



# From the Cradle to the Grave? Welfare Regimes and the Quantity of Life: Global Trends and Cross-National Evidence

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## Abstract

Can welfare institutions affect the quantity of human life? While the question may seem grandiose, years of welfare state retrenchment and the COVID-19 pandemic have refocused attention on government intervention in people's lives. Scholars have long been concerned with the impact of the welfare state on different outcomes, primarily economic and social. More recent focus has shifted to the impact of welfare policy on human well-being. Still, this literature suffers from at least two drawbacks: an overriding focus on high-income countries and emphasis on subjective well-being. In this article, we try to address these drawbacks by examining multiple dimensions of human longevity, including life expectancy, life expectancy inequality, maternal mortality, and healthy life years, using a panel dataset covering countries at varying levels of development over multiple decades. We begin by documenting global trends in these outcomes and in welfare regimes over time (1990–2023). We then assess the relationship between welfare institutions and longevity indicators using pooled panel models and specifications with two-way fixed effects (2006–2022). Finally, we discuss some illustrative cases. Our findings indicate that more generous welfare regimes are associated with higher levels in the quantity of life overall. Implications for the study of the relationship between the welfare state and well-being are discussed.

**Keywords** Welfare regimes · Welfare policy · Human longevity · Life expectancy · Human well-being

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## 1 Introduction

For more than a century, scholars have debated the merits of the welfare state across a vast range of outcomes that comprise or strongly affect economic, social, cultural, and political life. The extraordinary scholarly focus on welfare policy reflects its presumed effects on many dimensions of human endeavor. The cumulative impact of welfare policy leads to a fundamental question: does it, in the end, contribute to or detract from the quality and length of human lives? Welfare institutions are generally agreed to have profound consequences, as they, perhaps more than any other factor (aside from the market economy itself), can dramatically affect the degree to which people lead long and satisfying lives. Welfare regimes are thus especially salient because they are among the most important contemporary policy instruments for improving people's lives; that is, they are unique in the extent to which they allow political outcomes to displace or supplement market outcomes by regulating the processes by which well-being is produced and distributed.

A vast body of research has examined various aspects of the welfare state, such that any attempt to briefly characterize it must necessarily touch on only the most compelling strands, such as its effect on poverty (e.g., Kenworthy, 1999; Scruggs & Allan, 2008), inequality (e.g., Kenworthy & Pontusson, 2005), crime (e.g., Messner & Rosenfeld, 1997), rates of domestic violence, divorce, and other aspects of family life (e.g., Buckingham, 1999), alcoholism (e.g., Valdez, Kaplan and Kurtis 2007), several dimensions of physical and mental health (e.g., Mossakowski, 2009; Ruckert and Labonte 2017), suicide (Flavin and Radcliff 2009), social capital (e.g., Rothstein, 1998), support for democracy (e.g., Bollyky et al., 2019; Inglehart & Ponarin, 2013), and political tolerance (e.g., Chebotareva, 2015).<sup>1</sup>

Prior research has linked aspects of welfare policies to perceptions of quality of life, that is, the extent to which individuals find their lives satisfying or "happy." This body of empirical literature has grown considerably, with a focus primarily on the developed OECD countries (Ono and Lee 2013; Pacek and Radcliff 2008a, b; Radcliff 2013; Rothstein 2010), and more recently, with a more expanded global view (Kotakorpi and Laamenen 2010; O'Connor, 2017; Ram, 2009; Schmidt et al., 2024). While conclusions remain mixed, and findings are becoming more nuanced with respect to what sub-groups in the population find their happiness enhanced or constrained by government intervention in the economy, a rough consensus suggests that welfare programs, with some important caveats, do positively affect the extent to which individuals find their lives enjoyable. This raises a related question about the *quantity* rather than the quality of life.

Across the tapestry of work on the utility of welfare, we identify a core question concerning whether welfare policy contributes to (or inhibits) improvements in human well-being in its most fundamental sense. In the final analysis, do welfare regimes contribute to (or inhibit) human life's greatest good for the greatest number? This is, of course, an ideological question that defies any simple answer, such that any attempt, such as this, to answer it will (rightly) face skepticism from those who emphasize the ideological presumptions that are embedded in the research question itself. While we do not dismiss that issue lightly, we do note that the question, however ideological, can be profitably reduced to a relatively straightforward empirical question that can be studied using the same methods and evaluative standards applicable to any other empirical question. In principle, it is possible

<sup>1</sup> See also Atkinson (1999); Chung and Bemak (1996); Pacek and Radcliff 2008a, b; Saunders (2000); Shandra et al. (2004); Shin (1989).

to assess the observed impact of welfare institutions on specific issues, such as the degree to which people lead long, healthy, and enjoyable lives. Such a research program does present important practical difficulties, one of which is the obvious and troublesome issue of how we conceptualize and measure human well-being. In this paper, we propose several metrics centered around the concept of life “quantity.” Whatever else one might value, happiness and *life itself* are indisputably universal goals.

Traditionally, scholars have eschewed those precise questions by focusing instead on proxies, the most ubiquitous of which are measures of macroeconomic conditions, with GDP and its variants being relied upon the most. Aware of the shortcomings of such measures, economists and others have sought to bypass economic growth as the benchmark for operationalizing quality of life across countries. One strategy, as represented by the familiar United Nations Development Programme (UNDP)’s Human Development Index, combines how affluent a country is (as determined by its GDP and its analogs) with additional aggregate measures (such as the country’s average years of education of its adult population).<sup>2</sup> There is indeed a rough consensus that the HDI and similar indices represent an advancement over limiting attention to a country’s level of economic development. At the same time, it is also generally (if not uniformly) agreed that any such measures remain crude and, more, incomplete as measures of human well-being.

The present study is further motivated by the literature’s insufficient attention to the role of political factors as important explanatory factors driving differences in well-being. Particularly troubling is the lack of attention to one of the central issues in political economy and comparative politics: the nature and extent of political regulation of the economy, as assessed by the generosity of welfare institutions. In this paper, we attempt to address these omissions by examining a range of objective measures reflecting human longevity, focusing on the role of welfare regimes as our principal independent variable. We also seek to contribute to existing research by extending the analysis’s geographic scope to include low- and middle-income countries, rather than relying primarily on data from more affluent (almost certainly OECD) countries.

The logic for these choices is obvious. In the absence of a single consensus measure of well-being, any findings suggesting this-or-that connection between well-being and welfare policy are limited by the imprecision of available measures. We try to gain some purchase on this problem by studying more objective measures of well-being in the hope of finding consistent evidence on the predictors of well-being, however defined. Similarly, studying the question across multiple contexts and with multiple dependent variables provides greater confidence in any empirical regularities linking welfare institutions to well-being. In sum, our understanding of the political economy of well-being must avoid being predicated on evidence and theory emerging from, and in the end, perhaps only applicable to, high-income countries.

While work on industrial democracies has been invaluable, our understanding of political connections is inherently limited by the range of contexts under consideration. The wider the range of contexts considered, the more confidence we may have in the conclusions we draw. If only for that reason, the literature on well-being is hampered (as in many other areas of political research) by a nearly exclusive focus on the wealthy, stable, peaceful, and democratic countries of Western Europe, North America, and the Pacific. This immediately

<sup>2</sup> Human Development Index (United Nations Development Programme): <https://hdr.undp.org/data-center/human-development-index#/indicies/HDI>. Last accessed: 23 July 2026.

raises an important concern about such work: do the conclusions drawn from it generalize to the rest of the world?

The quality and coverage of data for non-rich countries are also problematic, in that the empirical data that have traditionally existed have typically had only a few observations per country over time and covered only a relatively small set of countries. Understandably, this creates a strong practical incentive to focus on rich countries, as research is better and more readily conducted when armed with the kind of abundant, readily available high-quality data that typically exists for OECD countries relative to other countries. There is an additional advantage in not limiting attention to rich countries that is more theoretical in nature. Setting aside concerns about the availability or quality of data, we are best reminded that our very conceptualization of what the welfare state contributes may be limited by studying only a few privileged countries that enjoy conditions conspicuously absent in much of the world: a democratic state with competitive electoral choices, in an environment of relative domestic tranquility and the rule of law, all nested within a generally prosperous, “modern” economy.<sup>3</sup>

Against this backdrop, we examine the relationship between welfare institutions and multiple dimensions of human longevity using a panel dataset covering countries at varying levels of development. We begin by documenting global trends in key indicators of the quantity of life, including life expectancy, life expectancy inequality, maternal mortality, and healthy life years, alongside changes in welfare states between 1990 and 2023. We then estimate pooled panel models as a substantive benchmark, as well as two-way fixed effects (TWFE) models to assess how within-country changes in welfare regimes are associated with variation in these indicators while accounting for time-invariant country characteristics and common global shocks (2006–2022). Following Bartram (2025), our interpretation emphasizes the direction, magnitude, and consistency of the estimated relationships across outcomes and model specifications, together with descriptive evidence from individual country trajectories involving both welfare-regime development and retrenchment. Across the countries included in the analysis, the estimated relationships are consistent in direction: more generous welfare regimes are associated with longer and healthier lives, lower maternal mortality, and lower inequality in longevity.

The article proceeds as follows. We first review the literature on the relationship between welfare institutions and well-being. We then describe the data and empirical strategy, followed by an examination of cross-national trends in both longevity outcomes and welfare regimes. We next present the results of our empirical models, discuss some illustrative cases, and conclude with a discussion of the implications of our findings for the study of the relationship between the welfare state and human well-being.

## 2 The Welfare State and Human Well-Being

One area of data collection that has been remarkably successful across high, middle, and low-income countries is survey data on subjective well-being, i.e., life satisfaction and happiness, capturing individuals’ overall evaluations of their lives and their reported happiness. Comparing mean levels of these two indicators across nations has become increasingly

<sup>3</sup> See Bromo et al. (2024, 2025) and Ponarin and Afanasyeva (2025) for recent studies examining the relationship between subjective well-being (quality of life) and political regime.

commonplace, and the measures themselves have been subject to a battery of evaluations and criticism as well (see Veenhoven, 1996, 1997). It is reasonable to be skeptical of using survey items to measure a complex and contested notion such as human happiness. Not surprisingly, a large body of literature has emerged to assess the validity and reliability of self-reported measures of happiness and life satisfaction. While scholarly debate over these measures continues, there is some consensus that concerns about various biases can be safely set aside (Veenhoven, 2000). Biases such as language, desirability, and others have been subject to careful scrutiny over the past few decades.

Over time, the measures themselves have expanded. For example, for years, the “gold standard” was the World Values Survey, which measured life satisfaction and happiness using the question: “All things considered, how satisfied or dissatisfied are you with your life as a whole nowadays?” with higher values indicating greater satisfaction.<sup>4</sup> More recently, scholars have turned to the Gallup World Poll measures, such as the Cantril Self-Anchoring Scale, which asks such questions as: “The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?” with higher scores corresponding to more sanguine perceptions of one’s own life (see Cantril, 1965). The expansion of these and other measures of subjective well-being over the last decade has improved the ability to delve deeper into the determinants of human well-being across high-, middle-, and low-income countries. These studies alone, while valuable, provide an incomplete picture. Some recent work shows that the welfare state exerts a positive and significant effect on subjective well-being (happiness) in both wealthy and middle- and low-income countries (O’Connor, 2017; Schmidt et al., 2024). Intriguingly, a number of studies also find an association between happiness and longevity worldwide. In other words, individuals who score higher on measures of subjective well-being also appear to enjoy longer and healthier lives (Diener & Chan, 2011; Lawrence et al., 2015; Lee et al., 2019; Song et al., 2023). If, controlling for other relevant factors shown to affect well-being, the degree of government intervention is associated with higher levels of happiness, it is plausible that these relationships extend to more objective well-being metrics, such as longevity (conceived in various ways).

We argue that there are reasons to believe that welfare programs might be positively associated with longevity across high-, middle-, and low-income countries (albeit to differing degrees). Our argument is straightforward: we examine several factors and conditions known to affect human longevity (and related issues) and assess whether welfare regimes, in turn, affect these conditions. The mechanisms are relatively straightforward and articulated in prior studies, particularly in high-income countries. For example, Reynolds and Avendaño’s (2018) study on 20 OECD countries between 1980 and 2010 found an unambiguously positive relationship between social spending and life expectancy. They identified three pathways through which this relationship operates. First, a more generous welfare state can alleviate poverty, which, as we note below, is associated with lower life expectancy. Second, it may increase access to health-related resources, enabling individuals to live longer and healthier lives. Third, welfare regimes can provide insulation against sources of chronic stress, which in turn would adversely affect health and longevity, a mechanism also noted in the subjective well-being literature (see Pacek and Radcliff 2008a, b). In what follows, we expand further on this line of reasoning.

<sup>4</sup> World Values Survey: <https://www.worldvaluessurvey.org/wvs.jsp>. Last accessed: 23 July 2026.

We begin with what is perhaps the most studied set of factors: the related conditions of poverty and inequality. While most empirical studies on poverty's impact on longevity have focused on high-income developed countries (e.g., OECD countries), they paint a relatively consistent picture, particularly in the United States. (Chokshi, 2018; Liu et al., 2024; Pillay-van Wyk & Bradshaw, 2017; Stringhini and Shipley 2010). Specifically, poverty shortens lifespans in a variety of ways. "Living conditions" constitute one such category; poorer areas generally face more limited access to health care, fewer economic resources, and greater exposure to environmental risks such as pollution. "Lifestyle" factors may likewise be affected, including poor diet and higher prevalence of unhealthy behaviors such as smoking and excessive drinking. Poverty also reduces access to, and the benefits of, education, which has been shown to affect mortality (van Raalte et al., 2011).

Similarly, income inequality has been shown to significantly affect life expectancy, although the relationship is complex and empirical results are mixed (De Vogli et al., 2005; Neumayer and Plümper 2016). Greater income inequality is often associated with higher levels of poverty, though not always directly with adverse health outcomes. However, as Neumayer and Plümper argue, income inequality can contribute to deteriorating communities, weakened public services, higher crime rates, and other factors that may affect mortality. Moreover, if economically disadvantaged people are left out of the political process or are further marginalized, social policies may be less responsive to their needs and less reflective of their preferences, potentially leading to deleterious health outcomes (Gilens, 2012). While caution is warranted, the balance of evidence suggests that, in the absence of mitigating factors, income inequality *can* negatively affect longevity.

Can welfare-state interventions mitigate the impact of poverty and inequality on longevity? A preponderance of evidence would suggest so. A recent analysis by Popova (2023) of 101 countries over a ten-year period found a strong positive effect of social spending on reducing poverty and inequality, although the effect depended on how resources were distributed. While this study emphasizes distribution, other research similarly finds that higher levels of welfare spending are associated with lower poverty rates. Although much of this research focuses on high-income countries, the effect has increasingly been demonstrated in low- and middle-income countries as well. For instance, Haile and Nino-Zarazua's (2018) study of 55 low- and middle-income countries provided strong evidence of social spending's poverty-alleviating effect. It is important to note that these effects are not necessarily uniform, varying across country contexts and types of welfare programs. For example, Rudra's (2004) study of 35 low- and middle-income countries and 11 high-income countries found that the impact of welfare policies on alleviating inequality was stronger in the latter group than in the former.

Another related pathway to longevity concerns education. Increased access to and improvements in education have been shown to exert a powerful influence on health in general and mortality specifically (Hummer & Hernandez, 2013; IHME-CHAIN Collaborators, 2024; Ross and Mirowsky 2010; The Lancet Public Health, 2020). Simply put, education enables access to better employment, income, health care, and information necessary to make healthier lifestyle decisions, and these effects appear to persist across the life course. As with poverty and inequality mitigation measures, the relationship between welfare institutions and educational outcomes is complex, and the evidence is mixed. In contexts with more developed social protection systems, individuals may face fewer constraints on basic needs, potentially allowing greater investment in education and skill acquisition. Consistent

with this, a number of empirical studies find a positive relationship between welfare policies and educational attainment and outcomes across countries (Dreher et al., 2008; Gupta et al., 2002; Moore, 2024).

In a similar vein and related to the above, another pathway to variation in mortality and life expectancy is food insecurity. The effect is particularly straightforward: limited access to nutritious food increases the odds of chronic illness and a concomitant reduction in life expectancy, often dramatically. Perhaps nowhere has this been studied more extensively than in the United States, with its pronounced health disparities, “food deserts,” etc., but the link to life expectancy is clear and unambiguous (Hao et al., 2024; Vercammen et al., 2019; Walker et al., 2019; Wang et al., 2019). Once again, the mitigating role of welfare institutions is nuanced and complex. Data on food insecurity are more limited outside OECD countries, and as a result, studies of mitigation effects have primarily focused on high-income contexts. That said, cross-national evidence suggests that more developed social protection systems are associated with greater food availability and improved access to nutrition (Hossain et al., 2021; Loopstra et al., 2016; Reeves et al., 2017).

All of this suggests that, with more generous welfare regimes (among other things), we might observe a series of positive outcomes on human longevity. Assuming “good government” exists and has the capacity to deliver, then social protection can provide a security blanket for vulnerable populations, mitigating the psychological and physical stressors that affect how individuals age. As a result, people might live longer, healthier lives, and there may be fewer disparities in the ability of people within this or that society to do so. In what follows, we explore global trends and assess these expectations using a longitudinal research design with countries at varying levels of development. Our evaluation centers on the substantive magnitude and consistency of the estimated relationships, together with individual country trajectories. We next describe the data and empirical strategy.

### 3 Data and Research Design

We base our analysis on a panel dataset covering countries at varying levels of economic development over the period 1990–2023.<sup>5</sup> The unit of analysis is the country-year. We compiled the data from multiple sources and included a range of social, economic, and political indicators relevant to the study of human well-being. The resulting dataset is unbalanced, reflecting differences in data availability across countries and years.

Our principal independent variable is the *Welfare Regime Index*, derived from the Bertelsmann Stiftung’s Transformation Index (BTI) and made available through the World Bank. The BTI evaluates the extent to which countries are advancing toward a socially inclusive market economy, with particular emphasis on developing and transition economies, based on expert assessments across multiple dimensions of political and economic transformation, covering the years 2006–2022. The welfare regime indicator captures the social dimension of this transformation, measuring the extent to which countries provide effective social safety nets and ensure equal access to basic opportunities. In this sense, the variable reflects not only the level of social protection but also the broader institutional capacity of the state

<sup>5</sup> In principle, the dataset covers up to 195 countries. However, due to missing observations across several variables, the effective sample used in the regression analyses is substantially smaller and varies across model specifications.

to mitigate socioeconomic risks and promote inclusion. The index ranges from 1 to 10, with higher values indicating more generous welfare regimes characterized by stronger social safety nets and equality of opportunity.<sup>6</sup> In our sample, the index ranges from 1.00 to 9.50, with a mean of 4.95. The cross-country distribution of the Welfare Regime Index is shown in Figure 3 in the Appendix.

Unlike single-category measures of social spending, the BTI index captures the broader structure and functioning of welfare institutions, including how social protection is organized and delivered. As such, it provides a more comprehensive indicator of welfare regimes across countries. In addition, its coverage across developing and transition economies allows for the inclusion of a wider range of countries than is typically possible using more disaggregated spending-based indicators. The Welfare Regime Index thus offers relatively broad and consistent country and temporal coverage, which makes it better suited to the panel analysis conducted here. Although it does not distinguish as finely between specific dimensions of welfare provision, it captures the overall structure and functioning of welfare institutions in a way that permits more systematic comparison across countries and over time. Because the Welfare Regime Index is an expert-assessed measure, it should be understood as a standardized evaluation of welfare institutions rather than as a directly observed spending or coverage measure.<sup>7</sup>

Our dependent variables capture multiple dimensions of human longevity and are drawn from widely used international data sources. Life expectancy at birth, measured in years for the total population and separately for males and females, and life expectancy inequality, which measures the dispersion of age-at-death across a population, are sourced from the UNDP's Human Development Reports (HDR) and constitute individual components that are subsequently aggregated into the Human Development Index.<sup>8</sup> Life expectancy at birth ranges from 12.16 to 86.37 years, with a mean of 68.71 years. Similar patterns are observed for males (11.41–84.45, mean 66.14) and females (13.32–88.50, mean 71.35). Life expectancy inequality also varies substantially across the sample, ranging from 1.79 to 69.52, with a mean of 14.61. These measures thus capture both the average life expectancy and the variation in mortality across countries. The *Maternal Mortality Ratio* variable, measured as the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births, is drawn from the World Bank's World Development Indicators and reflects risks associated with childbirth as well as broader health system capacity.<sup>9</sup> Maternal mortality exhibits particularly high disper-

<sup>6</sup> For further details on the Bertelsmann Stiftung's Transformation Index, see <https://bti-project.org/en/methodology>. See also *BTI 2024 Codebook for Country Assessments*: [https://bti-project.org/fileadmin/api/content/en/downloads/codebooks/BTI2024\\_Codebook.pdf](https://bti-project.org/fileadmin/api/content/en/downloads/codebooks/BTI2024_Codebook.pdf). Last accessed: 23 July 2026.

<sup>7</sup> Using a composite indicator of welfare regimes also helps reduce potential collinearity with standard macroeconomic controls, such as GDP per capita and health expenditure, that may arise when relying on spending-based measures. While the index provides a broad measure of welfare institutions, capturing multiple dimensions of social protection, it does not distinguish between specific types of welfare provision or regime characteristics emphasized in the comparative welfare state literature (e.g., Esping-Andersen, 1990; Scruggs & Allan, 2006).

<sup>8</sup> Given well-established differences in male and female life expectancy, often substantial across countries, we analyze male and female life expectancy at birth separately, in addition to the overall measure. See the 2025 HDR Technical Note for further details: [https://hdr.undp.org/sites/default/files/2025\\_HDR/HDR25\\_Technical\\_Notes.pdf](https://hdr.undp.org/sites/default/files/2025_HDR/HDR25_Technical_Notes.pdf). Last accessed: 23 July 2026.

<sup>9</sup> World Development Indicators (World Bank): [https://data360.worldbank.org/en/indicator/WB\\_WDI\\_SH\\_STA\\_MMRT\\_NE](https://data360.worldbank.org/en/indicator/WB_WDI_SH_STA_MMRT_NE). Last accessed: 23 July 2026.

sion, with values ranging from 1.08 to 6,591.34 deaths per 100,000 live births and a mean of 220.85. *Healthy Life Years* is obtained from the WHO's Global Health Observatory and measures the expected number of years lived in good health.<sup>10</sup> It ranges from 35.30 to 73.80, with an average of 60.99. This measure complements standard life expectancy by capturing the quality, as well as the quantity, of longevity.

We include a set of control variables to account for key economic, demographic, and institutional factors that may be associated with both welfare regimes and human well-being. The selection of controls is guided by previous research on well-being and health outcomes (e.g., Dolan et al. 2008; Koreh et al. 2026; O'Connor 2017; Pacek and Radcliff 2008a, b; Schmidt et al. 2024), as well as recent work in the well-being literature emphasizing the importance of distinguishing between confounders and variables that may lie on the causal pathway between the independent and dependent variables (Bartram, 2021). These include GDP per capita and unemployment rate, meant to capture the broader economic environment, which may influence both the development of welfare institutions and population health, both from the World Bank; public health expenditure as a share of GDP, reflecting investment in health systems that may be associated with longevity outcomes and may also correlate with broader welfare arrangements, obtained from the WHO's Global Health Expenditure database; the old-age dependency ratio (number of individuals aged 65 or older per 100 people of working age), also from the World Bank, capturing demographic-related dynamics that are likely to affect both social policy demand and mortality patterns; and a measure of private civil liberties derived from the Varieties of Democracy (V-Dem) dataset as a proxy for broader institutional conditions that may be associated with both welfare policy and well-being outcomes. Summary statistics for variables are reported in Table 1.<sup>11</sup>

Our analysis combines descriptive examination of cross-national trends with regression-based estimation. We begin by examining global trends in longevity outcomes and welfare regimes over time. These trends provide context for the empirical analysis and illustrate broad patterns across countries. We then estimate pooled panel models as a substantive benchmark, followed by models with country and year fixed effects to assess how within-country changes in welfare regimes are associated with variation in longevity outcomes, while accounting for time-invariant country characteristics and common shocks affecting all countries in a given year. This specification helps mitigate concerns about omitted variable bias arising from unobserved, time-invariant differences across countries.

All models are estimated using ordinary least squares with standard errors clustered at the country level to account for dependence among observations within countries over time. The welfare regime measure is lagged by one period in all models to allow for a temporal delay between changes in welfare state conditions and observed outcomes. *Maternal Mortality Ratio* and *GDP per Capita* are log-transformed. Control variables are included as described above. Because country inclusion in our models is determined by data availability, the resulting set of countries should not be understood as a random or representative sample of a larger population of countries. As such, we place greater emphasis on the

<sup>10</sup> Global Health Observatory (World Health Organization): [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/life-expectancy-at-birth-\(years\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/life-expectancy-at-birth-(years)). Last accessed: 23 July 2026.

<sup>11</sup> The unusually low minimum values correspond to Rwanda in 1994, during the genocide. In that year, life expectancy, as reported in the Human Development Reports, fell to 12.16 years overall, 11.41 years for males, and 13.32 years for females. This sharp decline has also been documented in prior research (e.g., Iyer et al., 2018).

**Table 1** Summary Statistics (Whole Sample)

|                            | <i>N</i> | Min   | Max       | Average  | Median  | Std. Dev. |
|----------------------------|----------|-------|-----------|----------|---------|-----------|
| Life Expectancy            | 6,630    | 12.16 | 86.37     | 68.71    | 70.56   | 9.57      |
| Life Expectancy (Males)    | 6,630    | 11.41 | 84.45     | 66.14    | 67.50   | 9.28      |
| Life Expectancy (Females)  | 6,630    | 13.32 | 88.50     | 71.35    | 73.73   | 9.96      |
| Life Expectancy Inequality | 2,730    | 1.79  | 69.52     | 14.61    | 11.11   | 10.95     |
| Maternal Mortality Ratio   | 6,256    | 1.08  | 6591.34   | 220.85   | 66.87   | 358.14    |
| Healthy Life Years         | 4,048    | 35.30 | 73.80     | 60.99    | 63.10   | 7.35      |
| Welfare Regime Index       | 1,145    | 1.00  | 9.50      | 4.95     | 5.00    | 1.93      |
| Health Expenditure         | 4,540    | 1.22  | 27.09     | 6.23     | 5.66    | 2.86      |
| GDP per Capita             | 6,500    | 22.95 | 256799.80 | 11845.59 | 3528.87 | 21275.36  |
| Unemployment Rate          | 5,936    | 0.10  | 38.80     | 8.09     | 6.30    | 6.15      |
| Old-Age Dependency Ratio   | 6,630    | 1.01  | 74.79     | 11.81    | 8.12    | 8.31      |
| Private Civil Liberties    | 5,846    | 0.00  | 0.97      | 0.69     | 0.79    | 0.25      |

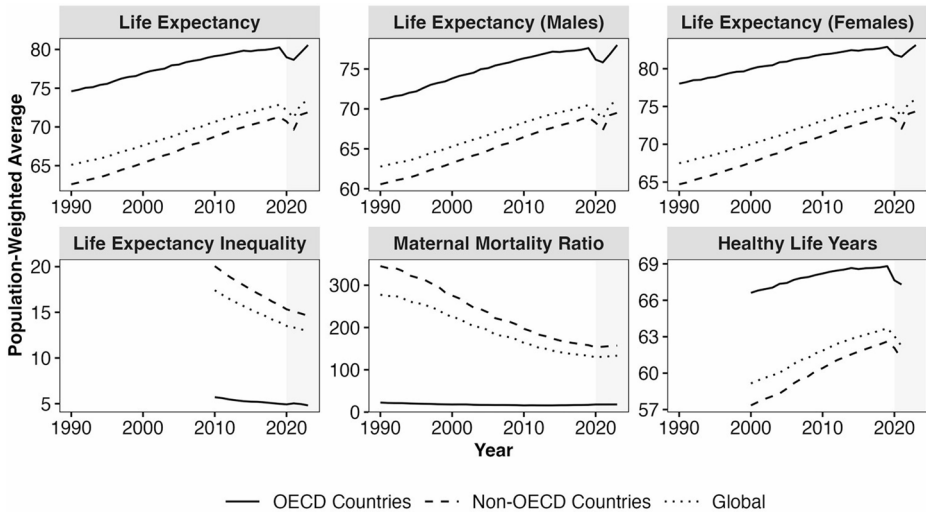
substantive magnitude of the estimated coefficients and their direction across the different longevity outcomes, together with descriptive evidence from individual country trajectories (Bartram, 2025). Our empirical conclusions thus pertain directly to the countries and years included in the analysis.<sup>12</sup> Finally, we discuss illustrative cases that experienced substantial increases or declines in the Welfare Regime Index and examine whether these changes were accompanied by corresponding movements in longevity outcomes. These examples complement our regression analysis by focusing on some of the trajectories observed in individual countries.

## 4 Comparative Evidence

### 4.1 Global Trends

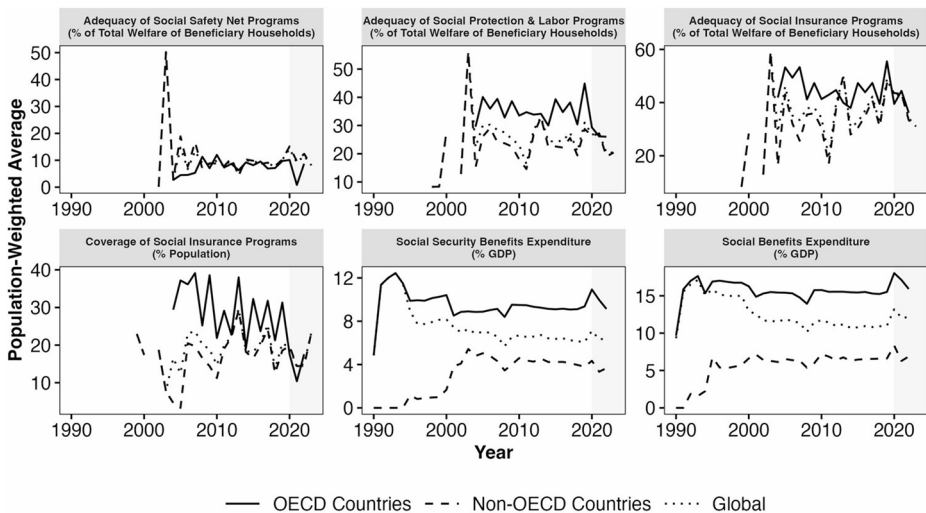
Figure 1 presents population-weighted trends in key indicators of the quantity of life from 1990 (or the first available time point) to 2023 for OECD countries, non-OECD countries, and the global average. Across all groups, life expectancy has increased steadily over time, with higher levels observed in OECD countries relative to non-OECD countries throughout the period. Similar patterns are evident for both male and female life expectancy. At the same time, measures of life expectancy inequality show a general decline, indicating a reduction in the dispersion of mortality across age groups, particularly in non-OECD countries. Maternal mortality has also fallen substantially over time, with particularly pronounced improvements in non-OECD countries, although levels remain higher than in OECD countries. Healthy life years display a broadly upward trend, suggesting improvements not only in the length of life but also in the number of years lived in good health. While OECD countries consistently exhibit higher levels across most indicators, non-OECD countries show notable convergence over time in several measures.

<sup>12</sup> In line with recent work emphasizing the importance of carefully distinguishing between confounders and variables that may lie on the causal pathway in observational models (Bartram, 2021), we also estimate alternative specifications in which the control variables are lagged by one period and the Welfare Regime Index is included contemporaneously. The results, reported in Table A1 in the Appendix, are very similar to those presented in the main analysis.



**Fig. 1** Global Trends in Well-Being Indicators, 1990–2023. Note: Global trends are computed as population-weighted yearly averages across countries. OECD and non-OECD aggregates are calculated separately, alongside the global average. Shaded areas indicate the post-COVID-19 period

Figure 2 presents population-weighted trends in key indicators of welfare state development from 1990 (or the first available time point) to 2023. Measures of social safety net adequacy, social protection and labor programs, and social insurance, from the World Bank's Atlas of Social Protection Indicators of Resilience and Equity database, display substantial variation over time, particularly in non-OECD countries, where levels tend to increase but



**Fig. 2** Global Trends in Welfare States, 1990–2023. Note: Global trends are computed as population-weighted yearly averages across countries. OECD and non-OECD aggregates are calculated separately, alongside the global average. Shaded areas indicate the post-COVID-19 period

remain more volatile.<sup>13</sup> Indicators of social insurance coverage also fluctuate considerably, reflecting differences in the reach and implementation of welfare programs across countries. Measures of social benefits expenditure, expressed as a share of GDP, from the International Monetary Fund's Government Finance Statistics, made available through the World Bank, show more stable patterns in OECD countries, while non-OECD countries exhibit lower levels and more gradual increases over time.<sup>14</sup>

Overall, while welfare state indicators tend to be higher and more stable in OECD countries, patterns across non-OECD countries suggest gradual yet uneven development of social protection systems over time. Additional detail on the evolution of the Welfare Regime Index over time is provided in Figure 4 in the Appendix, which shows both cross-national differences and within-country variation across the sample period.

## 4.2 Regression Analysis

These descriptive trends provide important context for the empirical analysis by displaying broad patterns in both longevity outcomes and the development of welfare institutions across countries. While informative, however, these patterns do not account for unobserved differences between countries, common shocks over time, or other confounding factors captured by the control variables. Moreover, the indicators presented in Fig. 2 reflect specific aspects of welfare systems, such as coverage, adequacy, and expenditure, and their availability is uneven across countries and years, especially for non-OECD countries. Our regression analysis employs a broader measure of welfare regimes that captures the overall structure and functioning of welfare institutions with more suitable coverage for panel estimation. This allows us to examine how welfare regimes are associated with variation in longevity outcomes in a more systematic way. We thus turn to regression analysis, the results of which are presented in Table 2.

While the OECD/non-OECD comparisons in Figs. 1 and 2 use the broader descriptive dataset and are not restricted to countries covered by the BTI Welfare Regime Index, the regression analysis covers the smaller set of developing and transition countries for which BTI data are available. Consequently, the OECD members appearing in the regression sample should not be interpreted as representing the full group of affluent Western OECD welfare states. Table 2 presents estimates from pooled panel models and models with country and year fixed effects. We use the pooled models as the main basis for substantive interpretation because their coefficients reflect the broader cross-national relationships among welfare regimes, the control variables, and longevity outcomes. The fixed-effects models provide a more demanding within-country test by accounting for stable differences across countries and common changes over time. Importantly, the estimated relationship between the Welfare Regime Index and each longevity outcome is consistent in direction across both specifications.<sup>15</sup>

<sup>13</sup> The Atlas of Social Protection Indicators of Resilience and Equity (World Bank): <https://www.worldbank.org/en/data/datatopics/aspire>. Last accessed: 23 July 2026.

<sup>14</sup> Available at: [https://data360.worldbank.org/en/dataset/IMF\\_GFSE](https://data360.worldbank.org/en/dataset/IMF_GFSE). Last accessed: 18 April 2026.

<sup>15</sup> Simple cross-country associations between the Welfare Regime Index and the longevity outcomes are presented in Figure 5 in the Appendix. While purely descriptive, these relationships are consistent in direction with the regression results reported in Table 2.

Table 2 Regression estimates

|                                              | Life<br>Expectancy<br>(1) | Life<br>Expectancy<br>(Males)<br>(2) | Life<br>Expectancy<br>(Males)<br>(3) | Life<br>Expectancy<br>(Males)<br>(4) | Life<br>Expectancy<br>(Females)<br>(5) | Life<br>Expectancy<br>(Females)<br>(6) | Life<br>Expectancy<br>Inequality<br>(7) | Maternal<br>Mortality<br>Ratio (log)<br>(8) | Maternal<br>Mortality<br>Ratio (log)<br>(9) | Healthy<br>Life<br>Years<br>(10) | Healthy<br>Life<br>Years<br>(11) | Healthy<br>Life<br>Years<br>(12) |
|----------------------------------------------|---------------------------|--------------------------------------|--------------------------------------|--------------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Welfare Regime Index <sub><i>t-1</i></sub>   | 0.76**<br>(0.30)          | 0.28***<br>(0.11)                    | 0.71**<br>(0.29)                     | 0.28***<br>(0.10)                    | 0.79**<br>(0.31)                       | 0.29**<br>(0.12)                       | -1.15***<br>(0.41)                      | -0.39***<br>(0.10)                          | -0.19***<br>(0.05)                          | -0.03*<br>(0.02)                 | 0.52*<br>(0.28)                  | 0.36***<br>(0.11)                |
| Health Expenditure <sub><i>t</i></sub>       | 0.20<br>(0.16)            | -0.15*<br>(0.08)                     | 0.18<br>(0.16)                       | -0.13*<br>(0.08)                     | 0.22<br>(0.16)                         | -0.17*<br>(0.09)                       | -0.42**<br>(0.21)                       | 0.16**<br>(0.07)                            | -0.02<br>(0.03)                             | 0.00<br>(0.01)                   | 0.09<br>(0.16)                   | -0.15***<br>(0.06)               |
| log(GDP Per Capita) <sub><i>t</i></sub>      | 3.85***<br>(0.39)         | -0.10<br>(0.62)                      | 3.90***<br>(0.38)                    | 0.08<br>(0.67)                       | 3.86***<br>(0.40)                      | -0.28<br>(0.57)                        | -4.95***<br>(0.53)                      | -0.66<br>(0.51)                             | -0.60***<br>(0.07)                          | -0.09<br>(0.05)                  | 2.93***<br>(0.37)                | 0.59<br>(0.55)                   |
| Unemployment Rate <sub><i>t</i></sub>        | -0.09<br>(0.07)           | -0.03<br>(0.05)                      | -0.10<br>(0.07)                      | -0.04<br>(0.05)                      | -0.09<br>(0.07)                        | -0.03<br>(0.05)                        | 0.01<br>(0.08)                          | 0.07*<br>(0.04)                             | 0.00<br>(0.01)                              | 0.01*<br>(0.01)                  | -0.12*<br>(0.07)                 | -0.05<br>(0.04)                  |
| Old Age Dependency Ratio <sub><i>t</i></sub> | 0.16**<br>(0.06)          | -0.35***<br>(0.07)                   | 0.07<br>(0.07)                       | -0.29***<br>(0.07)                   | 0.23***<br>(0.06)                      | -0.41***<br>(0.08)                     | -0.35***<br>(0.07)                      | 0.62***<br>(0.07)                           | -0.08***<br>(0.01)                          | 0.01<br>(0.01)                   | 0.18***<br>(0.06)                | -0.33***<br>(0.07)               |
| Private Civil Liberties <sub><i>t</i></sub>  | -5.91***<br>(1.55)        | -1.12<br>(1.35)                      | -5.70***<br>(1.50)                   | -0.98<br>(1.39)                      | -6.29***<br>(1.68)                     | -1.30<br>(1.35)                        | 7.67***<br>(2.29)                       | 2.31*<br>(1.34)                             | 1.61***<br>(0.39)                           | 0.18<br>(0.13)                   | -3.89***<br>(1.30)               | 0.42<br>(1.40)                   |
| Intercept                                    | 35.89***<br>(3.12)        | 63.38***<br>(3.90)                   | 34.10***<br>(3.07)                   | 59.84***<br>(4.27)                   | 37.61***<br>(3.23)                     | 67.04***<br>(3.56)                     | 64.39***<br>(4.17)                      | 30.64***<br>(3.46)                          | 9.97***<br>(0.52)                           | 7.21***<br>(0.34)                | 35.47***<br>(2.71)               | 42.28***<br>(3.53)               |
| Country FE                                   | ✓                         | ✓                                    | ✓                                    | ✓                                    | ✓                                      | ✓                                      | ✓                                       | ✓                                           | ✓                                           | ✓                                | ✓                                | ✓                                |
| Year FE                                      | ✓                         | ✓                                    | ✓                                    | ✓                                    | ✓                                      | ✓                                      | ✓                                       | ✓                                           | ✓                                           | ✓                                | ✓                                | ✓                                |
| Num. Obs.                                    | 1,105                     | 1,105                                | 1,105                                | 1,105                                | 1,105                                  | 1,105                                  | 872                                     | 872                                         | 1,105                                       | 1,105                            | 978                              | 978                              |
| Adjusted R <sup>2</sup>                      | 0.66                      | 0.96                                 | 0.63                                 | 0.95                                 | 0.68                                   | 0.97                                   | 0.73                                    | 0.99                                        | 0.77                                        | 0.99                             | 0.62                             | 0.97                             |

Note: Entries are ordinary least squares (OLS) estimates. Standard errors, clustered at the country level, are reported in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

The pooled estimates provide the clearest basis for interpreting the broader substantive relationships among welfare institutions, the control variables, and longevity outcomes. The fixed-effects estimates answer a narrower question: whether changes in welfare regimes within countries are associated with changes in longevity after accounting for stable country characteristics and common year-specific shocks. The coefficients on the Welfare Regime Index are smaller in the fixed-effects specifications, as might be expected once persistent differences between countries and common temporal trends are removed. Nevertheless, the direction of the relationship remains unchanged across all six outcomes. In both sets of models, more generous welfare regimes are associated with longer life expectancy, more healthy life years, lower life expectancy inequality, and lower maternal mortality. That said, we note here again that our principal explanatory variable is based on expert assessment and may therefore contain evaluative or measurement uncertainty not present in the same form in the longevity indicators.

The control variables in the pooled models also provide a substantively plausible picture of the social and economic conditions associated with longevity. Economic development exhibits the clearest pattern. Higher GDP per capita is associated with longer overall, male, and female life expectancy, more healthy life years, less inequality in longevity, and lower maternal mortality. These are comparatively large relationships: a one-unit increase in logged GDP per capita is associated with nearly four additional years of life expectancy and almost three additional healthy life years. This reinforces the importance of material development for population health, while also showing that the relationship between welfare regimes and longevity is observed after accounting for national income. Health expenditure displays a similarly favorable, although more modest, pattern in the pooled models. Greater health expenditure as a share of GDP is associated with longer life expectancy, more healthy life years, lower maternal mortality, and less inequality in longevity. Unemployment is associated with slightly lower overall, male, and female life expectancy and fewer healthy life years, although the estimated differences are small.

The old-age dependency ratio is associated with longer life expectancy, more healthy life years, lower life expectancy inequality, and lower maternal mortality. This pattern likely reflects the broader demographic and developmental conditions of societies in which larger proportions of the population survive into old age, rather than an independent beneficial effect of population ageing itself. The results for private civil liberties are less straightforward. Conditional on the other covariates, higher values are associated in the pooled models with lower life expectancy and healthy life years and with higher life expectancy inequality and maternal mortality. The measure is included to account for broad differences in political and institutional context, but its coefficient may also capture features of state capacity, political transition, or national development that overlap with the other variables in the model. As with the other coefficients in Table 2, these estimates are interpreted as conditional associations rather than causal effects.

Against this background, the principal result is the consistency of the Welfare Regime Index. In the pooled models, a one-point increase in the index is associated with approximately 0.76 additional years of overall life expectancy, 0.71 additional years for males, and 0.79 additional years for females. The corresponding fixed-effects estimates are approximately 0.28 years for overall and male life expectancy and 0.29 years for female life expectancy. Thus, the broader cross-national relationship is larger than the association identified

from within-country change, but both approaches point in the same substantive direction. A two-point difference in the Welfare Regime Index (the magnitude of change observed in several of the illustrative cases considered below) is associated with approximately 1.5 additional years of life expectancy in the pooled model and slightly more than one-half of a year in the fixed-effects model.

The results for life expectancy inequality suggest that welfare institutions are associated not only with how long people live on average, but also with how evenly longevity is distributed. A one-point increase in the Welfare Regime Index is associated with a 1.15-point reduction in life expectancy inequality in the pooled model and a 0.39-point reduction in the fixed-effects model. The association therefore becomes smaller when the analysis is restricted to within-country variation, but it remains substantively consistent. This pattern accords with the expectation that social protection may reduce differences in exposure to economic insecurity, access to health care, nutrition, and other resources that shape the distribution of mortality. At the same time, prior cross-national research remains mixed regarding the extent to which welfare institutions reduce health inequalities, so this finding should be regarded as part of a broader and still developing body of evidence (Hurrelmann et al., 2011).

The maternal mortality results follow the same general pattern. Because maternal mortality is logged, the coefficients are most naturally interpreted proportionally. In the pooled model, a one-point increase in the Welfare Regime Index is associated with an estimated reduction of approximately 17% in the maternal mortality ratio ( $100[e^{-0.19}-1]$ ). The corresponding fixed-effects estimate implies a reduction of approximately 3% ( $100[e^{-0.03}-1]$ ). The difference in magnitude is consistent with the possibility that persistent differences among countries account for part of the broader cross-national relationship, but the within-country estimate nevertheless points in the same direction. Substantively, this association is important because maternal mortality reflects not only the risks of pregnancy and childbirth, but also access to medical care, public-health capacity, income security, and the ability of social institutions to protect people during periods of heightened vulnerability.

Finally, more generous welfare regimes are associated with more years lived in good health. A one-point increase in the Welfare Regime Index corresponds to approximately 0.52 additional healthy life years in the pooled specification and 0.36 additional years in the fixed-effects specification. These results suggest that the relationship between welfare regimes and longevity concerns not only how long people live, but also the quality of those years. This pattern is consistent with the broader literature linking welfare institutions to population health more generally (Lundberg et al., 2008; Kim & Jennings, 2009). One plausible interpretation is that more generous welfare regimes are associated with social and economic conditions that reduce cumulative stress and improve access to resources relevant not only for longevity itself, but also for the quality of years lived.

The estimates show a consistent substantive pattern across distinct dimensions of longevity, indicating that the relationship between welfare institutions and human well-being is visible not only in subjective evaluations of life, but also in several objective indicators of the quantity of life itself. More generous welfare regimes are associated with longer lives for both women and men, a more equal distribution of longevity, lower maternal mortality, and more years lived in good health. The estimated magnitudes are generally larger in the pooled models and more conservative in the fixed-effects models, but none of the

substantive conclusions depend on a single specification. For robustness, we report several additional specifications in the Appendix. Models with lagged controls produce very similar estimates (Table 4). Specifications with only country fixed effects or only year fixed effects preserve the direction of the Welfare Regime Index across the outcomes (Tables 6 and 7), as do models without controls (Table 8), models excluding health expenditure (Table 9), and models restricted to economic controls (Table 10). The results also remain similar when the analysis is limited to non-OECD countries (Table 11), indicating that the overall pattern is not driven solely by higher-income cases. Finally, we conduct a leave-one-country-out jack-knife analysis to evaluate the sensitivity of the estimates to individual countries. As shown in Figure 6, the estimated coefficients remain stable in both magnitude and sign across all specifications, indicating that no single country drives the results.

### 4.3 Illustrative Cases

To complement the regression analysis, we examine countries that experienced especially large changes in the Welfare Regime Index over the period covered by that measure. Cases were selected by calculating, for each country, the difference between its last and first available observations on the index. We first identified the two largest positive changes while retaining ties. Algeria recorded the largest increase, rising by 2.5 points, while Angola, Bhutan, Kenya, Liberia, and Uganda each registered increases of 2 points. We also identified the two largest declines in the index. Libya experienced the largest observed reduction, falling by 4.5 points, followed by Syria, where the index declined by 3.5 points. These eight countries therefore provide illustrative cases of both welfare-regime development and retrenchment within the sample. The purpose of this exercise is not to identify causal effects from individual country histories, but to examine whether the longitudinal patterns visible in countries experiencing particularly large welfare-regime changes are descriptively consistent with the relationships reported in the regression models. Table 3 presents the first and last available observations for the Welfare Regime Index and each longevity outcome, together with the corresponding net change.<sup>16</sup>

For life expectancy, healthy life years, and the Welfare Regime Index, positive changes indicate improvement. For life expectancy inequality and maternal mortality, declines indicate improvement. The descriptive patterns are strikingly consistent across the six cases. In every country, improvements in the Welfare Regime Index were accompanied by increases in overall life expectancy, male life expectancy, female life expectancy, and healthy life years. Algeria's 2.5-point increase in the index coincided with an 8.6-year increase in overall life expectancy and a 2.6-year increase in healthy life years. The corresponding changes were especially large in Angola, Bhutan, Liberia, and Uganda. Overall life expectancy increased by 22.8 years in Angola, 17.2 years in Bhutan, 24.5 years in Liberia, and 20.7 years in Uganda. Healthy life years rose by 11.0 years in Angola, 7.6 years in Bhutan, 8.9 years in Liberia, and 14.7 years in Uganda. Kenya displayed more modest gains in overall life expectancy, but still recorded increases in each of the positive longevity indicators. The

<sup>16</sup> Because the underlying panel is unbalanced, the first and last available years need not be identical across all outcomes or countries. The table should therefore be read as a summary of the longest observable change for each country-variable combination rather than as a uniform comparison between two common benchmark years.

**Table 3** Changes in welfare regime and longevity outcomes in eight illustrative cases

| Case               | Welfare<br>Regime<br>Index | Healthy<br>Life<br>Years | Life<br>Expectancy<br>Inequality | Life<br>Expectancy | Life<br>Expectancy<br>(Females) | Life<br>Expectancy<br>(Males) | Ma-<br>ternal<br>Mortal-<br>ity Ratio |
|--------------------|----------------------------|--------------------------|----------------------------------|--------------------|---------------------------------|-------------------------------|---------------------------------------|
| Algeria First      | 3.50                       | 62.90                    | 15.20                            | 67.66              | 68.24                           | 67.09                         | 205.82                                |
| Algeria Last       | 6.00                       | 65.50                    | 11.89                            | 76.26              | 77.70                           | 74.89                         | 77.69                                 |
| Algeria Net Change | 2.50                       | 2.60                     | -3.32                            | 8.60               | 9.45                            | 7.81                          | -128.13                               |
| Angola First       | 2.00                       | 42.80                    | 39.84                            | 41.85              | 45.43                           | 38.64                         | 1101.51                               |
| Angola Last        | 4.00                       | 53.80                    | 27.39                            | 64.62              | 67.14                           | 62.10                         | 221.91                                |
| Angola Net Change  | 2.00                       | 11.00                    | -12.45                           | 22.76              | 21.71                           | 23.46                         | -879.60                               |
| Bhutan First       | 3.00                       | 57.20                    | 20.00                            | 55.81              | 57.14                           | 54.72                         | 603.62                                |
| Bhutan Last        | 5.00                       | 64.80                    | 13.14                            | 72.97              | 74.97                           | 71.31                         | 59.95                                 |
| Bhutan Net Change  | 2.00                       | 7.60                     | -6.86                            | 17.16              | 17.82                           | 16.59                         | -543.67                               |
| Kenya First        | 3.50                       | 47.20                    | 25.05                            | 58.33              | 60.01                           | 56.61                         | 582.96                                |
| Kenya Last         | 5.50                       | 58.20                    | 20.90                            | 63.65              | 65.92                           | 61.46                         | 529.96                                |
| Kenya Net Change   | 2.00                       | 11.00                    | -4.16                            | 5.31               | 5.91                            | 4.85                          | -53.00                                |
| Liberia First      | 1.50                       | 45.10                    | 36.23                            | 37.64              | 44.72                           | 32.38                         | 1553.02                               |
| Liberia Last       | 3.50                       | 54.00                    | 29.23                            | 62.16              | 63.44                           | 60.88                         | 652.34                                |
| Liberia Net Change | 2.00                       | 8.90                     | -7.00                            | 24.52              | 18.72                           | 28.49                         | -900.68                               |
| Uganda First       | 3.00                       | 42.50                    | 30.79                            | 47.56              | 49.85                           | 45.32                         | 602.29                                |
| Uganda Last        | 5.00                       | 57.20                    | 20.14                            | 68.25              | 71.12                           | 65.27                         | 284.14                                |
| Uganda Net Change  | 2.00                       | 14.70                    | -10.64                           | 20.69              | 21.27                           | 19.95                         | -318.15                               |
| Libya First        | 6.50                       | 64.20                    | 10.61                            | 69.31              | 71.84                           | 67.31                         | 47.92                                 |
| Libya Last         | 2.00                       | 62.10                    | 16.84                            | 69.34              | 70.42                           | 68.27                         | 72.13                                 |
| Libya Net Change   | -4.50                      | -2.10                    | 6.23                             | 0.03               | -1.42                           | 0.95                          | 24.21                                 |
| Syria First        | 4.50                       | 62.10                    | 11.37                            | 69.83              | 72.15                           | 67.75                         | 43.16                                 |
| Syria Last         | 1.00                       | 62.30                    | 13.32                            | 72.12              | 74.41                           | 69.83                         | 29.92                                 |
| Syria Net Change   | -3.50                      | 0.20                     | 1.95                             | 2.29               | 2.27                            | 2.08                          | -13.25                                |

Note: “First” and “Last” refer to the first and last available observations for each country, respectively. “Net Change” is calculated as the difference between the last and first available observations. Positive differences indicate improvement for all outcomes except Life Expectancy Inequality and Maternal Mortality Ratio, for which negative differences indicate improvement

two outcomes for which lower values indicate improvement show the same general pattern. Life expectancy inequality declined in all six countries, with reductions ranging from 3.3 points in Algeria to 12.5 points in Angola. Maternal mortality also fell in every case. The largest absolute declines occurred in Liberia, Angola, and Bhutan, where the maternal mortality ratio decreased by approximately 901, 880, and 544 deaths per 100,000 live births, respectively. Uganda and Algeria likewise experienced substantial reductions, while Kenya registered a smaller but still favorable decline.

The two retrenchment cases show a less consistent pattern than the six improvement cases. Libya’s Welfare Regime Index declined by 4.5 points. This decline was accompanied by a reduction of 2.1 healthy life years, a 6.23-point increase in life expectancy inequality, a 1.42-year decline in female life expectancy, and an increase of approximately 24 maternal deaths per 100,000 live births. These changes are broadly consistent with the direction of the regression estimates. Overall life expectancy remained nearly unchanged, however, while male life expectancy increased by approximately one year. Syria presents a less consistent

trajectory. Although its Welfare Regime Index declined by 3.5 points and life expectancy inequality increased by 1.95 points, the remaining longevity indicators moved in a favorable direction. Overall life expectancy increased by approximately 2.3 years, male and female life expectancy each increased by slightly more than two years, healthy life years increased marginally, and maternal mortality declined by approximately 13 deaths per 100,000 live births. Thus, the Syrian case does not mirror the full directional pattern found in the regression estimates.

Taken together, the illustrative cases provide a more nuanced complement to the regression analysis. The six cases of welfare-regime improvement exhibit a notably consistent pattern of favorable movement across all longevity outcomes. Libya, the country with the largest observed retrenchment, also displays deterioration in several outcomes, although not in all of them. Syria, by contrast, demonstrates that substantial welfare-regime decline need not be accompanied by contemporaneous deterioration across every longevity indicator. This variation is not necessarily surprising because welfare institutions represent only one part of the broader economic, demographic, political, and health-system environments associated with longevity. The country trajectories should, of course, not be interpreted as evidence that changes in the Welfare Regime Index independently produced the observed longevity changes. The cases were selected on the basis of changes in the explanatory variable; other consequential developments may have occurred over the same period, and the descriptive comparisons do not incorporate the controls or fixed effects included in the regression models. Instead, Table 3 illustrates both the broad empirical pattern and its limits: welfare-regime development is accompanied by favorable longevity changes in the selected improvement cases, while the retrenchment cases show that the corresponding relationship is neither symmetric nor uniform across countries and outcomes.

## 5 Discussion and Conclusion

The findings presented here point to a consistent relationship between welfare regimes and multiple dimensions of human longevity: more generous welfare regimes are associated with higher life expectancy, lower life expectancy inequality, lower maternal mortality, and higher healthy life years. Altogether, these results suggest that the relationship between welfare institutions and human well-being extends beyond subjective evaluations of life and is also reflected in more objective indicators of the quantity of life. The pattern is stable across model specifications, outcomes, and the illustrative country cases.

These findings contribute to the literature in several ways. First, they shift attention from the now well-developed literature on welfare institutions and subjective well-being to outcomes centered on longevity itself. A substantial body of work has examined how welfare states shape happiness and life satisfaction (e.g., O'Connor 2017; Pacek and Radcliff 2008a, b; Radcliff 2013), but less attention has been devoted to how welfare institutions are related to the length, distribution, and health quality of life. Second, the analysis broadens the empirical scope beyond the affluent OECD democracies that dominate much of the existing literature by examining countries at varying levels of development. Third, by presenting both pooled and fixed-effects estimates, the analysis moves beyond purely cross-sectional comparisons. In that sense, it addresses part of the concern that associations

between welfare institutions and well-being may simply reflect stable differences between countries rather than relationships unfolding within them.

Substantively, the results are consistent with the broader literature suggesting that welfare institutions may be related to longevity through several pathways. As discussed earlier, more generous welfare regimes may be associated with lower poverty and inequality, greater access to health-related resources, improved educational opportunities, and reduced exposure to chronic insecurity and stress. Each of these conditions has been linked in prior research to mortality, health, and life expectancy (Chokshi, 2018; Hummer & Hernandez, 2013; Neumayer and Plümper 2016; Ross and Mirowsky 2010; Stringhini and Shipley 2010). Prior studies have also connected welfare institutions to population health and life expectancy more directly (Kim & Jennings, 2009; Lundberg et al., 2008; Reynolds and Avendano 2018). At the same time, the present study does not directly test these mechanisms. The analysis therefore speaks to the overall relationship between welfare regimes and longevity outcomes rather than to the precise channels through which that relationship operates. Establishing those mechanisms more directly remains an important task for future research.

The findings should also be interpreted with appropriate caution. First, although the use of two-way fixed effects improves on a purely cross-sectional design by accounting for time-invariant country characteristics and common period shocks, the results remain observational. They therefore do not by themselves fully establish causality or rule out all sources of endogeneity. As such, we deliberately avoid strong causal language and interpret our findings as associations. Second, the principal independent variable is a broad, expert-assessed indicator of welfare regimes. This is advantageous insofar as it captures the wider structure and functioning of welfare institutions rather than a single dimension of social spending, but it also means that the analysis cannot distinguish which particular components of welfare regimes matter most for which longevity outcomes. In that respect, the study is better understood as identifying a broad institutional relationship than as isolating the effects of specific policy instruments or spending categories (Esping-Andersen, 1990; Scruggs & Allan, 2006). Third, the panel is unbalanced, and data availability varies considerably across variables. As a result, the effective estimation sample is substantially smaller than the full set of countries potentially covered by the underlying sources, so the results pertain directly to the countries and years included in the analysis. Fourth, because the BTI places particular emphasis on developing and transition contexts, the measure is especially useful for extending the analysis beyond the usual OECD focus, but it does not map perfectly onto all dimensions of welfare-state development emphasized in the comparative welfare-state literature.

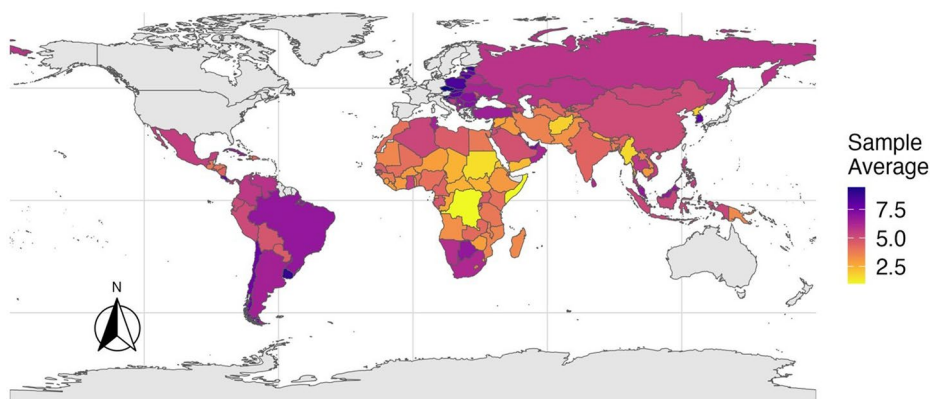
These limitations notwithstanding, the results suggest that welfare regimes deserve greater attention in research on human longevity. Much comparative work on well-being has focused either on subjective life evaluations or on broad socioeconomic proxies such as income and development. The present findings indicate that political and institutional organization may also be systematically related to whether people live longer lives, whether those lives are healthier, and whether longevity is distributed more equally within societies. In this respect, the study speaks to a broader political economy of human well-being in which welfare institutions are associated not only with how people feel about their lives, but also with how long and how healthily they live. That broader perspective matters because

both subjective and objective improvements in well-being have been linked in previous research to a range of beneficial social and political outcomes, including better physical and mental health, lower levels of social pathology, and stronger support for democratic life (Chebotareva, 2015; Diener & Chan, 2011; Dorn et al., 2007; Inglehart & Ponarin, 2013; Lyubomirsky et al., 2005).

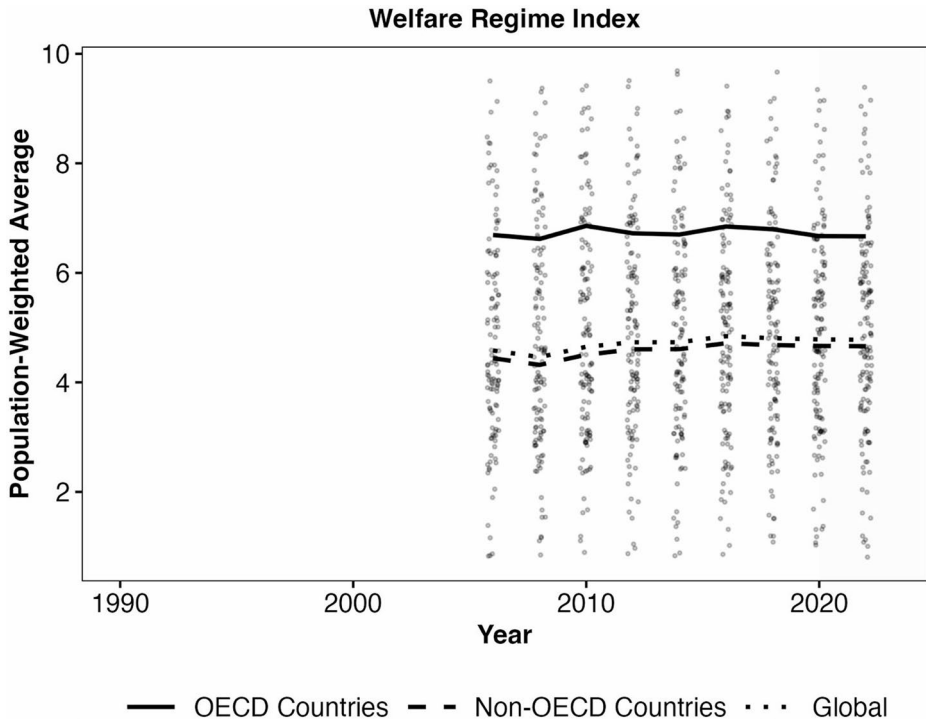
The results also bear on a wider set of debates about retrenchment, austerity, and the durability of welfare institutions. Although this study does not directly evaluate austerity policies, the findings are broadly consistent with work suggesting that the weakening of social protection may carry consequences for population health and longevity. A growing literature has linked austerity measures to poorer health outcomes, stalled mortality improvements, and widening health inequities in a range of settings (McCartney et al., 2022; Rajmil et al., 2020; Ruckert and Labonte 2017; Walsh et al., 2022). The point here is not that welfare regimes constitute a panacea or that all forms of intervention are equally effective, but rather that the institutional organization of social protection appears to be relevant to one of the most fundamental dimensions of human well-being.

Overall, then, the findings suggest a clear empirical pattern: more generous welfare regimes are associated with longer and healthier lives, as well as lower disparities in longevity outcomes. Much remains to be done to clarify the mechanisms involved, to identify which institutional components matter most, and to determine the scope conditions under which these relationships are strongest. Even so, the evidence presented here indicates that welfare institutions belong centrally in any broader account of the political and economic determinants of human well-being.

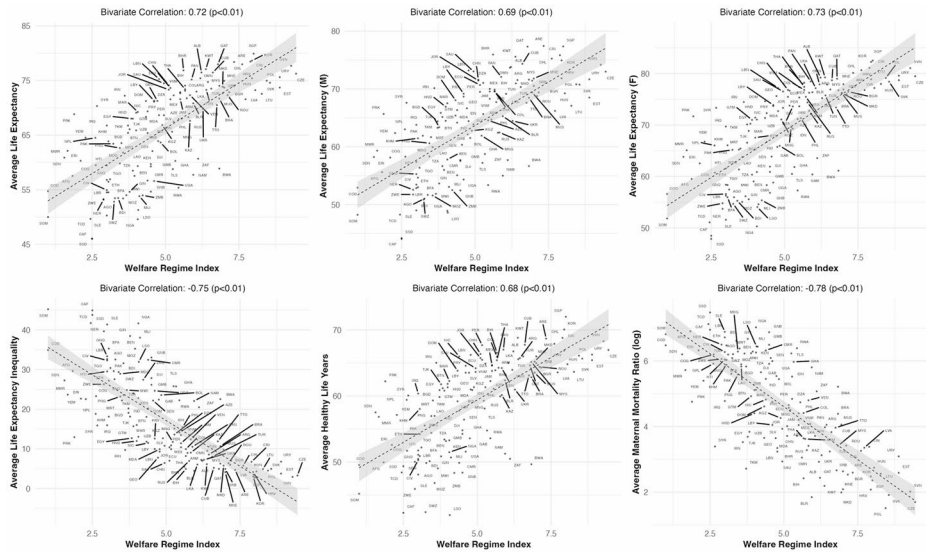
## Appendix



**Fig. 3** Sample Average of Welfare Regime Index. Note: The map shows country-level averages of the Welfare Regime Index over the sample period. Values are computed as the mean across all available observations for each country. Darker shading indicates higher values. Countries without available data are shown in grey



**Fig. 4** Welfare Regime Index, 2006–2022. Note: Global trends are computed as population-weighted yearly averages across countries. OECD and non-OECD aggregates are calculated separately, alongside the global average. Points represent country-level observations in each year. Shaded areas indicate the post-COVID-19 period



**Fig. 5** Cross-Country Associations Between Welfare Regime Index and Longevity Outcomes. Note: Each point represents a country, with values averaged over the sample period. The dashed line shows the fitted linear relationship, and shaded areas denote 95% confidence intervals. Reported statistics are bivariate Pearson correlations based on country-level averages

**Table 4** TWFE Regression Estimates (Lagged Controls)

|                                   | Life Expectancy  | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-----------------------------------|------------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime Index <sub>t</sub> | 0.35**<br>(0.14) | 0.40***<br>(0.15)       | 0.31**<br>(0.13)          | -0.38***<br>(0.13)         | -0.04*<br>(0.02)               | 0.49***<br>(0.17)  |
| Controls <sub>t-1</sub>           | ✓                | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE                        | ✓                | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                           | ✓                | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.                         | 1,107            | 1,107                   | 1,107                     | 874                        | 1,107                          | 977                |
| Adjusted R <sup>2</sup>           | 0.96             | 0.95                    | 0.96                      | 0.99                       | 0.99                           | 0.96               |

Note: Entries are ordinary least squares (OLS) estimates with country and year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include lagged controls ( $t-1$ ) for health expenditure, GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

**Table 5** Regression estimates (No TWFE)

|                                     | Life Expectancy  | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------------------|------------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime Index <sub>t-1</sub> | 0.76**<br>(0.30) | 0.71**<br>(0.29)        | 0.79**<br>(0.31)          | -1.15***<br>(0.41)         | -0.19***<br>(0.05)             | 0.52*<br>(0.28)    |
| Controls <sub>t</sub>               | ✓                | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE                          | ✗                | ✗                       | ✗                         | ✗                          | ✗                              | ✗                  |
| Year FE                             | ✗                | ✗                       | ✗                         | ✗                          | ✗                              | ✗                  |
| Num. Obs.                           | 1,105            | 1,105                   | 1,105                     | 872                        | 1,105                          | 978                |
| Adjusted R <sup>2</sup>             | 0.66             | 0.63                    | 0.68                      | 0.73                       | 0.77                           | 0.62               |

Note: Entries are ordinary least squares (OLS) estimates. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for health expenditure, GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

**Table 6** TWFE regression estimates (Only Country FE)

|                                     | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime Index <sub>t-1</sub> | 0.33*<br>(0.19) | 0.32*<br>(0.19)         | 0.34*<br>(0.20)           | -0.26<br>(0.21)            | -0.04**<br>(0.02)              | 0.42**<br>(0.16)   |
| Controls <sub>t</sub>               | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE                          | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                             | ✗               | ✗                       | ✗                         | ✗                          | ✗                              | ✗                  |
| Num. Obs.                           | 1,107           | 1,107                   | 1,107                     | 874                        | 1,107                          | 977                |
| Adjusted R <sup>2</sup>             | 0.93            | 0.93                    | 0.94                      | 0.97                       | 0.99                           | 0.95               |

Note: Entries are ordinary least squares (OLS) estimates with country fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for health expenditure, GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

**Table 7** Regression estimates (Only Year FE)

|                         | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime          | 0.77**          | 0.74**                  | 0.80**                    | -1.17***                   | -0.17***                       | 0.51*              |
| Index <sub>t-1</sub>    | (0.30)          | (0.30)                  | (0.32)                    | (0.42)                     | (0.05)                         | (0.29)             |
| Controls <sub>t</sub>   | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE              | ✗               | ✗                       | ✗                         | ✗                          | ✗                              | ✗                  |
| Year FE                 | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.               | 1,105           | 1,105                   | 1,105                     | 872                        | 1,105                          | 978                |
| Adjusted R <sup>2</sup> | 0.67            | 0.64                    | 0.69                      | 0.73                       | 0.77                           | 0.63               |

Note: Entries are ordinary least squares (OLS) estimates with year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for health expenditure, GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 8** TWFE Regression Estimates (No Controls)

|                         | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime          | 0.37***         | 0.35***                 | 0.39***                   | -0.47***                   | -0.05***                       | 0.48***            |
| Index <sub>t-1</sub>    | (0.12)          | (0.13)                  | (0.13)                    | (0.12)                     | (0.02)                         | (0.16)             |
| Controls <sub>t</sub>   | ✗               | ✗                       | ✗                         | ✗                          | ✗                              | ✗                  |
| Country FE              | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                 | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.               | 1,145           | 1,145                   | 1,145                     | 903                        | 1,145                          | 1,010              |
| Adjusted R <sup>2</sup> | 0.94            | 0.94                    | 0.95                      | 0.98                       | 0.99                           | 0.97               |

Note: Entries are ordinary least squares (OLS) estimates with country and year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 9** TWFE Regression Estimates (No Health Expenditure)

|                         | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime          | 0.19            | 0.19*                   | 0.20                      | -0.31**                    | -0.03*                         | 0.30**             |
| Index <sub>t-1</sub>    | (0.12)          | (0.11)                  | (0.14)                    | (0.13)                     | (0.02)                         | (0.12)             |
| Controls <sub>t</sub>   | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE              | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                 | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.               | 1,118           | 1,118                   | 1,118                     | 878                        | 1,118                          | 991                |
| Adjusted R <sup>2</sup> | 0.95            | 0.95                    | 0.96                      | 0.99                       | 0.99                           | 0.97               |

Note: Entries are ordinary least squares (OLS) estimates with country and year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 10** TWFE Regression Estimates (Only Economic Controls)

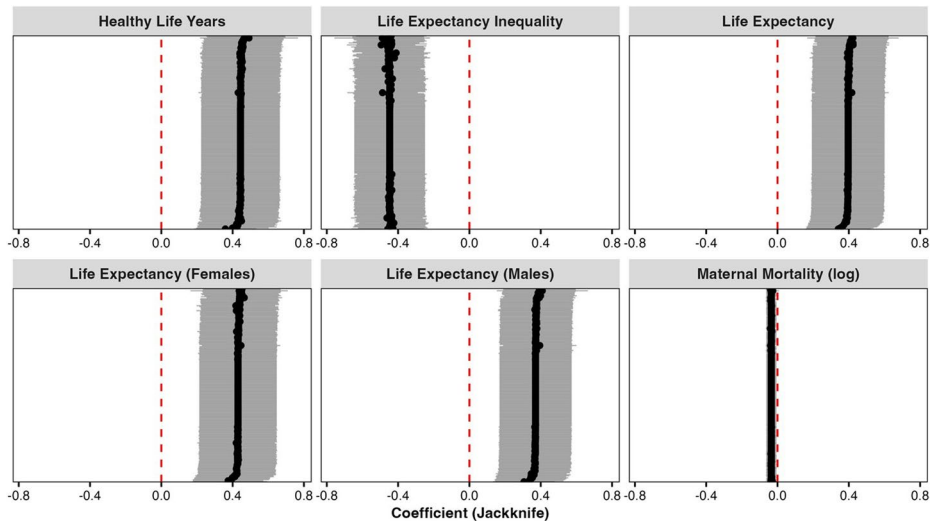
|                         | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime          | 0.40***         | 0.37***                 | 0.43***                   | -0.45***                   | -0.03**                        | 0.44***            |
| Index <sub>t-1</sub>    | (0.12)          | (0.12)                  | (0.13)                    | (0.12)                     | (0.02)                         | (0.13)             |
| Controls <sub>t</sub>   | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE              | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                 | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.               | 1,105           | 1,105                   | 1,105                     | 872                        | 1,105                          | 978                |
| Adjusted R <sup>2</sup> | 0.96            | 0.95                    | 0.96                      | 0.99                       | 0.99                           | 0.97               |

Note: Entries are ordinary least squares (OLS) estimates with country and year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for health expenditure, GDP per capita (log), and unemployment rate. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 11** TWFE Regression Estimates (Only Non-OECD Countries)

|                         | Life Expectancy | Life Expectancy (Males) | Life Expectancy (Females) | Life Expectancy Inequality | Maternal Mortality Ratio (log) | Healthy Life Years |
|-------------------------|-----------------|-------------------------|---------------------------|----------------------------|--------------------------------|--------------------|
| Welfare Regime          | 0.30***         | 0.29***                 | 0.32**                    | -0.41***                   | -0.03                          | 0.38***            |
| Index <sub>t-1</sub>    | (0.10)          | (0.10)                  | (0.12)                    | (0.11)                     | (0.02)                         | (0.11)             |
| Controls <sub>t</sub>   | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Country FE              | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Year FE                 | ✓               | ✓                       | ✓                         | ✓                          | ✓                              | ✓                  |
| Num. Obs.               | 988             | 988                     | 988                       | 781                        | 988                            | 874                |
| Adjusted R <sup>2</sup> | 0.95            | 0.95                    | 0.96                      | 0.99                       | 0.99                           | 0.97               |

Note: Entries are ordinary least squares (OLS) estimates with country and year fixed effects. Standard errors, clustered at the country level, are reported in parentheses. All models include controls for health expenditure, GDP per capita (log), unemployment rate, old-age dependency ratio, and private civil liberties. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10



**Fig. 6** Jackknife Estimates of Welfare Regime Index. Note: Points show coefficient estimates for the Welfare Regime Index from leave-one-country-out jackknife regressions, in which each country is sequentially excluded from the sample. Horizontal lines indicate 90% confidence intervals based on country-clustered standard errors. The red dashed line denotes zero. All specifications include country and year fixed effects and the control variables reported in Table 2

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**Data Availability** The data are available from the corresponding author upon reasonable request.

## Declarations

**Conflict of interest** The authors have no conflicts of interest to disclose.

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