evidence from Italian regional data. *The Annals of Regional Science*, *64*, 79-109.
- Crociata, A., Agovino, M., Furia, D., Osmi, G., Mattoscio, N., & Cerciello, M. (2020). Impulse and time persistence of disaggregate welfare expenditure on growth in the EU. *Economia Politica*, *37*, 13-38.
- Daniele, V. (2009). Public spending and regional convergence in Italy. *Journal of Applied Economic Sciences*, *4*(2), 318-328.
- De Blasio, G., & Nuzzo, G. (2010). Historical traditions of civicness and local economic development. *Journal of Regional Science*, *50*(4), 833-857.
- Dellmuth, L. (2021). EU Spending Effects on Regional Well-Being. In *Is Europe Good for You?* (pp. 77-98). Bristol University Press.
- Del Monte, A., De Iudicibus, A., Moccia, S., & Pennacchio, L. (2022). Speed of spending and government decentralization: evidence from Italy. *Regional Studies*, *56*(12), 2133-2146.
- De Siano, R., & D'uva, M. (2017). Fiscal decentralization and spillover effects of local government public spending: the case of Italy. *Regional Studies*, *51*(10), 1507-1517.
- Di Bernardino, C., Mauro, G., Quaglione, D., & Sarra, A. (2016). Industrial districts and socio-economic well-being: An investigation on the Italian provinces disparities. *Social Indicators Research*, *129*, 337-363.
- Diaz-Serrano, L., & Rodríguez-Pose, A. (2012). Decentralization, subjective well-being, and the perception of institutions. *Kyklos*, *65*(2), 179-193.
- D'Urso, P., Alaimo, L. S., De Giovanni, L., & Massari, R. (2020). Well-being in the Italian regions over time. *Social Indicators Research*, 1-29.
- Elhorst J.P. (2010) Applied spatial econometrics: Raising the bar. *Spatial Economic Analysis*, *5*: 9-28.
- Elhorst J.P. (Ed.) (2014) *Spatial Econometrics: From Cross-Sectional Data to Spatial Panels*. Springer-Verlag, Berlin
- Faggian, A., Modrego, F., & McCann, P. (2019). Human capital and regional development. *Handbook of regional growth and development theories*, 149-171.
- Ferrara, A. R., & Nisticò, R. (2013). Well-being indicators and convergence across Italian regions. *Applied Research in Quality of Life*, *8*, 15-44.
- Ferrara, A. R., & Nisticò, R. (2019). Does institutional quality matter for multidimensional well-being inequalities? Insights from Italy. *Social Indicators Research*, *145*(3), 1063-1105.
- Ferrara, A. R., Dijkstra, L., McCann, P., & Nisticó, R. (2022). The response of regional well-being to place-based policy interventions. *Regional Science and Urban Economics*, *97*, 103830.
- Ferrari, L., & Meliciani, V. (2022). *Public Spending for Future Generations: Recent Trends in EU Countries*. Luiss School of European Political Economy.
- Ferraresi, M., Migali, G., & Rizzo, L. (2018). Spillover effects in local public spending. *Regional Studies*, *52*(11), 1570-1584.

- Florida, R., Mellander, C., & Stolarick, K. (2008). Inside the black box of regional development—human capital, the creative class and tolerance. *Journal of economic geography*, 8(5), 615-649.
- Furceri, D., & Zdzienicka, A. (2012). The effects of social spending on economic activity: Empirical evidence from a panel of OECD countries. *Fiscal Studies*, 33(1), 129-152.
- Garrizmann, J., Häusermann, S., & Palier, B. (2022). *The World Politics of Social Investment (Volume II). Welfare States in the Knowledge Economy*.
- Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2013). Human capital and regional development. *The Quarterly journal of economics*, 128(1), 105-164.
- Grisorio, M. J., & Prota, F. (2015). The impact of fiscal decentralization on the composition of public expenditure: panel data evidence from Italy. *Regional Studies*, 49(12), 1941-1956.
- Haile, F., & Niño-Zarazúa, M. (2018). Does social spending improve welfare in low-income and middle-income countries?. *Journal of International Development*, 30(3), 367-398.
- Hemerijck, A. (Ed.). (2017). *The uses of social investment*. Oxford: Oxford University Press.
- International Monetary Fund (2017). *IMF fiscal monitor: Tackling Inequality*. International Monetary Fund: Washington, DC, USA.
- Kazepov, Y., & Cefalo, R. (2022). The territorial dimension of social investment in Europe. In *Handbook on urban social policies* (pp. 55-71). Edward Elgar Publishing.
- Kim, S. W., & Ahn, S. H. (2020). Social investment effects of public education, health care, and welfare service expenditures on economic growth. *Asian Social Work and Policy Review*, 14(1), 34-44.
- LeSage JP, Pace RK (2009) *Introduction to spatial econometrics*. Taylor & Francis, New York, FL
- Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, 22(1), 3-42.
- Liberati, P., & Resce, G. (2022). Regional well-being and its inequality in the oecd member countries. *The Journal of Economic Inequality*, 20(3), 671-700.
- Luintel, K. B., Matthews, K., Minford, L., Valentinyi, A., & Wang, B. (2020). The role of Provincial Government Spending Composition in growth and convergence in China. *Economic Modelling*, 90, 117-134.
- Manca, F. (2012). Human capital composition and economic growth at the regional level. *Regional Studies*, 46(10), 1367-1388.
- Meliciani, V., & Terzo, G. (2024). *Public welfare spending and cross-country economic disparities in the European Union: Panel evidence for the period 2000-2021*, Luiss Institute for European Analysis and Policy, Working Paper 2/2024.
- Miranda-Lescano, R., Muinelo-Gallo, L., & Roca-Sagalés, O. (2023). Human development and decentralization: The importance of public health expenditure. *Annals of Public and Cooperative Economics*, 94(1), 191-219.
- Miranda-Lescano, R., Muinelo-Gallo, L., & Roca-Sagales, O. (2024). Human development and inequalities: The importance of social public spending. *Structural Change and Economic Dynamics*, 69, 363-377.
- Monni, S. (2003). L'indice di sviluppo umano nelle province italiane. *QA Rivista dell'Associazione Rossi-Doria*, (2002/1).

- Morel, N., Palier, B., & Palme, J. (2012). *Social investment: a paradigm in search of a new economic model and political mobilisation*. In Morel, N., Palier, B., & Palme, J. (eds.), *Towards a Social Investment Welfare State? Ideas, Policies and Challenges*. Bristol: Policy Press, pp. 353–76.
- Murias, P., Novello, S., & Martinez, F. (2012). The regions of economic well-being in Italy and Spain. *Regional Studies*, 46(6), 793-816.
- Muringani, J. (2022). Trust as a catalyst for regional growth in a decentralized Europe: The interplay between informal and formal institutions in driving economic growth. *Journal of Regional Science*, 62(5), 1229-1249.
- Nardo, M., Saisana, M., Saltelli, A., Tarantola, S., Hoffman, A., & Giovannini, E. (2005). *Handbook on constructing composite indicators: methodology and user guide*. OECD Statistics Working Papers 2005/03.
- Paliova, I., McNown, R., & Nülle, G. (2019). *Multiple dimensions of Human Development Index and public social spending for sustainable development*. International Monetary Fund.
- Peiró-Palomino, J. (2019). Regional well-being in the OECD: Disparities and convergence profiles. *The Journal of Economic Inequality*, 17, 195-218.
- Peiró-Palomino, J., Picazo-Tadeo, A. J., & Rios, V. (2020). Well-being in European regions: Does government quality matter?. *Papers in Regional Science*, 99(3), 555-582.
- Reed, W. R. (2015). On the practice of lagging variables to avoid simultaneity. *Oxford Bulletin of Economics and Statistics*, 77(6), 897-905.
- Reynaud, C., Miccoli, S., & Lagona, F. (2018). Population ageing in Italy: an empirical analysis of change in the ageing index across space and time. *Spatial Demography*, 6(3), 235-251.
- Ronchi, S. (2023). Boosting work through welfare? Individual-level employment outcomes of social investment across European welfare states through the Great Recession. *Socio-Economic Review*, 21(4), 2167-2189.
- Rodríguez-Pose, A., & Ezcurra, R. (2011). Is fiscal decentralization harmful for economic growth? Evidence from the OECD countries. *Journal of Economic Geography*, 11(4), 619-643.
- Rodríguez-Pose, A., Psycharis, Y., & Tselios, V. (2012). Public investment and regional growth and convergence: Evidence from Greece. *Papers in Regional Science*, 91(3), 543-568.
- Rodríguez-Pose, A., & Tselios, V. (2015). Toward inclusive growth: Is there regional convergence in social welfare?. *International Regional Science Review*, 38(1), 30-60.
- Rodríguez-Pose, A., Psycharis, Y., & Tselios, V. (2016). Politics and investment: Examining the territorial allocation of public investment in Greece. *Regional Studies*, 50(7), 1097-1112.
- Rodríguez-Pose, A. (2018). The revenge of the places that don't matter (and what to do about it). *Cambridge journal of regions, economy and society*, 11(1), 189-209.
- Rodríguez-Pose, A., & Muštra, V. (2022). The economic returns of decentralisation: Government quality and the role of space. *Environment and Planning A: Economy and Space*, 54(8), 1604-1622.
- Romagnoli, L., & Mastronardi, L. (2020). Can local policies reduce the gap between 'centers' and 'inner areas'? the case of Italian municipalities' expenditure. *Economies*, 8(2), 33.
- Sen, A. (1999), *Development as Freedom*. New York: Knopf.

- Staiger, D. & Stock, J.H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica*, 65, 557 – 586.
- Stiglitz, J. E., Sen, A., & Fitoussi, J. P. (2009). Report by the commission on the measurement of economic performance and social progress.
- Terzo, G. (2022). Investigating the link between social cooperation sector and economic well-being of Italian provinces through the lens of social capital. *Annals of Public and Cooperative Economics*, 93(4), 1041-1062.
- Terzo, G., Notarstefano, G., & Di Maggio, U. (2023). Non-profit sector and regional well-being in Italy. *Regional Studies*, 57(3), 462-477.
- Thanh, S. D., Hart, N., & Canh, N. P. (2020). Public spending, public governance and economic growth at the Vietnamese provincial level: A disaggregate analysis. *Economic Systems*, 44(4), 100780.
- Tselios, V., & Rodríguez-Pose, A. (2022). Can decentralization help address poverty and social exclusion in Europe?. *Territory, Politics, Governance*, 1-24.
- Valls Martínez, M. D. C., Grasso, M. S., & Montero, J. M. (2022). Regional well-being inequalities arising from healthcare expenditure public policies in Spain. *Frontiers in Public Health*, 10, 953827.
- Veneri, P., & Murin, F. (2019). Where are the highest living standards? Measuring well-being and inclusiveness in OECD regions. *Regional Studies*, 53(5), 657-666.

Appendix**Table A1.** Correlation matrix of elementary indicators of well-being (N = 231)

Variable	1	2	3	4
1. INCOME				
2. TERTIARY_EDUC	0.54			
3. INFANT_MORT	-0.51	-0.44		
4. LIFE_EXP	0.54	0.58	-0.48	

Table A2. Variable description and summary statistics (N = 231)

Variable	Description	Source	Mean	S.D.
<i>Dependent variables</i>				
WELL_BEING		Our elaboration on ISTAT data	0.546	0.239
INCOME	See Table 1	ISTAT	18038.150	3572.607
TERTIARY_EDUC		ISTAT	24.138	4.662
INFANT_MORT		ISTAT	2.791	0.842
LIFE_EXP		ISTAT	82.484	0.786
<i>Independent variables</i>				
WELFARE_SPEND	Real welfare spending per capita in thousands of € (natural log)	Our elaboration on CPT data	8.263	1.058
HEALTH_SPEND	Real health spending per capita in thousands of € (natural log)	Our elaboration on CPT data	1.855	0.221
EDUC_SPEND	Real education and training spending per capita in thousands of € (natural log)	Our elaboration on CPT data	0.912	0.275
SOCPROT_SPEND	Real social protection spending per capita in thousands of € (natural log)	Our elaboration on CPT data	5.497	0.817
<i>Control variables</i>				
POP_GROWTH	Annual growth rate of the population	ISTAT	-1.598	4.843
TERTIARY	Tertiary employed as a percentage of total employed	ISTAT	72.036	5.196
PRIMARY	Primary employed as a percentage of total employed	ISTAT	5.011	3.329
DEP_RATIO	Non-working age population (0-14 years and 65 years and over) as a percentage of working age population	ISTAT	55.614	4.068
NORTH	Dummy = 1 if north	–	0.429	0.496
CENTRE	Dummy = 1 if centre	–	0.190	0.394
AUTONOMOUS	Dummy = 1 if special status region	–	0.286	0.453
<i>Instrumental variables</i>				
WELFARE_SPEND (lag)	10-year lag of real welfare spending per capita in thousands of € (natural log)	Our elaboration on CPT data	7.889	1.312

Note. The descriptive statistics of the variables in logs are reported in non-transformed values.

Table A3. Correlation matrix of continuous explanatory variables (N = 231)

Variable	1	2	3	4	5	6	7	8
1. WELFARE_SPEND								
2. EDUC_EXP	0.45							
3. HEALTH_EXP	0.79	0.45						
4. SOCPROT_EXP	0.93	0.12	0.60					
5. POP_GROWTH	0.29	0.37	0.26	0.17				
6. PRIMARY	-0.52	0.17	-0.28	-0.66	-0.31			
7. TERTIARY	0.22	0.09	0.09	0.23	-0.00	-0.14		
8. DEP_RATIO	0.62	0.31	0.31	0.77	-0.18	-0.55	-0.01	

Table A4. Estimation results V (OLS model)

	(I)	(II)	(III)
WELFARE_SPEND _{t-1}	1.108*** (0.103)		
WELFARE_SPEND _{t-2}		1.010*** (0.105)	
WELFARE_SPEND _{t-3}			1.116*** (0.099)
POP_GROWTH	0.099*** (0.002)	0.009*** (0.002)	0.010*** (0.002)
TERTIARY	-0.013*** (0.002)	-0.013*** (0.001)	-0.014*** (0.001)
PRIMARY	-0.012*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)
DEP_RATIO	-0.002 (0.002)	-0.002 (0.002)	0.085*** (0.025)
NORTH	0.111*** (0.025)	0.103*** (0.026)	0.085*** (0.025)
CENTRE	0.115*** (0.022)	0.110*** (0.022)	0.096*** (0.022)
AUTONOMOUS	-0.056 (0.009)	-0.053*** (0.010)	-0.051*** (0.009)
Time dummies	Yes	Yes	Yes
R ²	0.937	0.937	0.938
N. of regions	21	21	21
N. of observations	231	231	231

Notes: All regressions report PCSE in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

Table A5. Estimation results VI (OLS model)

	(I) INCOME (ln)	(II) TERTIARY_EDUC	(III) INFANT_MORT	(IV) LIFE_EXP
WELFARE_SPEND	0.589*** (0.052)	18.943*** (3.297)	-3.123*** (0.654)	3.005*** (0.400)
POP_GROWTH	0.009*** (0.002)	0.111 (0.093)	0.026 (0.017)	0.058*** (0.014)
TERTIARY	-0.002*** (0.000)	-0.115*** (0.015)	0.047*** (0.007)	-0.073*** (0.004)
PRIMARY	-0.008*** (0.001)	-0.190*** (0.053)	0.106*** (0.020)	0.035 (0.007)
DEP_RATIO	-0.002 (0.002)	0.041 (0.103)	0.031* (0.017)	0.019 (0.012)
NORTH	0.220*** (0.016)	-0.777 (0.990)	0.109 (0.261)	-0.142 (0.123)
CENTRE	0.133*** (0.015)	0.307 (0.893)	-0.142 (0.236)	0.299*** (0.098)
AUTONOMOUS	-0.024*** (0.006)	-3.338*** (0.302)	-0.066 (0.075)	0.005 (0.037)
Time dummies	Yes	Yes	Yes	Yes
R ²	0.964	0.768	0.486	0.787
N. of regions	21	21	21	21
N. of observations	231	231	231	231

Notes: All regressions report PCSE in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variable is log-transformed (natural logarithm) to mitigate skewness.

Table A6. Estimation results VII (OLS model)

	(I)	(II)	(III)	(IV)
HEALTH_SPEND	0.560*** (0.099)			0.229*** (0.060)
EDUC_SPEND		0.241*** (0.022)		0.184*** (0.028)
SOCPROT_SPEND			0.914*** (0.096)	0.714*** (0.091)
POP_GROWTH	0.013*** (0.003)	0.012*** (0.003)	0.015*** (0.002)	0.010*** (0.002)
TERTIARY	-0.009*** (0.003)	-0.008*** (0.001)	-0.013*** (0.001)	-0.012*** (0.001)
PRIMARY	-0.008*** (0.001)	-0.014*** (0.001)	-0.006*** (0.002)	-0.013*** (0.001)
DEP_RATIO	0.009*** (0.003)	0.015*** (0.002)	-0.002 (0.003)	0.001 (0.003)
NORTH	0.227*** (0.027)	0.229*** (0.021)	0.120*** (0.025)	0.111*** (0.019)
CENTRE	0.229*** (0.024)	0.212*** (0.018)	0.110*** (0.023)	0.103*** (0.018)
AUTONOMOUS	-0.017 (0.011)	-0.043*** (0.007)	-0.009 (0.105)	-0.074*** (0.010)
Time dummies	Yes	Yes	Yes	Yes
R ²	0.905	0.881	0.919	0.940
N. of regions	21	21	21	21
N. of observations	231	231	231	231

Notes: All regressions report PCSE in parentheses. Level of significance: 10% (*), 5% (**), and 1% (***). Constant term not shown. The key independent variables are log-transformed (natural logarithm) to mitigate skewness.