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## Article

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# The impact of government spending on well-being: a case of upper middle-income countries and high-income countries

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## ABSTRACT

The welfare effects of government redistributive policy have been subject to considerable debate for decades. Against this background, this study explores the effect of government social spending on an empirically constructed measure of well-being in a panel of 16 upper middle-income countries and 38 high-income countries observed between 2002 and 2019. The study utilises the Generalised Method of Moments (GMM) Model to estimate the empirical relationship between government social spending and well-being. The results suggest that welfare gains in upper middle-income countries are derived from redistributive spending that prioritises schooling. On the other hand, rich countries are more likely to benefit from health-related spending. Based on the results the study confirms that disaggregated social spending in upper middle-income nations and wealthy nations does not impact aggregate well-being uniformly. Therefore, efforts to improve aggregate welfare through government redistributive spending ought to consider these attendant heterogeneities.

## IMPACT STATEMENT

This study examines the association between government social spending and well-being using a panel dataset of 54 upper middle-income and high-income countries. The novel feature of this investigation is embedded in the construction of the aggregate well-being index. We employed the Principal Components Analysis (PCA) technique to build a composite well-being index. This well-being indicator incorporates age dependency, access to water, access to sanitation, and life expectancy, the institutional quality is measured by four indicators which are government effectiveness, control of corruption, political stability and rule of law, environment degradation (CO2 emissions) and economic growth (GDP). This approach is expected to contribute substantially to the scarce literature in the field of well-being in upper middle-income countries and higher-income countries. A focus on well-being research is important since improved well-being leads to a better quality of life and stimulates economic performance through its influence on human development. The findings suggest that welfare gains in upper middle-income economies are attributed to social spending that prioritizes education. In contrast, wealthy countries are more likely to benefit from health-related spending. Policymakers should develop redistributive policies that address the specific needs of each region since evidence demonstrates that disaggregated social spending in upper middle-income countries and wealthy nations does not influence aggregate well-being uniformly.

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## 1. Introduction

Fiscal policy is part of the toolkit that governments employ to achieve their macroeconomic objectives (Mankiw, 2010). In the Keynesian school of thought, fiscal policy can stabilise cyclical fluctuations in output and employment in the short run. This understanding has motivated a strand of empirical research probing the economic effects of fiscal policy (Chipaumire et al., 2014; Chude & Chude, 2013; Odhiambo,

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2015). However, fiscal policy also facilitates the redistribution of income. The primary objective of redistributive policies is to advance the welfare of the society. Redistributive programs advocate for equality by overseeing the transfer of resources from the wealthy class to the less privileged people. Therefore, building on the foundation of the egalitarian school of thought which encourages equality among people. The concept of well-being can be observed from two different perspectives, objective and subjective viewpoints. The subjective approach deals with non-economic characteristics of well-being. The subjective approach describes people's assessment of their lives, especially their contentment with their lives. In contrast, objective well-being captures material resources that significantly determine the basic needs of households, such as distribution of income, household consumption, employment, expenditures etc.

The well-being concept is essential and requires more attention since improved well-being not only promotes the quality of life but also stimulates economic growth through the human development channel. In general, people with improved well-being tend to progress through the education system more smoothly and highly productive at work than compared to those with poor health and education outcomes. The emergence of the endogenous growth paradigm has highlighted the significance of the redistributive components of fiscal policy, which have been undervalued in the literature. According to this theory, public investment in the social sectors (such as health and education) promotes human development which is a significant factor in sustainable growth and well-being (Lucas, 1988; Romer, 1990). In addition, the formulation of the Millennium Development Goals (MDG) in 2000 also reinforced the importance of social policy in eradicating extreme poverty and advancing well-being (United Nations, 2015).

There is a dearth of welfare studies, the majority of which focus on the quality of education (years of schooling and school enrolment), health (life expectancy, mortality), income redistribution (Gini coefficient), and economic growth (real GDP or GDP per capita) as indicators for aggregate welfare (Anderson et al., 2017; Arthur & Oaikhenan, 2017; Craigwell et al., 2012; Karim, 2015; Ndaguba & Hlotywa, 2021). A key challenge facing these studies is the complexity surrounding the definition and measurement of well-being. Recently, a troubling pattern has emerged where economic growth is associated with persistent inequality and socio-economic issues, causing economists to challenge the notion that economic growth is the appropriate indicator of aggregate well-being. Consequently, there are growing demands for the development of new measurements which embody holistic well-being.

To address the knowledge gap, this study explores the association between government social spending and welfare using a panel dataset of 54 upper middle-income and high-income countries. The findings will contribute to the scarce literature in terms of redistribution policy and well-being. The novel feature of this investigation is embedded in the development of the well-being index. To achieve this uniqueness, the study will use the Principal Components Analysis (PCA) technique to build a composite well-being index. The PCA technique integrates several characteristics into a single indicator, thus allowing for the inclusion of several significant well-being variables in a single regression. Furthermore, utilising disaggregated government spending on education, health and social protection has the advantage of facilitating your targeted fiscal policymaking in terms of discretionary decisions.

The remainder of the paper is arranged as follows: Section 2 focuses on the literature review, Section 3 documents methodology (which covers data description and estimation strategy), and empirical results and discussion are provided in Section 4. The robustness findings are reported in Section 5, while the conclusion and policy recommendation are presented in Section 6.

## 2. Literature review

For decades, economists and policymakers have focused on GDP as a composite indicator of well-being. However, the notion that 'income (GDP) is a better indicator for well-being' has recently been contested by several economists, arguing that GDP is simply a subset of the complex concept of well-being (Aitken, 2019; Decancq & Schokkaert, 2016; Stiglitz et al., 2019). The Nobel laureate Amartya Sen's earlier research played a major role in the development of the well-being indicator. Sen (1985) thus suggested that when economic growth indicator like GDP is utilised as a proxy for aggregate well-being people's freedoms are neglected. According to this framework, well-being can be characterised as a multidimensional domain that looks at life quality and considers non-financial aspects including leisure activities, social interactions,

and the standard of education and health. Sen's (1985) study led to the formation of the Human Development Index (HDI) under the United Nations Development Programme (UNDP) in 1990.

The HDI measured life expectancy at birth, GDP per capita, and educational attainment. According to the United Nations (UN), the three factors promote aggregate well-being (Shrotryia & Singh, 2020). On the other hand, Stiglitz et al. (2019), Broček and Lalinský (2017) and Jones and Klenow (2016) also analysed the concept of beyond GDP. They argued that employing the wrong indicator for example, GDP as a proxy for aggregate well-being could distort the truth of how people are faring in the country and induce the government to implement irrelevant policies. According to these researchers' well-being studies must incorporate income distribution, the quality of education, health-related indicators, environmental changes, and all factors influencing the standard of living. Finally, scholars like Wiseman and Brasher (2008) and Atkinson et al. (2020) have developed a conceptual framework for community well-being recently. Accordingly, community well-being is determined by multiple domains (social, economic, political, cultural, environmental, etc.). These factors assist individuals and communities achieve their goals through building strong social networks of relationships and promoting liveable and equitable communities.

When exploring the well-being and the redistributive aspects of government policy it is imperative to discuss the egalitarian school which seeks to address the inequalities within the society through the distribution of resources, and wealth and providing equal opportunities to all citizens. Traditionally egalitarianism framework suggested that the government should diminish the inequalities originating from external factors while ignoring the inequalities created by people's decisions (Bengtson & Lippert-Rasmussen, 2023; Dworkin, 1981). This notion was opposed by some egalitarians who claimed that people who have made bad decisions a left to suffer, thus antithetical to the egalitarian perspective whose primary objective is to promote equality for all citizens. Egalitarianism should place more emphasis on relational equality rather than merely equalising people's circumstances. Relational equality proposes that in an egalitarian society, everyone is awarded the same fundamental rights and receives equal treatment. Those who advocate for relational egalitarianism believe that the equality concept is best explained by the relationships that exist among people rather than the distribution of resources (Anderson, 1999; Scheffler, 2010). In a nutshell, the egalitarianism ideology aims to promote equality among people, which can be achieved through improving the conditions of the less privileged, creating equal economic opportunities, and treating everyone equally.

Meltzer and Richard (1981) presented a majority-voting model, where a higher level of income inequality leads to higher redistribution efforts. Most people tend to prefer a government that redistributes capital from the wealthy group to the underprivileged group when the population earning mean income is greater than those earning the median income (Gumede et al., 2019). The Meltzer and Richard model is the extension of the median voter theorem founded by Downs (1957). This suggests that in a democratic country which adopts the majority rule, the voting process will choose the outcome that is most popular with the median voter. The model is focused on two assumptions, The first one is that democratic regime voters can categorise all options into a single political spectrum. Secondly, the voter's preferences are single-peaked. Overall, the preferences of a median voter determine the size of the government expenditures and taxes.

From an empirical standpoint, Haile and Niño-Zarazúa (2018) sought to investigate whether social spending stimulates welfare in 55 low-income and middle-income economies with panel data spanning from 1990 to 2009. Social spending was denoted by education, health, and social protection spending, while aggregate welfare was proxied by the inequality-adjusted human development index (IHDI), human development index (HDI), and child mortality rates. Their results indicated that aggregate social spending stimulates welfare in both low-income and middle-income countries. In the case of disaggregated social spending, all components have a positive sign as expected, but only the health spending estimate promotes welfare. From a time series approach, Ndaguba and Hlotywa (2021) evaluated the relationship between government health expenditure and well-being. The ARDL estimates confirm that health spending is positively related to the human development index (HDI). Thus, investment in public health stimulates well-being in South Africa. In another study, Craigwell et al. (2012) examined the impact of government education and health spending on economic growth and the quality of life using panel data from 19 Caribbean countries. The findings indicated that health spending boosted life expectancy, while education spending had a significant impact on primary and secondary school enrolment. In addition to the above studies.

Arthur and Oaikhenan (2017) empirically assessed the influence of government expenditure on well-being in sub-Saharan Africa. They found that raising health spending prolonged life expectancy and mitigates mortality rate. The study by Niehues (2010) evaluated the effect of government redistribution expenditure on income inequality utilising panel data from 24 European countries. The GMM findings suggested that social programmes dealing with unemployment benefits and social pensions narrow the gap between the wealthy and the underprivileged. The welfare study conducted by Ospina (2010) revealed that public spending on education and health promotes equality in Latin America. However, social security spending promotes inequality.

Samir Saad (2024) panel research explored the role of public spending on inclusive growth. Through the principal component analysis (PCA) the study computed the composite inclusive growth index which took into account factors such as quality education and health, environment sustainability, and income distribution. Based on the findings, government intervention through education and health spending raised inclusive growth. A study by Amaluddin et al. (2018) sought to determine whether a modified human development index (HDI) constructed using the PCA significantly influenced well-being in 33 Indonesian villages. Following the United Nations methodology, the modified HDI indicator emerged years of schooling, income per capita and life expectancy, while the poverty rate served as the dependent variable. The outcome revealed that as human development advances, poverty declines, resulting in improved well-being in Indonesia.

Based on the empirical section, it appears limited studies have explored the link between government disaggregated social spending and aggregate well-being, most of which do not treat well-being as a multidimensional concept. Secondly, the mentioned studies have neglected institutional quality, although quality institutions play a significant role in well-being and social policy. The establishment of sound institutions stimulates inclusive growth and well-being through reducing transaction costs, protecting human rights, honouring contractual agreements, ensuring governments operate effectively and finally, minimising fraudulence activities. Thirdly, environmental factors have been overlooked in welfare studies. In recent years climate change has become more aggressive, causing severe damage to the environment and human well-being. Researchers must therefore take environmental sustainability into account when studying well-being. To address the mentioned issues, we employ the Principal Components Analysis (PCA) technique to build a composite well-being index. This well-being indicator incorporates age dependency, access to water, access to sanitation, and life expectancy, the institutional quality is measured by four indicators which are government effectiveness, control of corruption, political stability and rule of law, environment degradation (CO<sub>2</sub> emissions) and economic growth (GDP). The applied methodology will contribute significantly to the sparse literature in the field of well-being studies in upper middle-income countries and higher-income countries.

### 3. Methodology

To analyse the empirical association between government social spending and aggregate well-being we employed a panel dataset consisting of 54 countries spanning from 2002 to 2019. The sampled economies are categorised into 16 upper middle-income countries and 38 high-income economies following the World Bank classification. Furthermore, the selection of the countries and the sampling period were dictated by data availability. The list of selected nations and the data description are reported in the Appendix section, Tables A1 and A2, respectively. The secondary data was extracted from the OECD Social Expenditure Database (SOCX), IMF Government Finance Statistics (IMF-GFS), World Development Indicators (WDI), Economic Commission for Latin American and the Caribbean Countries (CEPALSTAT), Worldwide Governance Indicators (WGI) and the Eurostat Database.

#### 3.1. Welfare empirical model

Guided by empirical literature (Haile & Niño-Zarazúa, 2018), we estimated different variants of the following dynamic<sup>1</sup> model.

$$W_{i,t} = \theta_0 W_{i,t-1} + \beta_1 E_{i,t} + \beta_2 H_{i,t} + \beta_3 S_{i,t} + \gamma X + \eta_i + \nu_t + \varepsilon_{i,t} \quad (1)$$

$$i = 1, \dots, n; t = 1, \dots, T$$

From equation (1)  $W_{i,t}$  denotes well-being;  $W_{i,t-1}$  represents one period lagged well-being, while  $i$  indexes individual country and  $t$  time period (year).  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are the main parameters of inquiry, measuring the impact of disaggregated social spending (education, health and social protection, respectively) on aggregate well-being. On the other hand,  $X$  is a vector of other variables that are likely correlated with well-being ( $W_{i,t}$ ) and predictor variables ( $E_{i,t}$ ,  $H_{i,t}$  and  $S_{i,t}$ ). The selected control variables are employment in service sectors (% of total employment), gross capital formation (GCF) and inflation. Finally,  $\eta_i$  and  $v_t$  stands for country-specific fixed effects and time-fixed effects respectively, while the  $\varepsilon_{i,t}$  depicts the error term.

Our well-being index incorporates age dependency, access to water, access to sanitation, and life expectancy, the institutional quality is measured by four indicators which are government effectiveness, control of corruption, political stability and rule of law, environment (CO<sub>2</sub> emissions) and economic growth (GDP). Noteworthy, the concept of well-being is very comprehensive and thus measured by several indicators. However, it is impossible to incorporate all well-being variables into a single regression model. Furthermore, most of the well-being indicators are highly correlated (Haile & Niño-Zarazúa, 2018). Consequently, we employ the principal component analysis (PCA) approach to combine the selected well-being variables into a single variable. This process allows the replacement of huge numbers of highly correlated well-being indicators with small numbers of uncorrelated indicators. Through the consolidation of several variables into a single indicator, PCA replicates the original dataset.

The age dependency ratio is a crucial factor in assessing well-being and economic growth. As the age dependency ratio rises, savings and investments decline, which in turn lowers economic growth and living standards. Conversely, lower dependency ratios promote economic performance by improving overall savings and investment (Oliver, 2015). Overall, the population's structure affects economic growth and well-being, making the age dependency ratio an important indicator of aggregate well-being. Having access to improved water and sanitation facilities is essential for human survival. Quality water and sanitation services that are managed safely stimulate people's hygiene and health outcomes, which improves their overall well-being (Armah et al., 2018; Pullan et al., 2014). Conversely, tainted water and inadequate sanitation facilities exacerbate illnesses like cholera, hepatitis, diarrhoea, typhoid, and dysentery, impairing health and well-being. Another variable included in the formation of the well-being index is the life expectancy metric.

Accordingly, higher life expectancy typically signifies improved health and an adequate standard of living for individuals. Improved life expectancy fosters human development, which is normally used as an indicator of well-being (Haile & Niño-Zarazúa, 2018). On the other hand, institutional quality is a significant determinant of both economic development and aggregate welfare. Sound institutions foster sustainable growth by reducing costs associated with production, transactions and manufacturing (North, 1990). Institutional quality drives the government to perform its functions effectively and efficiently (Le & Kim, 2021; Sabir et al., 2019). Therefore, in the computation of the well-being indicator, we include the following variables to account for institutional quality: political stability, rule of law, government effectiveness, and control of corruption.

The detrimental impacts of climate change that have persisted over the past few decades have spurred conversations about practical strategies for reducing greenhouse gas emissions. The constant increase in greenhouse gas emissions has triggered severe weather phenomena like floods, droughts, elevated temperatures, and the deterioration of ecosystems. Consequently, greenhouse gas emissions are harmful to human well-being and the environment (Omri, 2013). A previous study by Majeed and Ozturk (2020) found that higher emissions of carbon dioxide (CO<sub>2</sub>) lead to lower life expectancy and higher infant mortality rates. After considering the significant influence greenhouse gas emissions have on health outcomes, we choose to incorporate this pollutant variable into our well-being index.'

Finally, we incorporate real GDP as a proxy for economic growth, into our well-being index. Economic growth is essential to people's well-being since it constitutes a substantial portion of objective well-being (Jones & Klenow, 2016). Overall, every variable that went into creating our well-being indicator is essential to human development, and our study is anticipated to make a significant contribution to the scant literature on well-being. Disaggregated social spending will be based on three components social

protection, health and education. Consequently, the work of Haile and Niño-Zarazúa (2018), Lustig (2018), and Khan and Bashar (2015) guided the selection of these variables.

The control variables well-being model will include employment, investment and inflation. The growth of employment stimulates economic performance and the standard of living (Atkinson, 2015). Employed individuals can enhance their quality of life without transferring the financial burden to the government (Dev, 2018). On the other hand, inflation is the most important macroeconomic variable, and even little changes in this indicator could negatively impact people's quality of life. Given that rising prices imply declining consumer purchasing power, high inflation is generally linked to poor well-being (Yolanda, 2017). Finally, investment is fundamental to sustainable growth because it simultaneously increases aggregate supply and demand and has positive externalities on well-being (Mankiw, 2010). Consequently, the study employs gross capital formation (GCF) as a proxy for domestic investment.

### **3.2. Principal component analysis framework**

To analyse the influence of government social spending on aggregate welfare, we construct a well-being index using the principal component analysis (PCA). The principal components analysis is generally portrayed as a multivariate approach that is responsible for reducing several variables into smaller orthogonal principal components, through linear combinations of those variables (Kuloğlu & Ecevit, 2017; Sabir et al., 2019). Each new principal component incorporates as much information as possible that is not accounted for by previous components. Therefore, the initial component is responsible for the highest possible variation in the original variables. A critical feature of the structure is that the initial and second components are uncorrelated. Furthermore, the third component captures maximum information which is not presented in the first and second components. The  $P$  variables of the model depict the structure interdependence and are also converted into new variables incorporating properties of linear, orthogonal and uncorrelated (Dalton-Greyling & Tregenna, 2014).

### **3.3. Econometric strategy**

Traditionally a panel estimation process uses unit root tests to evaluate the stationarity properties of the dataset to determine the suitable estimation strategy. However, Kitamura and Phillips (1997), Sarpong and Nketiah-Amponsah (2022) and Okafor et al. (2015) stated that a non-stationary series can generate robust and reliable outcomes under the conditions that the sample size is short, and the number of entities ( $N$ ) exceeds the time period ( $T$ ). The serial correlation issue is mitigated when these prerequisites are met. Furthermore, there is a possibility that our welfare empirical analysis may be exposed to the endogeneity, meaning that social spending variables are not exogenously determined. Accordingly, government spending on social sectors (education, health and social protection) and well-being could be determined by the same unobserved factors. Also, well-being may influence social spending (a phenomenon referred to as reversed causality). Notably, if the endogeneity problem is not accounted for in the regression, then the generated slope of coefficients may be biased. Thus, to address the issue of endogeneity we employ the Generalised Method of Moments (GMM) estimator.

### **3.4. Generalised Method of Moments (GMM)**

The Generalised Method of Moments (GMM) framework was founded by Arellano and Bond (1991). The core properties of this dynamic estimator are to control for unobserved country heterogeneity, endogeneity issues, measurement errors and omitted variable bias problems. GMM generates robust results when dealing with small sample sizes and more cross-sectional observation. Furthermore, a GMM is considered to be superior to an instrument variable (IV) since, in the presence of heteroskedasticity, a GMM estimator is more efficient than an IV estimator (Haile & Niño-Zarazúa, 2018), whereas, in the absence of heteroscedasticity, the GMM estimator is no worse asymptotical than the IV estimator. The original GMM estimator is referred to as difference GMM and is expressed as follows:

$$W_{it} - W_{it-1} = (\alpha - 1)W_{it} + \beta_0 X_{it} + \mu_i + \varepsilon_{i,t} \quad (2)$$

From equation 2, the left-hand side measures the growth rate of well-being at time (i), While  $W_{it}$  is the well-being index,  $i$  indexes individual country and  $t$  time period (year), the  $X_{it}$  stands for a vector of explanatory variables, while the unobserved country-specific effect is denoted by  $\mu_i$ , last  $\varepsilon_i$  stand for disturbance term. Rewriting equation (2), translate to:

$$W_{it} = \alpha W_{it-1} + \beta_0 X_{it} + \mu_i + \varepsilon_{i,t} \quad (3)$$

To eliminate country-specific effects, we take the first differences of equation 3:

$$W_{it} - W_{it-1} = \alpha(W_{it-1} - W_{it-2}) + \beta_0(X_{it} - X_{it-1}) + \varepsilon_{it} - \varepsilon_{it-1} \quad (4)$$

The GMM panel estimator uses the following moment conditions:

$$\begin{aligned} E[W_{it} - s(\varepsilon_{it} - \varepsilon_{it-1})] &= 0 \text{ for } s \geq 2; t = 3, \dots, T \\ E[X_{it} - s(\varepsilon_{it} - \varepsilon_{it-1})] &= 0 \text{ for } s \geq 2; t = 3, \dots, T \end{aligned}$$

The difference GMM estimator utilises the initial values of explanatory variables and the lagged for dependent variables as instruments. To generate robust and reliable coefficients under the first difference specification the hypotheses of weak exogenous variables and the absence of second serial correlation in disturbance terms must hold. However, like other econometric modelling approaches the first difference GMM estimator has some limitations. Firstly, when the regressors are persistent over time, their lagged levels become poor instruments for the variables in the different specifications. Secondly, the issue of weak instruments also prevails when the sample size is short (Arellano & Bover, 1995; Blundell & Bond, 1998; Kumar, 2013). Blundell and Bond (1998) introduced the extension of different GMM which is referred to as the system GMM estimator. This new estimation approach constructs the system GMM using two equations. The original equation (first difference equation with levels as instruments) and additional equation expressed in levels with first differences as instruments. Therefore, the moment of conditions for the added equation in levels is depicted as follows:

$$\begin{aligned} E[(W_{it-s} - W_{it-s-1})(\mu_i - \varepsilon_{i,t})] &= 0 \text{ for } s = 1 \\ E[(X_{it-s} - X_{it-s-1})(\mu_i - \varepsilon_{i,t})] &= 0 \text{ for } s = 1 \end{aligned}$$

Blundell and Bond (1998) concluded through the Monte Carlo simulations that the extended GMM model is comparatively more efficient than the first-difference GMM model. Therefore, we employ the system GMM as the baseline estimator.

### 3.5. Robustness testing: Panel Corrected Standard Errors (PCSE)

The system GMM estimator addresses endogeneity issues. However, the problem of contemporaneous correlation, which arises when the idiosyncratic disturbance factors are connected across countries, is ignored by the system GMM. As a result of trade links, there is a strong likelihood that cross-sectional dependency may arise among the observed nations. Therefore, to conduct our robustness assessment we employ the Panel Corrected Standard Error (PCSE) estimator pioneered by Beck and Katz (1995). This sophisticated technique accounts for cross-sectional dependence, heteroscedasticity, and autocorrelation. The PCSE estimator yields robust estimates when the number of cross-sections (N) is greater than the time dimension (T). Given that the cross-sectional units (54 countries) exceed the time dimension (2002–2019), the PCSE model is therefore appropriate for our situation (Bailey & Katz, 2011).

## 4. Results and discussion

This section provides an empirical analysis of the nexus between government social spending and aggregate well-being in upper middle-income and high-income economies. It is crucial to ascertain whether there are collinearity problems among the explanatory variables in each model before presenting our estimation results. The results of the pairwise correlation matrix test are shown in Table 1. Concerns for perfect collinearity between the explanatory variables are diminished in our situation because correlation

**Table 1.** Pairwise correlation matrix.

Full sample							
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Well-being	1.000						
(2) Education spending	0.381	1.000					
(3) Health spending	0.552	0.447	1.000				
(4) Social protection spending	0.524	0.278	0.689	1.000			
(5) Employment	0.647	0.243	0.334	0.249	1.000		
(6) Gross capital formation	−0.082	−0.097	−0.173	−0.210	−0.435	1.000	
(7) Inflation	−0.430	−0.227	−0.325	−0.326	−0.152	−0.036	1.000
<b>Upper middle-income countries</b>							
(1) Well-being	1.000						
(2) Education spending	0.281	1.000					
(3) Health spending	0.439	0.353	1.000				
(4) Social protection spending	0.029	−0.059	0.347	1.000			
(5) Employment	0.215	0.061	0.179	−0.133	1.000		
(6) Gross capital formation	0.095	−0.065	−0.233	−0.167	−0.558	1.000	
(7) Inflation	−0.155	−0.141	−0.142	0.029	0.234	−0.263	1.000
<b>High-income countries</b>							
(1) Well-being	1.000						
(2) Education spending	0.211	1.000					
(3) Health spending	0.190	0.362	1.000				
(4) Social protection spending	0.081	0.229	0.605	1.000			
(5) Employment	0.609	0.147	0.057	−0.038	1.000		
(6) Gross capital formation	0.069	−0.049	−0.056	−0.185	−0.278	1.000	
(7) Inflation	−0.248	−0.023	−0.176	−0.275	−0.227	0.193	1.000

Source: Authors' calculations.

findings from the full sample, upper middle-income countries and high-income countries show that all correlation coefficients are below the 0.8 thresholds in each group. Importantly, there is a positive association between disaggregated social spending and well-being in all three categories.

Next, we evaluate whether our interest variables government social spending on social protection, health, and education are endogenous. Using Sargan-Hansen statistics, the endogeneity test was carried out.

Given that each case's p-value is less than 5%, the results from Table 2 lead us to reject the exogeneity null hypothesis in favour of the alternative hypothesis. Thus, the use of the GMM estimator is justified, since the main variables of inquiry (spending on health, education and social protection) are endogenous across the three groups. First, we discuss the empirical findings from the full sample analysis (comprising of upper middle-income and high-income countries), followed by results from the upper middle-income countries and lastly, we documented findings from high-income countries.

#### 4.1. System GMM results and discussion

Table 3 reports the findings of the econometric analysis conducted to estimate the relationship between government social spending and aggregate well-being using a full sample dataset, consisting of 38 high-income countries and 16 upper middle-income countries. The step-one system GMM is employed as the baseline model. Initially, we interpret and discuss the findings from the full sample, followed by results from upper middle-income countries, and finally, we provide evidence from high-income countries.

##### 4.1.1. System GMM results for full sample

The full sample results in Table 3 illustrate that the well-being lagged coefficient is positive and statistically significant at the 1% level of significance. Given the statistical significance of the lagged coefficient of well-being, we will calculate the long-run estimates for explanatory variables that have a statistically significant impact in the short run. Regarding our first variable of enquiry, the reported results illustrate that social spending on education stimulates aggregate well-being. Accordingly, the baseline regression reveals that a one percentage point improvement in short-run education expenditure would raise aggregate well-being by 0.74 percentage points, ceteris paribus. While the long-run coefficient for education spending is expected to boost aggregate well-being by 4.88 percentage points. The generated findings are consistent with the endogenous framework which predicts that public spending in the education

**Table 2.** Endogeneity results.

Countries	Test statistics	Chi-sq (3) p-value
Full sample	158.788	0.000
Upper middle-income countries	17.594	0.005
High-income countries	46.443	0.000

Source: Authors' calculations.

**Table 3.** System GMM results for upper middle-income and high-income countries.

Full sample Variables	Upper middle income countries			High income countries		
	GMM Short-run results	GMM Long-run results	GMM Short-run results	GMM Long-run results	GMM Short-run results	GMM Long-run results
Lagged well-being	0.849*** (0.0609)		0.717*** (0.0502)		0.823*** (0.0752)	
Education spending	0.736*** (0.210)	4.879** (2.447)	0.675*** (0.144)	2.379*** (0.811)	−9.675 (5.791)	
Health spending	3.133* (1.742)	20.777*** (8.295)	−0.326 (5.031)		5.455** (2.619)	30.805* (18.161)
Social protection Spending	0.414 (0.565)		0.942 (1.448)		−0.305 (0.856)	
Employment	0.714** (0.356)	4.735*** (1.119)	0.550* (0.276)	1.939* (1.049)	1.290** (0.517)	7.284*** (2.128)
Gross capital Formation	0.800** (0.320)	5.309*** (1.971)	0.766* (0.392)	2.700* (1.538)	0.737 (0.457)	
Inflation	−0.738 (0.539)		−0.470 (0.427)		−0.775 (0.996)	
Constant	−90.07** (34.93)		−91.38*** (20.89)		−75.42* (43.20)	
AR(1)	0.000		0.006		0.000	
AR(2)	0.174		0.517		0.136	
Sargan	0.593		0.830		0.302	
Observations	854		16		38	
Number of c_id	54					

\*, \*\* and \*\*\* denotes the level of significance at 10%, 5% and 1%, respectively.

Source: Authors' calculations.

and health sectors fosters human development which is an essential determinant of productivity, sustainable growth and well-being (Karim, 2015).

Turning to the second social spending variable, Table 3 depicts that public health spending promotes aggregate well-being. The system GMM reveals that a one percentage point increase in health spending leads to a 3.13 percentage point growth in aggregate well-being. The long-run well-being coefficient is expected to expand by 20.78 percentage points in response to a one percentage point increase in health spending. The presented evidence suggests that public health investment is more effective in promoting aggregate well-being in the long term. In terms of consistency, our findings correspond with empirical evidence generated by Haile and Niño-Zarazúa (2018) who concluded that investment in the health sector (health expenditure) improves aggregate welfare in low-income and middle-income countries. With respect to the last social spending protection variable, the system GMM result suggests that the social protection spending estimate carries the desired sign however the impact is statistically insignificant. The reported outcome is plausible since the endogenous framework holds that social protection spending does not boost productivity and economic performance. From an empirical perspective, Haile and Niño-Zarazúa (2018), revealed that social protection has negligible effects on welfare.

Concerning the control variables, the system GMM regression confirmed that both employment and gross capital formation (GCF) are significant determinants of aggregate well-being. The outcome was anticipated as both factors (employment and investment) play a fundamental role in achieving the macroeconomic objectives (Mankiw, 2010). Additionally, the reported evidence is in line with previous studies conducted by Dev (2018), and Soegoto et al. (2022). Finally, the lack of statistical significance for the estimate of inflation suggests that inflation does not influence well-being according to system GMM regression. The presented findings correspond to the super neutrality of money theory. According to Sidrauski (1967), changes in the rate of inflation have no impact on macroeconomic variables in the

steady state. Overall, the generated findings highlight that redistributive policy promotes welfare under the full sample analysis. According to the system GMM diagnostic inspection results the Arellano-Bond test detects the presence of first-order serial correlation, but most importantly it rejects second-order serial correlation, which implies that the instruments incorporated in the system GMM are relevant. On the other hand, the Sargan test results confirm the validity of instruments employed in the system GMM.

#### **4.1.2. System GMM results for upper middle-income countries**

For upper middle-income economies, the system GMM findings in Table 3 show that the short-run education coefficient is positive and statistically significant at a 1% level of significance. Thus, a percentage growth in education spending translates into a 0.67 percentage point increase in aggregate well-being, *ceteris paribus*. While long-run education spending is expected to induce growth of 2.38 percentage points on welfare in upper middle-income countries. The presented evidence supports the earlier studies by Craigwell et al. (2012) and Karim (2015), which found that public spending on education enhances well-being outcomes.

The system GMM estimation revealed that the health-spending coefficient has an insignificant impact on aggregate well-being. Several factors may contribute to the insignificance of health spending coefficient. Firstly, the employed health spending indicator measured quantity. Consequently, we may have obtained a favourable outcome if we utilised the health spending variable captured quantity. Secondly, government intervention is more likely to be successful in a democratic country with sound institutions that advocate for political freedom, government effectiveness, rule of law and control of corruption (Haile & Niño-Zarazúa, 2018). Turning to our last social spending variable, Table 3 reports that social-protection spending has an insignificant effect on well-being in the case of upper middle-income countries. Since a sizable portion of social protection programs support people who have withdrawn from the labour market rather than promoting productivity, it makes sense that the social protection spending estimate is insignificant.

Moving to the control variables, the system GMM estimation suggested that employment and domestic investment stimulate aggregate well-being in the upper middle-income economies. The obtained results are not surprising given that employed individuals can improve their quality of life thus lessening the social welfare burden carried by the government, while expansion of investment raises economic performance (Dev, 2018; Soegoto et al., 2022). Concerning the final regressor, the inflation coefficient has a negative and insignificant impact on aggregate well-being under the system GMM specification. This indicates that inflation does not influence welfare in emerging economies. Overall, social expenditures that support human capital, especially those linked to education, are critical to the advancement of well-being in upper middle-income countries. The system GMM regression passed all the diagnostics check-ups, thus implying the instruments utilised in the model are valid and relevant.

#### **4.1.3. System GMM results for high-income countries**

Regarding the first regressor, the outcome of system GMM regression demonstrates that the relationship between education spending and well-being is statistically negligible in high-income countries. The result is not consistent with the theoretical framework; however, the insignificance of the education estimate can be attributed to several factors. Firstly, the choice of measurement may account for the observed outcome, given that the employed indicator, which is aggregate education spending, captures quantity and not quality. Furthermore, the study used an aggregate measure of education spending, but the literature suggests that not all forms of education expenditure have uniform effects on economic growth. Accordingly, Eggoh et al. (2015) reported that government investment in primary education yields a higher social rate of return than post-primary education. Thus, there is a high possibility that, if the study employed disaggregated education spending, we would have observed a significant positive nexus between education expenditure and aggregate well-being. Additionally, Haile and Niño-Zarazúa (2018) highlighted that public spending on the education sector does not influence aggregate welfare.

On the other hand, it is quite encouraging to witness that the estimated coefficient of health spending has a significant influence on aggregate well-being in the case of high-income economies. Therefore, the system GMM estimation revealed that a percentage rise in short-run health spending

boosts aggregate well-being by 5.46 percentage points holding constant other explanatory variables. During the long term, aggregate well-being improves by 30.80 percentage points as a result of a one percentage increase in health spending. Thus, health spending has a sizable impact on well-being in the long term. Our finding corresponds to the earlier work of Haile and Niño-Zarazúa (2018), Arthur and Oaikhenan (2017) and Bein et al. (2017) which reported that public spending on health improves human well-being. Overall, public spending on the health sector stimulates welfare in high-income economies.

With respect to the last social spending regressor, the baseline estimation indicates that social protection spending does not influence aggregate well-being. The depicted result supports the empirical evidence of Haile and Niño-Zarazúa (2018), which demonstrates that social welfare spending does not influence aggregate welfare. Turning to control variables, only employment appears to be a significant predictor of well-being in high-income countries. From baseline estimation, a 1 percentage increase in employment boosts aggregate welfare by 1.29 percentage points holding constant other explanatory variables. In the case of wealthy nations welfare gains arise from redistributive spending that prioritises health. The system GMM diagnostic tests (Arellano-Bond test and Sargan test), confirm the validity and relevance of the instruments.

#### 4.1.4. Summary

This section discusses the main findings from the system GMM model regarding the association between social spending and aggregate well-being in upper middle-income and high-income countries.

Based on the full sample analysis, the baseline regression revealed that redistributive spending which focused on education and health sectors advances aggregate well-being. In addition to social spending indicators, employment and gross capital formation also contribute significantly to aggregate well-being. In the case of upper middle-income countries, the results revealed that only education spending is the significant driver of aggregate well-being. Control variables, employment and gross capital formation also promote welfare according to the baseline estimation. On the other hand, welfare gains in high-income countries are only generated through health-related spending. Concerning control variables, only employment boosts well-being in wealthy economies.

Finally, the system GMM findings illustrate that government intervention through redistributive policy plays a crucial role in enhancing aggregate well-being in upper middle-income countries and higher-income countries. According to the overall findings, only productive spending (education and health sectors) raises welfare in sampled countries, essentially supporting the endogenous framework. Furthermore, we can conclude that redistributive policy is more instrumental during the long term since the magnitudes for long-run social spending estimates are substantially larger than those of short-run coefficients across all groups. One noteworthy observation is that disaggregated social spending in emerging economies and wealthy nations does not influence aggregate well-being uniformly. Therefore, the heterogeneities between upper middle-income countries and high-income countries illustrate the need for each group to design a unique redistributive policy that satisfies the demands of their welfare system.

## 5. Robustness results

To verify that findings derived from the baseline regression (system GMM) are not sensitive to changes in the estimation strategy, we conduct robustness analysis using the panel-corrected standard errors (PCSE) for the role of social spending on aggregate well-being. We began by discussing the findings for full sample analysis, followed by upper middle-income countries and final high-income countries.

### 5.1. PCSE results for full sample

The full sample findings reported in Table 4 demonstrate that a 0.79 percentage point rise in well-being is induced by a one percentage increase in education spending. While health spending estimate grows aggregate well-being by 6.29 percentage points. Regarding the role of education and health spending on aggregate well-being the PCSE and system GMM reached a similar conclusion, which is education and health spending are significant determinants of aggregate well-being under the full sample analysis. The generated findings are consistent with the endogenous framework which predicts that public

**Table 4.** PCSE results for upper middle-income and high-income countries.

Variables	Full sample PCSE	Upper middle income countries PCSE	High income countries PCSE
Education spending	0.785* (0.417)	0.643* (0.333)	3.064 (2.232)
Health spending	6.291*** (1.156)	7.205*** (1.575)	3.020** (1.323)
Social protection spending	3.603*** (0.493)	−1.040 (0.779)	−0.00117 (0.537)
Employment	4.615*** (0.413)	1.064*** (0.412)	4.111*** (0.541)
Gross capital formation	1.769*** (0.409)	0.937** (0.370)	0.879** (0.416)
Inflation	−0.398 (0.251)	−0.220 (0.160)	−0.193 (0.484)
Constant	−434.2*** (35.94)	−228.1*** (30.56)	−293.0*** (45.95)
Observations	902	264	638
R-squared	0.410	0.507	0.282
Number of c_id	54	16	38

\*, \*\* and \*\*\* denotes the level of significance at 10%, 5% and 1%, respectively.

Source: Authors' calculations.

spending in the education and health sectors fosters human development which is an essential determinant of productivity, sustainable growth and well-being (Karim, 2015).

On the other hand, the PCSE reveal that social protection spending promotes aggregate well-being. According one percentage point increase in social protection spending is estimated to grow aggregate well-being by 3.60 percentage points. Under the system GMM regression social protection spending coefficient is statistically insignificant, therefore, the depicted PCSE outcome is different from the baseline model. The observed differences between the system GMM and PCSE findings highlight the importance of addressing the cross-sectional dependency issue, given that we obtained a significant estimate after using the PCSE estimator, which accounts for cross-sectional dependency. Furthermore, previous studies by Popova (2023), and Aydan et al. (2022) indicated that social protection spending improves aggregate well-being.

## 5.2. PCSE results for upper middle-income countries

The upper middle-income findings depicted in Table 4 indicate that PCSE estimation yields results that are comparable to those of the baseline regression, showing that a percentage increase in education spending leads to a 0.64 percentage point growth in aggregate well-being. This outcome supports the earlier studies by Craigwell et al. (2012) and Karim (2015), which found that public spending on education enhances well-being outcomes.

On the other hand, the PCSE estimation suggests that a one percentage point increase in the health spending coefficient is expected to raise aggregate well-being by 7.21 percentage points. Thus, opposing the system GMM outcome (where the health spending estimate is statistically insignificant). The disparities in the reported results highlight the necessity of addressing the cross-sectional dependency issue since we obtain the desired outcome after applying the PCSE estimator, which accounts for cross-sectional dependence. Additionally, The PCSE outcome is consistent with the findings of Haile and Niño-Zarazúa (2018) and Arthur and Oaikhenan (2017). Concerning the last social spending variable, the PCSE estimation demonstrates that social-protection spending has no significant effect on aggregate well-being, thus supporting the outcome of the baseline regression.

Turning to control variables, the PCSE estimation suggested that employment and domestic investment promote aggregate well-being in upper middle-income economies. Consequently, a percentage increase in employment is estimated to raise aggregate well-being by 1.06 percentage points. While aggregate well-being grows by 0.94 percentage points when domestic investment increases by one percentage point. However, inflation has no significant influence on aggregate well-being. In terms of control variables, the PCSE findings confirm the results of system GMM regression.

### 5.3. PCSE results for high-income countries

Table 4 shows that only spending on health has a positive and significant influence on aggregate well-being. Thus, a percentage increase in the health spending coefficient grows aggregate well-being by 3.02 percentage points. Several researchers have reached a similar Conclusion (Arthur & Oaikhenan, 2017; Bein et al., 2017; Haile & Niño-Zarazúa, 2018). Whereas redistributive spending on education and social protection has insignificant effects on aggregate well-being. As suggested under the system GMM findings, the lack of significant association between education spending and aggregate well-being could be attributed to the use of an aggregate measure of education spending instead of a disaggregate indicator, as prior research reveals that not all components of education expenditure promote economic growth (Eggoh et al., 2015). Overall, the PCSE estimates for social disaggregated spending are consistent with those generated by the system GMM regression. Based on the reported findings the social spending estimates produced by the system GMM are robust and reliable.

Moving to control variables, the PCSE estimation postulates that employment, and gross capital formation (GCF) improve aggregate well-being in wealthy nations. Consequently, a percentage increase in employment coefficient is expected to grow aggregate well-being by 4.11. On the other hand, a one percentage point increase in gross capital formation(GCF) coefficient grows aggregate well-being by 0.88 percentage points. Therefore, opposing the system GMM outcome suggests that the GCF estimate is statistically insignificant. The disparities arising from the two regressions (PCSE and system GMM) emphasise the importance of accounting for cross-sectional dependency, given that we achieved the anticipated outcome after applying the PCSE approach. Concerning the last regressor, inflation does not influence aggregate well-being. Based on the PCSE and system GMM findings, it appears that social spending in the health sector is the only significant stimulus for aggregate well-being in wealthy nations.

## 6. Conclusion

This research paper explored the nexus between government social spending and aggregate well-being utilising a panel dataset from upper middle-income and high-income countries, covering the period of 2002 to 2019. To achieve the objective of the study we used the system GMM estimator as the baseline regression and PCSE model for robustness purposes. In full sample analysis, baseline findings revealed that only social spending on education and health boosts aggregate well-being. However, the PCSE findings demonstrated that, after controlling for unobserved cross-sectional dependencies, all three disaggregated government expenditures on education, health, and social protection stimulated welfare.

In the case of upper middle-income economies, the baseline estimation found that welfare gains are derived from the redistributive policy that prioritises education. However, the study reveals that, after accounting for cross-sectional dependency under the PCSE specification, two (education and health) of the three social spending components promoted aggregate well-being. On the other hand, the system GMM results indicated that high-income economies are more likely to benefit from social spending in the health sector. The PCSE reached the same conclusion that only health spending was a significant predictor of aggregate well-being in wealthy countries. Therefore, suggesting that the baseline results are robust and reliable. In conclusion, the study confirms that disaggregated social spending in upper middle-income nations and wealthy nations does not impact aggregate well-being uniformly. Therefore, efforts to promote aggregate welfare through government redistributive policy should take into account these concomitant heterogeneities.

### 6.1. Policy implications

Governments and policymakers should develop redistributive policies that address the specific needs of each region since evidence demonstrates that disaggregated social spending in upper middle-income countries and wealthy nations do not influence aggregate well-being uniformly. For upper middle-income countries, social policy should prioritise the education sector, whereas, for wealthy economies, it

should primarily focus on the health sector. The proposed implementation should occur without abandoning the other redistributive programs.

## 6.2. Limitation and future research

During the construction of our welfare index, we concentrated primarily on objective well-being factors, while overlooking subjective well-being. Future studies should use mixed methods since the qualitative side of this approach will allow researchers to capture the subjective aspects of well-being which relate to human psychology. Therefore acquiring subjective well-being data through interviews, questionnaires and surveys. On the other hand, the quantitative side will focus on objective well-being. There will be significant contributions to the field of well-being resulting from the application of this methodology.

## Note

1. A dynamic model is preferred over a static model to capture inertia effects and the persistent nature of welfare improvements.

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## Authors contributions

Conceptualization, R.T.G.; B.T.M.; and L.G.; Methodology, R.T.G.; B.T.M.; Software, R.T.G.; B.T.M.; Formal analysis, R.T.G.; Resources, R.T.G.; Data curation, R.T.G.; Writing—original draft, R.T.G.; Supervision, L.G. and B.T.M. All authors have read and agreed to the published version of the manuscript.

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## Data availability statement

The study's dataset is available upon request from the corresponding author, R.T. Gumede.

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## Appendix

**Table A1.** Selected countries.

Upper middle-incomes countries		High-income countries	
1. Albania	1. Australia	20. Japan	
2. Argentina	2. Austria	21. Latvia	
3. Brazil	3. Belgium	22. Lithuania	
4. Bulgaria	4. Canada	23. Luxembourg	
5. China	5. Chile	24. Malta	
6. Colombia	6. Croatia	25. Netherlands	
7. Costa Rica	7. Cyprus	26. New Zealand	
8. Dominican Republic	8. Czech Republic	27. Norway	
9. Jamaica	9. Denmark	28. Poland	
10. Mexico	10. Estonia	29. Portugal	
11. Panama	11. Finland	30. Singapore	
12. Paraguay	12. France	31. Slovak Republic	
13. Peru	13. Germany	32. Slovenia	
14. Romania	14. Greece	33. Spain	
15. Russian Federation	15. Hungary	34. Sweden	
16. South Africa	16. Iceland	35. Switzerland	
	17. Ireland	36. United Kingdom	
	18. Israel	37. United States	
	19. Italy	38. Uruguay	

Source: World Bank.

**Table A2.** Data description and sources.

Variables	Description	Source
GDP	In this case, GDP denotes gross domestic product (calculated at constant 2010 prices). GDP is calculated by incorporating the value of the final products and services produced in a specific country over time.	WDI
Education expenditure	General government spending on education is expressed as a percentage of GDP, annually.	IMF-GFS SOXC
Health expenditure	General government spending on health is expressed as a percentage of GDP.	IMF-GFS SOCX
Social protection spending	General government spending on social protection is expressed as a percentage of GDP, annually.	IMF_GFS SOXC
Age dependency	Reflects the ratio of dependents between 15 and 64 years old to individuals of the working age population (15-64 years old).	WDI
CO2 emission	Presenting carbon dioxide emissions (kg per 2017 ppp \$ of GDP) generated from fossil fuel combustion and cement production.	WDI
Employment	Employment in services (% of total employment). This sector comprises several industries such as real estate, finance, insurance, wholesale and retail trade, restaurants, lodging, and hotels; in addition to transportation, storage, and communications.	WDI
Gross capital formation	Gross capital formation (%GDP) represents the fixed assets of the economy.	WDI
Inflation	An economy's overall increase in the cost of goods and services is known as inflation. Using the consumer price index (annual %) we measure inflation.	WDI
Control of corruption	This indicator portrays the perceptions of how public power is being exploited for private gain, capturing both small-scale and massive corruption.	WGI
Government effectiveness	Assesses the public's perception of the government's commitments to delivering public services, its quality, and its independence from political pressures.	WGI
Rule of law	Portrays the trust and compliance of people with the rule of law, particularly concerning contract enforcement, property rights, court enforcement, along crime and violence risks.	WGI
Political stability	This indicator captures people's views of the potential of political instability.	WGI
Life expectancy	Life expectancy, at birth (years) Depicts life expectancy of infant at birth assuming that mortality rate recorded at birth remains constant.	WDI
Basic drinking water	Access to improved drinking water (% of the population).	WDI
Sanitation	Access to safety managed sanitation services (% population)	WDI