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Shorter Lives in Stingier States: Social Policy Shortcomings Help Explain the US Mortality Disadvantage

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ABSTRACT

The United States has a mortality disadvantage relative to its political and economic peer group of other *"rich democracies"*. Recently it has been suggested that there could be a role for social policy in explaining this disadvantage. In this paper, we test this 'social policy' hypothesis by presenting a time trend analysis from 1970 to 2011 of the association between welfare state generosity (for unemployment insurance, sickness benefits, and pensions) and life expectancy, for the US and 17 other high-income countries. Fixed-effects estimation with autocorrelation-corrected standard errors (robust to unmeasured between-country differences and serial autocorrelation of repeated measures) found strong associations between welfare generosity and life expectancy. A unit increase in overall welfare generosity yields a 0.17 year increase in life expectancy at birth ($p<.001$), and a 0.07 year increase in life expectancy at age 65 ($p<.001$). The strongest effects of the welfare state are in the domain of pension benefits ($b=.439$ for life expectancy at birth, $p<.001$; $b=.199$ for life expectancy at age 65, $p<.001$). Models that lag the measures of social policy by ten years produce similar results, suggesting that the results are not driven by endogeneity bias. There is evidence that the US mortality disadvantage is, in part, a welfare-state disadvantage. We estimate that life expectancy in the US would be approximately 3.77 years longer, if it had just the average social policy generosity of the other 17 OECD nations.

233 words

Keywords: welfare state, US mortality disadvantage, population health, social policy

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INTRODUCTION

Recent reports highlight growing concern about the "US mortality disadvantage" – the growing gap in life expectancy between the US and other rich democracies (Crimmins et al. 2011; Woolf and Aron 2013). Previous research into the underperformance of the US in terms of health and mortality – relative to its peer group of "rich democracies" (Wilensky 2002) – tends to focus on individual-level lifestyle factors and healthcare systems (Crimmins et al. 2011; Woolf and Aron 2013. Much less work has investigated macro-level welfare state institutional arrangements, which might also help to account for the US mortality disadvantage. This paper addresses this issue by (1) investigating long-term trends in life expectancy and social policy in the 18 richest democracies of the Organization for Economic Cooperation and Development (OECD), and (2) quantifying the contribution of social policy shortcomings in the US to the US mortality disadvantage.

US mortality disadvantage

The US mortality disadvantage is a pressing priority for policy and research (Woolf and Aron 2013). In 1960, Scandinavian nations topped the life expectancy (at birth) charts, with Norway's life expectancy of 73.8 years (OECD 2012). The US ranked fifteenth, at 69.8 years: a gap of four years. The average life expectancy at birth for the 18 OECD countries in 1960 was 70.8 years. By 2010, the US had dropped to the bottom of the relative rankings, with a life expectancy of 78.7 years compared to 83.0 years in table-topping Japan (OECD 2012). There is a similar pattern for infant mortality rates: in 1960, the US ranked eleventh with an infant mortality rate of 26.0, double Iceland's rate of 13.0; by 2010, this relative difference grew as the US dropped to the bottom of the list with an infant mortality rate of 6.1 - nearly triple table-topping Iceland's rate of 2.2 (OECD 2012).

The relatively poor health performance of the USA emerged in the 1980s (Woolf and Aron 2013). In the 1940s for example, the US had one of the healthiest populations in the world. But the recent National Academy of Sciences panel report on the US health disadvantage found that residents of the US fared worse, across at least nine domains of health, than residents of other rich democracies – and the disadvantage was consistent across all

socioeconomic positions. This cross-cutting difference in the distribution of population health supports the notion that macro-level institutional factors like social policy differences - not just lifestyle or health care factors - may help to explain the US disadvantage (Woolf and Aron 2013).

Lifestyle and health care explanations

The US now has one of the lowest smoking rates of high-income countries; of comparable countries, only Sweden has lower rates. However, historically it was the highest tobacco consumer and there is evidence that around 20% of the US health disadvantage in terms of life expectancy and mortality of the over 50s is attributable to these historical differences in smoking rates (Preston et al 2010). There are also significant differences in diet between the US and other countries. For example, average calorie intake per US adult is 3770 per day, and obesity also thus contributes to mortality differences among adults aged 50 and over (Preston and Stokes 2011). The results of studies that examine cross-national differences in physical activity rates vary – with some suggesting that the US population has about average rates of activity, while others suggest it is lower (Woolf and Aron 2013). Turning to alcohol consumption, there is tentative evidence that heavy drinking and binge drinking might be higher amongst young Americans, yet the overall prevalence of alcohol consumption amongst Americans is lower than for Europe (Woolf and Aron 2013).

The US spends the most on health care – in absolute terms, per head of population and as a proportion of national income – around 18% of US gross domestic product is spent on health care compared to around 6% in the UK (Woolf and Aron 2013). Unlike other high-income countries that operate a social insurance system (whereby the government, employers and employees co-fund health care via regular set contributions e.g. France and Germany) or a national health system (where health care is funded by the government based on general taxation e.g. the UK, Sweden or New Zealand), the US system is effectively a private market. Individuals buy insurance policies themselves to cover their health risk, or receive coverage from their employers. There are some government-funded schemes for the very poor (Medicaid) and for the elderly (Medicare) but these are not as generous as schemes in other countries. The 'Obamacare' Patient Protection and Affordable Care Act reforms of 2010 did increase coverage rates, but today around 10% of Americans remain without health insurance of any kind and

therefore only have access to emergency care – not prevention or primary or secondary care. Millions of others remain "under-insured" whereby their health care policies do not cover the full range of health services or their health needs. US patients also face considerable out-of-pocket payments and co-payments for services (Woolf and Aron, 2013). This all means that healthcare access in the US is the most "commodified" (market dependent) of high-income nations, and the healthiest people have the best access to healthcare, in line with the 'inverse care law' (Tudor-Hart, 1971).

Institutional explanations

At the level of theory, we argue that institutional arrangements like the welfare state are important for at least three reasons. First, welfare states stratify (Esping-Andersen 1990). The welfare states that people are born into organize social relations, sorting and ranking people into social hierarchies. Welfare states also affect income inequality (Alderson and Nielsen 2002). Poverty is also largely a function of institutional arrangements (Brady 2008). Indeed, previous research has indicated the important role that different antipoverty policy strategies can have on health outcomes, resulting in significant cross-national patterns. For example, Lundberg and colleagues (2008) have shown how universal pensions and family policies that support dual-earners can lead to reductions in old age mortality and infant mortality respectively. Esser and Palme (2010) found similar results for pensions - particularly the value of the basic state pension for older women's health. Nelson and Fritzell (2014) found that the generosity of minimum income benefits available to those with no entitlement to contributory benefits (the poorest groups in high-income countries) was strongly associated with population level mortality rates and life expectancy: countries that provided higher minimum income benefits had better population health.

Second, again at the level of theory, welfare states not only influence the extent and kind of social stratification in society, but they also condition the operation of the social determinants of health (Beckfield et al 2015). For example, the welfare state – itself a complex of citizenship rights (Marshall 1950) – provides resources to citizens that may make other kinds of market resources less necessary for preventing illness and ensuring good health. An example of a fairly direct effect of the welfare state on health would be healthcare services (Bambra 2005). A less direct way in which institutions impact health is by providing stingier or more generous cash benefits in times of

unemployment or sickness (Esping-Anderson 1990). In countries with more generous social programs, the health of the poorest should be better thus enhancing overall population health. For example, research by Mackenbach and colleagues (2011) found that inequality related losses to health amount to more than 700,000 deaths per year and 33 million prevalent cases of ill health in the European Union.

Third, it is possible that social policy itself is affected by population-health improvements, such that part of any association between social policy and population health might result from the endogeneity of social policy generosity to the health of the population, and especially the health of older cohorts, which can be expected to be larger in healthier societies, *ceteris paribus* (Mackenbach et al. 2011; Vogt and Kluge 2015; Gunasekara et. al 2014). Indeed, the effect of population aging on social policy is well established in the comparative political economy literature (Wilensky 2002). For this reason, we emphasize our models of life expectancy at birth, which are shown in tables. We also estimate models that use ten-year lags for the social policy measures, to guard against reverse causation. Of course, without experimental data or a strong instrumental variable, we acknowledge it is impossible to rule out endogeneity bias.

In the growing field of research on the role of the welfare state in producing population health, studies have fairly consistently shown that infant mortality rates (IMR) vary significantly by welfare state, with rates lowest in the more generous Social Democratic countries of Scandinavia and highest in the less generous Liberal (e.g. US and UK) and Southern (e.g. Spain or Italy) welfare states (Chung and Muntaner 2006, 2007; Coburn 2004; Eikemo et al. 2008; Karim et al. 2010; Navarro et al. 2003, 2006).

There are, however, several limitations to such regime-based comparative analysis of population health. While such studies are useful for explaining cross-sectional difference in population health profiles, they aggregate information across policy domains, they overlook within-regime policy heterogeneity, and they elide cross-national within-regime differences in trends (Beckfield and Krieger 2009). Other studies have therefore compared more specific welfare state policies such as pension provision (universal versus contributory), family policies (traditional family versus dual earner support), total expenditure on specific benefits such as on sickness benefits, or basic

income support levels (Lundberg et al 2008; Dahl and Van der Wel 2013; Nelson and Fritzell 2014) have also found that countries that provide more generous and less hierarchical benefits have better health outcomes (Lundberg et al 2008).

The first contribution of our study, then, is to connect change in social policy over a long timespan (1970-2010) to changes over time in population health, using rigorous models that account for both unmeasured stable country characteristics, and serial autocorrelation. Our second contribution is to analyse directly the possible contribution of social policy to the US mortality disadvantage.

METHODS

Population health

Our dependent variable is (1) life expectancy at birth (annual measures, 1971 to 2010, from *OECD Health Data* [OECD 2012]). We also conduct supplemental analysis using life expectancy at age 65; the two sets of models produce very similar results, and so we focus on life expectancy at birth. Our focal independent variables are four measures of the welfare state from 1971 to 2010: (1) overall benefit generosity, (2) unemployment insurance generosity, (3) sickness insurance generosity, and (4) pension benefit generosity. These data come from the *Comparative Welfare Entitlements Database II* (Scruggs et al 2014). The data and codebook are publicly available at www.cwed2.org. Key advantages are rigorous over-time and cross-national comparability, and detailed documentation of coding that facilitates replication. Full details on the construction of the generosity indices we use here are provided by Scruggs (2014). We address endogeneity by estimating models that lag the covariates by five and ten years, respectively; because of space constraints we show only the ten-year-lag results but we note that the five-year-lag results are consistent with those shown.

Welfare-state generosity

In contrast to the regimes approach (Bambra and Eikemo 2009, Olafsdottir and Beckfield 2011), which is helpful for analysing cross-sectional differences but tends to lump policy domains together (Kasza 2002), our measures include both cross-national and within-nation, over-time variation in welfare states, and program-specific

information on the generosity and coverage of unemployment insurance, sickness benefits, and public pension programs. For each program, benefit generosity is measured as a function of (1) the percentage of the average worker wage that is replaced by benefits, (2) the duration of benefits, (3) restrictions on benefit eligibility, such as waiting periods, retirement ages, and work requirements, and (4) the coverage rate or take-up rate. The first three characteristics are each transformed to a z-score, using all available data on each characteristic as the reference distribution. For unemployment insurance and sickness benefits, the relative generosity level of each benefit is then multiplied by the proportion of the labor force that is covered by each benefit. For pensions, the relative generosity is multiplied by the take-up rate. Thus, for each year, and for unemployment, sickness, and pensions, each welfare state receives a generosity score that is based on its benefit generosity relative to the distribution of generosity across all countries and years included in the CWED data, and the extent to which each benefit covers the relevant population. The overall generosity summary score combines this information into one index.

Specifically, the summary score is calculated by summing the normalized scores for each of the characteristics that define the generosity of each program, and taking the product of that quantity and the population coverage rate or take-up rate. Thus overall generosity is weighted by coverage, and is calculated on the basis of within-domain relative generosity. For unemployment and sickness insurance, these characteristics are the income replacement rate, the duration of benefits, the qualifying period, and the number of waiting days. For pension benefits, these characteristics are the replacement rates from standard and supplemental social pensions, the expected duration, the number of qualifying years required, and the employee funding ratio. For each characteristic of each policy, the log (of non-zero values) is first taken to adjust for skew, and then the z-score is calculated on the basis of the standard deviation (top- and bottom-coded at 2.5 and -2.5) and the mean of the logged scores (where 0s are unlogged), for the entire distribution of scores on that measure across all countries and years of available data. Next, those z-scores are reverse-coded so that higher scores indicate more benefits, summed, and multiplied by the coverage/take-up rate to create relative generosity scores for unemployment, sickness, and pension benefits, respectively. Additional details are available from Scruggs (2014), including the Stata code required to produce the summary scores from the raw data.

To clarify the construction of these measures, consider the cases of the United States, Germany, and Sweden. In 2010, the United States scores 21.7 on the summary measure of relative generosity, which is mainly a function of low levels of generosity relative to the maximum generosity scores for the countries and years included in the data (maxima on unemployment, sickness, and pensions are observed in Norway 2000-2001, Sweden 1987-1990, and Sweden 1983, respectively). This is toward the low end of summary generosity, which ranges from 20.9 (Australia) to 43.9 (Norway) among the 18 countries in the data in 2010. Germany's summary relative generosity score for 2010 is 32, which is more a function of restricted coverage of non means-tested public insurance (76% for unemployment insurance, and 83% for sickness insurance) than benefit generosity. In 2010, Sweden's summary relative generosity score is 35.2; its decline from a high of 46.6 in 1989 is a function of declining generosity in all three domains of the welfare state, and declining coverage in the area of unemployment insurance. Crucial for interpretation is the fact that these measures of social policy generosity are inherently relative, although originating in very specific policy indicators. As such, the relative rankings on these measures are reliable, and a one-unit change means the same thing at the bottom of the generosity distribution as it does at the top, but the quantity of each score itself has no direct interpretation (e.g., it is not a percentage).

Fixed-effects estimation with autocorrelation correction

We employ fixed-effects models with an autocorrelation adjustment. Fixed-effects models remove the effects of all stable, unmeasured country characteristics (such as geographic location, size, economic attributes, and ethnic diversity) by including in the model an indicator variable for each country (minus one, which serves as the reference country; below we use the US as the reference). The autocorrelation adjustment is used because all the variables are highly serially correlated (e.g., life expectancy in year *t* is largely a function of life expectancy in year *t*-1). We have a total of 637 cases for the estimation, after deleting country-years with missing data on any of the variables we use. We include 18 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. For the main analyses shown in Table 1, we have a minimum of 27 observations per country, and a maximum of 39 observations per country, 1971-2010.

To evaluate the robustness of our results to potential confounding from other factors that are associated with both welfare-state development and life expectancy, we estimate additional models that introduce controls for real (inflation- and PPP-adjusted) GDP per capita, the size of the population aged 65 and older as a percentage of the total population, and the OECD's measure public and mandatory private social expenditure as a percentage of GDP. We control for GDP per capita because it is associated with health and may reduce mortality, holding citizenship rights constant (McKeown 1976). We control for the percentage of the population aged 65 and older to adjust for the potential feedback effects of population health on social policy. Our models, however, assume the exogeneity of social policy, which might be a more reasonable assumption for OECD welfare states than for developing welfare states, since social policy generosity is on the decline in many aging populations, such as Germany and Sweden. Nevertheless, recognizing that there are still probably feedback effects from health to social policy, we include a control for the proportion of the population that is aged 65 and older, following the logic that social policy effects net of population aging should be less vulnerable to endogeneity. Finally, we control for public and private social expenditure because many welfare states use a mix of public and private supports. The differences between the expenditure data and the policy-based CWED data are that expenditure is "downstream" from policy, and the expenditure data capture private social spending net of the public spending that is uniquely caused by the policy-based measures also included in the models (the OECD measure also includes several areas of social spending, including income supports, housing, and family supports, among other policy domains; see Adema et al [2011]). We expect (and find) positive associations for all three controls. Data for public and private social expenditure are taken from the Comparative Political Dataset (Armingeon et al. 2015). Models that include all the controls use many fewer observations, because of limitations on data availability, as shown in the sample sizes reported in the table titles.

To simulate a counterfactual scenario of generous US social policy, and evaluate how life expectancy might be different under such a scenario, we estimate a Blinder-Oaxaca regression decomposition (Greene 2000:251-253). This regression decomposition approach is more commonly applied in labor economics research, where it was developed to analyse sex differences in wages as a function of both (a) sex differences in returns to human capital, and (b) sex differences in the stock of human capital. The decomposition allows the analyst to examine what the

difference in the outcome would be between two groups, if the groups were identical on measured covariates, and their effects. The decomposition also quantifies the contribution of the differences in the measured covariates, vs. the differences in the regression coefficients, across the two groups. We apply this approach to the case of the US mortality disadvantage by estimating one model for the US, and one model for the non-US OECD countries. We combine the information from these separate models using Jann's (2008) "oaxaca" add-on program for Stata, which reports estimated life expectancy if the US had the average social policy generosity of the rest of the OECD (the "endowments effect"), the estimated life expectancy if the US had the coefficients of the rest of the OECD (the "coefficients effect"), and their interaction.

RESULTS

We begin by describing the long-term trends in life expectancy. Figure 1 shows the trends in life expectancy at birth, in three panels grouped by welfare regime: (A) social-democratic, (B) conservative, and (C) liberal. Although we are not conducting a regime analysis, and are instead interested in within-regime and over-time variability on specific social policy measures, we group the countries by regime (a) for readability, and (b) as a bridge to previous work. In all 18 OECD nations, there is a positive, nearly linear trend. There are, however, several notable deviations from the main trend. Panel A shows Finland's rapid catch-up in the 1970s and early 1980s, and Denmark's slower rate of improvement until the early 1990s (the Danish deviation may be related to smoking [Preston et al. 2010]). Panel C shows the divergence of the US from Australia, Canada, New Zealand, and the UK started in the late 1990s.

Long-term trends in welfare generosity

Figure 2 shows the long-term trends in overall welfare generosity. The between-country differences are so great that the scale of the y-axis differs significantly across the panels: Denmark, Finland, Norway, and Sweden range from about 29 to about 47. The continental European countries and Japan range from about 20 to about 43. At the bottom of the range of welfare generosity, Australia, Canada, Ireland, New Zealand, the UK and the US range from about 11 to about 37. Interestingly, the upper range of the variation is extended by Ireland's significant welfare-state expansion during the 200s, when its generosity score increased from about 25 to over 32. We note that our fixed-effects estimation relies on this within-country variation.

Fixed-effects and autocorrelation-corrected estimates

To test the hypothesis that welfare generosity is associated with life expectancy in these 18 rich democracies, we estimate regressions of two measures of life expectancy (at birth, and at age 65) on a linear trend variable, and each of our four measures of welfare generosity. In all the regressions, we also include country fixed effects (which control for any effects of unmeasured between-country characteristics), as well as an adjustment for serial autocorrelation. We note that autocorrelation is quite strong in these data, with estimated rhos above .9. Correcting for serial autocorrelation effectively removes most of the year-to-year variation from our data, creating a very stringent hypothesis test.

The results show robust associations between welfare generosity and life expectancy. Table 1, which displays the models of life expectancy at birth, shows that the effect of welfare generosity (b = .167) is nearly half as large in magnitude as the linear trend (b = .313). Disaggregating overall generosity by measuring generosity separately for each major welfare domain reveals that not all effects are equal: the estimated effect of pension generosity (b = .439) is even larger in magnitude than the linear trend, and is also larger than the effects of overall generosity (b = .167), unemployment benefit generosity (b = .225), and sickness benefit generosity (b = .113). The large effect of pension benefits is striking; we interpret this as suggestive evidence that economic support for retired people may be increasingly important for population health as these populations age (several of these countries have large "baby-boomer" cohorts), and as chronic conditions become more important. Sensitivity analysis (displayed in Tables 6-8) shows substantively identical results for life expectancy at age 65, female life expectancy at birth, and male life expectancy at birth.

Table 2 shows results for models that lag the covariates by ten years, to guard against the possibility of endogeneity bias. Once again the coefficients for the measures of social policy generosity are all positive and statistically significant.

Table 3 shows results from models of life expectancy at birth that add controls for GDP per capita, the proportion of the population aged 65 and older, and public and mandatory private social expenditure as a percentage of GDP. The collinearity between year and log real GDP per capita means that precise estimates of their independent associations are not possible; in the model with GDP per capita, which itself has a strong positive association with life expectancy at birth, year loses its statistical significance. Given that the social expenditure measure reflects, in part, spending from citizenship entitlements, it is surprising that the associations between total welfare generosity and life expectancy, and between pension generosity and life expectancy, are both robust to the inclusion of these controls. That unemployment generosity and sickness generosity lose statistical significance and approach zero suggests that their effects may be absorbed by the expenditure measure. We note that we do not interpret the coefficient for the size of the population aged 65 and older as the estimate of a causal effect; it could be interpreted as evidence of the rectangularization of the survival curve (Nusselder and Mackenbach 1996).

Table 4 shows the same progression of models, with the covariates lagged by ten years. Note first that the sample size drops significantly, to n=283, because ten years of observations are lost for each of the 18 OECD countries in the analysis. In these models, the coefficient on social spending retains its positive sign, magnitude and statistical significance, but the CWED-based policy measures lose significance. Given the available data, it is impossible to evaluate whether the change in coefficients is driven more by the decreased sample size, the changed period of observation, or the multicollinearity introduced by the correlations between the CWED policy measures and the expenditure measure (the bivariate correlations range from .51 to .80).

How much of the US mortality disadvantage is explained by social policy?

To evaluate the extent to which social policy shortcomings explain the US mortality disadvantage, we extend the analysis in two ways. First, we re-estimated the models with Sweden as the omitted country instead of the US as the omitted country, in order to observe how the difference between the US and a leader in population health changes over time (this is of course equivalent to subtracting the fixed effect for Sweden from the constant term where the US serves as the omitted category). The logic of this test is that the addition of our social policy measures to a model that includes a linear trend and fixed effects, but no other covariates, should reduce the size

of the difference between the US and Sweden (chosen for its high levels of life expectancy). Second, we conduct a Blinder-Oaxaca decomposition analysis of the regression results, in order to estimate what the US mortality disadvantage would be if US social policies were as generous as the other rich democracies.

Both analyses yield evidence of a strong role for social policy shortcomings in explaining the US mortality disadvantage. First, in a model of life expectancy at birth with Sweden as the reference category, the US fixed effect drops from -2.88 to -2.43 when total generosity is added to the model. When all four policy measures are added to the same model, the US fixed effect drops even further, to -1.70. Second, the Blinder-Oaxaca decomposition shows that US life expectancy at birth would be 3.77 years longer than it is, if the US had the average social policy profile of the other 17 OECD member states included in the analysis. We emphasize that the counterfactual scenario involves attributing to the US the average non-US OECD values for the policy measures, not the maximum non-US OECD values. Our decomposition suggests the US could gain nearly four years in life expectancy just by catching up to the OECD average, not by becoming a social-policy leader. To address the more stringent counterfactual, we compared the US to the most generous welfare states, Denmark, Finland, Norway, and Sweden. We find that if the US had the social policy profile of these leading welfare states, life expectancy at birth would be 5.56 years longer than it is. Table 5 shows the results.

DISCUSSION

Year-to-year changes in life expectancy in the United States have failed to keep up with those in other rich democracies. Existing work that focuses on lifestyle and healthcare as candidate explanations has explained only part of the US mortality disadvantage. Newer research is turning to political institutions as possible solutions to this puzzle (Bambra and Beckfield 2012), as newer theoretical developments in social and spatial epidemiology also argue for more attention to “upstream” and societal causes of population health (Hall and Lamont 2009; Link and Phelan 1995). A major area of scholarly debate within this newer literature surrounds the welfare state: does the US have a mortality disadvantage in part because it has a welfare-state disadvantage?

Our research suggests that the answer may be: "Yes." While most existing research relies on cross-sectional comparative designs that overlook within-country variation in welfare states, and aggregate together all domains of the welfare state, our study uses newly-available measures of welfare generosity in the domains of unemployment, sickness, and pension benefits (as well as a summary measure), and fixed-effects regression techniques that use (only) within-country variation for estimation. Our results are unambiguous: within-country, over-time increases in welfare generosity are strongly, positively, and statistically-significantly associated with within-country, over-time changes in life expectancy.

There are various potential pathways whereby less generous US social policy may contribute to an additional burden of ill health. These include poverty, incarceration, and public health (de)regulation. The US has relatively high rates of poverty with over 17% of US citizens experiencing 'relative poverty' (defined as having less than 50% of the average [median] national income) compared to 11% in the UK and around 7% in Denmark (Woolf and Aron 2013). The US also has the highest rates of child poverty amongst high-income countries; in excess of 20% of US children live in poverty – disproportionately concentrated amongst African American children. The links between poverty and poor health are well established. For example, Nelson and Fritzell (2014) examined the role of antipoverty strategies in explaining international differences in population level mortality rates and life expectancy: countries that provided higher minimum income benefits, and therefore had lower poverty rates, had better population health. The US also has far higher rates of incarceration (Schrecker and Bambra 2015), which contributes to ill health among the incarcerated and their families (Wildeman et al 2012).

Market regulation to promote public health is also another potential pathway. Preventative health policy such as regulating saturated fat levels in food can reduce cardiovascular disease, reducing air pollution levels lowers risks for respiratory and cardiovascular disease, and workplace health and safety regulations reduce workplace accidents and illnesses (Mackenbach and McKee 2013). The US has the highest rates of obesity, and it also regulates products and their advertising less than other comparable countries (De Vogli et al 2014).

Methodologically, our paper has presented a new way of analysing the associations between welfare states and health. We have used a newly available source of data – the Comparative Welfare Entitlements Database II (Scruggs et al 2014) – to address methodological shortcomings of previous work. We disaggregated the measurement of the welfare state into three primary policy domains (unemployment insurance, sickness benefits, and pensions). We also use models that are robust to unmeasured between-country differences and serial autocorrelation of repeated measures (fixed-effects estimation with autocorrelation-corrected standard errors). Our methods therefore overcome some of the criticisms of previous "welfare state regime" based research: Firstly, they present a longitudinal analysis where most previous research has been cross-sectional. Secondly, by looking at specific indicators of welfare generosity across specific individual policy domains, they allow a more detailed examination and isolation of social policy effects on population health (Lundberg et al 2008). Previous welfare states and health research has been criticised as the regimes concept assumes that most of the key social policy areas within a welfare regime (i.e. social transfers, education, health care, public health regulation) will reflect a similar across the board approach to welfare provision and that each regime type itself reflects *"a set of principles or values that establishes a coherence in each country's welfare package"* (Kasza 2002). We therefore build on recent research by Van der Wel and Dahl (2011), who take an institutional approach to analysing welfare state effects (their analysis examined the effects of social expenditure on inequalities in the employment of people with ill health) and thereby helps to unpack 'the black box' of welfare state regimes (Castles 2008). The drawback of this approach though is that *"it prevents an examination of the impact of the entire complexity and dynamics of welfare programs and their interaction with other institutions, like a regime approach does"* (Van der Wel and Dahl 2011).

Future research should address the limitations of our study. First, individual-level mortality data should be integrated with individual-level policy coverage data to assess the mechanisms whereby the welfare state improves population health. Such data are exceedingly scarce, and should be the topmost priority for the international research infrastructure. Second, the timing of these effects should be disentangled, and the possibilities of cumulative effects should be explored, since our analysis is limited to associations between short-term within-country changes. Third, although our fixed-effects models simulate control for all unmeasured, between-country differences, we were limited in our ability to add time-varying covariates; for instance, the

potential role of medical technology should be explored in future work. Fourth, we acknowledge that the associations between social policy generosity and life expectancy at age 65 may be affected by residual confounding. Fifth, our ability to assess the role of voluntary private welfare spending is limited by our data. Sixth and finally, we cannot, with the data we have access to, completely rule out endogeneity bias.

CONCLUSION

The United States has a mortality disadvantage relative to its political and economic peer group. Previous research has focused on lifestyle and health care explanations. In this paper, we present the first long-term longitudinal examination of the contribution of the generosity of social policy programmes in explaining this disadvantage. Using life expectancy and indicators of unemployment insurance, pensions and sickness insurance, we found a substantively and statistically significant association between welfare generosity and population health – especially in regards to pension provision. Our research suggests that there is evidence that the US mortality disadvantage is, in part, a welfare state disadvantage.

REFERENCES

Adema, W., P. Fron and M. Ladaique (2011), "Is the European Welfare State Really More Expensive?: Indicators on Social Spending, 1980-2012; and a Manual to the OECD Social Expenditure Database (SOCX)", OECD Social, Employment and Migration Working Papers, No. 124, OECD Publishing. http://dx.doi.org/10.1787/5kg2d2d4pbf0-en .

Alderson AS, Nielsen F. (2002) Globalization and the great u-turn: Income inequality trends in 16 OECD countries. *American Journal of Sociology* 107:1244-99.

Armingeon, Klaus, Christian Isler, Laura Knöpfel, David Weisstanner and Sarah Engler. 2015. *Comparative Political Data Set 1960-2013*. http://www.cpds-data.org/

Bambra, C. (2005). Cash versus services: 'worlds of welfare' and the decommodification of cash benefits and health care services. *Journal of Social Policy*, 34, 195-213

Bambra, C. and Eikemo, T. (2009). Welfare state regimes, unemployment and health: A comparative study of the relationship between unemployment and self-reported health in 23 European countries. *Journal of Epidemiology and Community Health*, 63: 92-98

Bambra, C. and Beckfield, J. (2012) *Institutional Arrangements as Candidate Explanations for the US Mortality Disadvantage* (Cambridge, MA: Harvard University). Retrieved from: http://scholar.harvard.edu/files/jbeckfield/files/bambra_and_beckfield_2012.pdf. [accessed 15 July 2014].

Beckfield, J. and Krieger, N. (2009). Epi + demos + cracy: Linking Political Systems and Priorities to the Magnitude of Health Inequities—Evidence, Gaps, and a Research Agenda. *Epidemiologic Reviews*, 31: 152–177

Beckfield, J., Bambra, C., Eikemo, TA., Huijts, T., and Wendt, C. (2015) Towards An Institutional Theory of Welfare State Effects on the Distribution of Population Health, *Social Theory and Health*, 13, 227–244

Brady, D. (2008). *Rich Democracies, Poor People: How Politics Explain Poverty*. New York: Oxford University Press.

Castles, F. G. (2008). What welfare states do: a disaggregated expenditure approach? *Journal of Social Policy*, 38: 45-62.

Chung, H. and Muntaner, C. (2006). Political and welfare state determinants of infant and child health indicators: an analysis of wealthy countries. *Social Science & Medicine*, 63, 829-842

Chung, H. and Muntaner, C. (2007). Welfare State Matters: A Typological Multilevel Analysis Of Wealthy Countries. *Health Policy*, 80, 328-339

Coburn, D. (2004) Beyond the Income Inequality Hypothesis: Class, Neo-Liberalism, and Health Inequalities. *Social Science & Medicine*, 58, 41-56

Crimmins, EM., Vasunilashorn, S., and Kim, JK. (2010) Are international differences in health similar to international differences in life expectancy?, in EM. Crimmins, SH. Preston, and B Cohen (eds), *International Differences in Mortality at Older Ages*, National Academies Press, Washington, USA. Available at: http://www.nap.edu/openbook.php?record_id=12945&page=R1 [accessed 24/8/2015]

Dahl, E. and van der Wel, K. (2013) Educational inequalities in health in European welfare states: a social expenditure approach. Social Science and Medicine, 81: 60–69

De Vogli, R., Kouvonen, A., and Gimeno, D. (2014b) 'The influence of market deregulation on fast food consumption and body mass index: a cross-national time series analysis.' *Bulletin of the World Health Organisation*, 92: 99-107.

Eikemo, T.A., Bambra, C., Judge, K. and Ringdal, K. (2008). Welfare State Regimes and Differences in Self-Perceived Health in Europe: A Multi-Level Analysis. *Social Science & Medicine*, 66, 2281-95

Esser I, Palme J. (2010) Do public pensions matter for health and wellbeing among retired persons? Basic and income security pensions across 13 Western European countries, Int J Soc Welfare 19: S103–S120

Esping-Andersen, G. (1990) *The Three Worlds of Welfare Capitalism* (London: Polity).

Greene, WH. 2000. *Econometric Analysis.* Prentice Hall.

Gunasekara, F. I., Richardson, K., Carter, K., & Blakely, T. (2014). Fixed effects analysis of repeated measures data. *International Journal of Epidemiology*, *43*(1), 264-269.

Hall, PA and M Lamont. 2009. *Successful Societies.* Cambridge University Press.

Jann, B. (2008). The Blinder-Oaxaca decomposition for linear regression models. *The Stata Journal*, *8*(4), 453-479.

Karim, Syahirah Abdul, Terje A. Eikemo, and Clare Bambra. (2010) "Welfare state regimes and population health: integrating the East Asian welfare states." *Health Policy* 94.1: 45-53.

Kasza, G. (2002). The Illusion of Welfare Regimes. *Journal of Social Policy*, 31: 271-287

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of health and social behavior*, 80-94.

Lundberg, O., Yngwe, M., Kölegård Stjärne, M., Elstad, J., Ferrarini, T., Kangas, O. et al. (2008). The role of welfare state principles and generosity in social policy programmes for public health: an international comparative study. *Lancet*, 372: 1633–40

Mackenbach, J. and McKee, M. (2013) Social Democratic government and health policy in Europe: a quantitative analysis. *International Journal of Health Services*, 43: 389–413.

Mackenbach, J., Meerding, W., Kunst, A. (2011) Economic costs of health inequalities in the European Union. *Journal of Epidemiology and Community Health,* 65:412-419.

Mackenbach, J. P., Slobbe, L., Looman, C. W. N., van der Heide, A., Polder, J., & Garssen, J. (2011). Sharp upturn of life expectancy in the Netherlands: effect of more health care for the elderly?. *European journal of epidemiology*,*26*(12), 903-914.

Marshall, T.H. (1950). *Citizenship and social class, and other essays*. Cambridge, Cambridge University Press.

McKeown, T., The Role of Medicine. 1976, London: Nuffield

Navarro, V., Borrell, C., Benach, J. and Muntaner, C. (2003). The Importance of the Political And The Social In Explaining Mortality Differentials Among The Countries Of The OECD, 1950-1998. *International Journal of Health Services Research*, 33: 419-494

Navarro, V., Muntaner, C., Borrell, C. and Benach, J. (2006). Politics and Health Outcomes. *Lancet*, 368: 1033-1037

Nelson, K. and Fritzell, J. (2014) Welfare states and population health: The role of minimum income benefits for mortality. *Social Science and Medicine*, 112: 63e71.

Nusselder WJ, Mackenbach JP. Rectangularization of the survival curve in the Netherlands, 1950-1992. The Gerontologist. 1996 Dec 1;36(6):773-82.

OECD (2012) *Health Statistics 2012* (Paris: OECD). Retrieved from: http://dx.doi.org/10.1787/health-data-en [accessed 15 July 2015].

Olafsdottir, S, and Beckfield, J (2011). "Health and the social rights of citizenship: integrating welfare-state theory and medical sociology." *Handbook of the sociology of health, illness, and healing*. Springer New York, 2011. 101-115.

Preston, SH., Glei, DA., and Wilmouth, JR. (2010) Contributions of smoking to international differences in life expectancy, in EM. Crimmins, SH. Preston, and B Cohen (eds), *International Differences in Mortality at Older Ages,* National Academies Press, Washington, USA. Available at: http://www.nap.edu/openbook.php?record_id=12945&page=R1 [accessed 24/8/2015]

Preston, SH. and Stokes, A. (2011) Contribution of obesity to international differences in life expectancy. *American Journal of Public Heath*, 101: 2137-43

Schrecker, T. and Bambra, C. (2015) *How politics makes us sick: Neoliberal epidemics*, London, Palgrave Macmillan.

Scruggs, L. (2014) "Social Welfare Generosity Scores in CWED 2: A Methodological Genealogy." *CWED Working Paper Series* WP 01.

Scruggs, L., Detlef, J. and Kuitto, K. (2014) *Comparative Welfare Entitlements Dataset 2*, Version 2014-03 (Connecticut: University of Connecticut & University of Greifswald) [On-line]. Accessed at: http://cwed2.org/. [accessed 15 July 2014].

Tudor-Hart, J., The inverse care law. The Lancet, 1971. 297(7696): p. 405-412

Van der Wel, K., dahl, E., and Thielen, K. (2011) Social inequalities in 'sickness': European welfare states and non-employment among the chronically ill, *Social Science & Medicine*, 73: 1608-1617

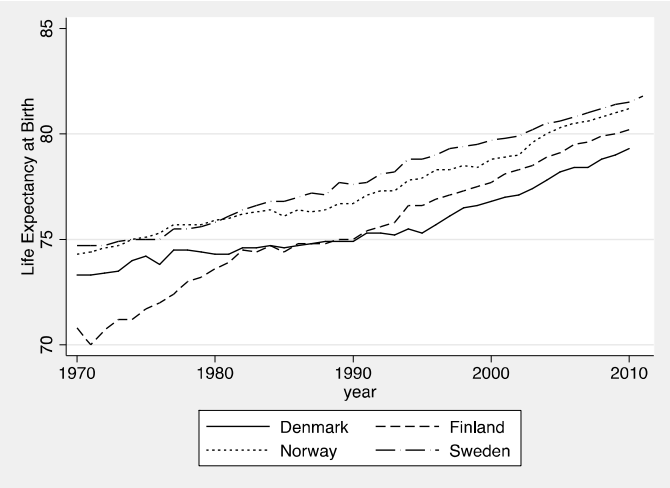
Vogt, T. C., & Kluge, F. A. (2015). Can public spending reduce mortality disparities? Findings from East Germany after reunification. *The Journal of the Economics of Ageing*, *5*, 7-13.

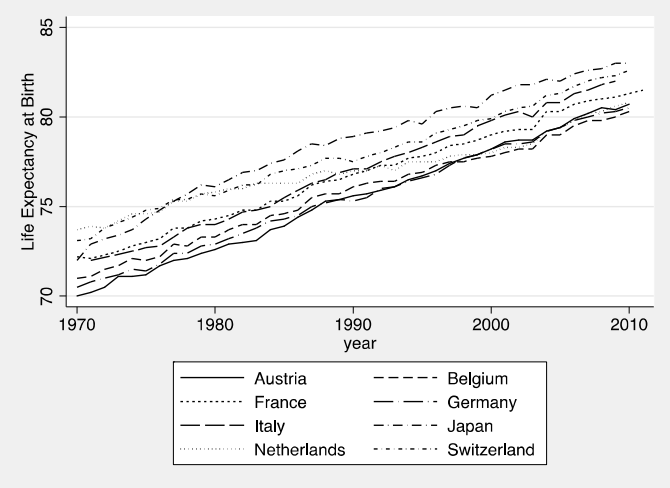
Woolf, S. and Aron, l. (eds.) (2013) U*S health in International Perspective: Shorter Lives, Poorer Health* (Washington, DC: National Academies Press). Retrieved from: http://download.nap.edu/cart/download.cgi?&record_id=13497 [accessed 15 July 2015].

Wildeman, C., Schnittker, J., & Turney, K. (2012). Despair by association? The mental health of mothers with children by recently incarcerated fathers. *American Sociological Review*, *77*(2), 216-243.

Wilensky H. (2002) *Rich democracies: Political economy, public policy, and performance*. Berkeley and Los Angeles, CA: University of California Press.

Figure 1. Long-Term Trends in Life Expectancy at Birth





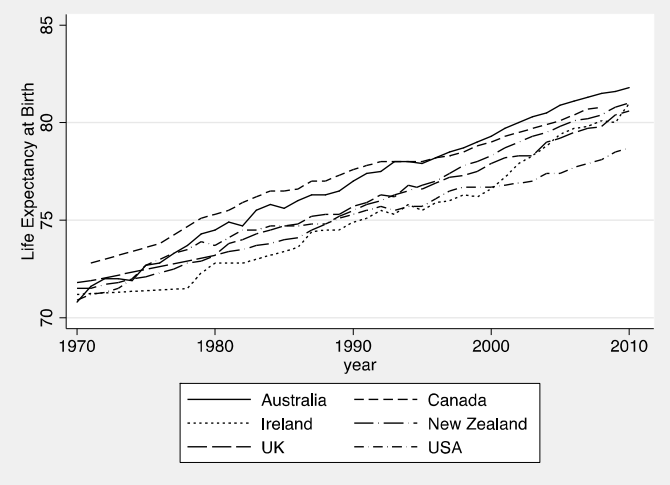
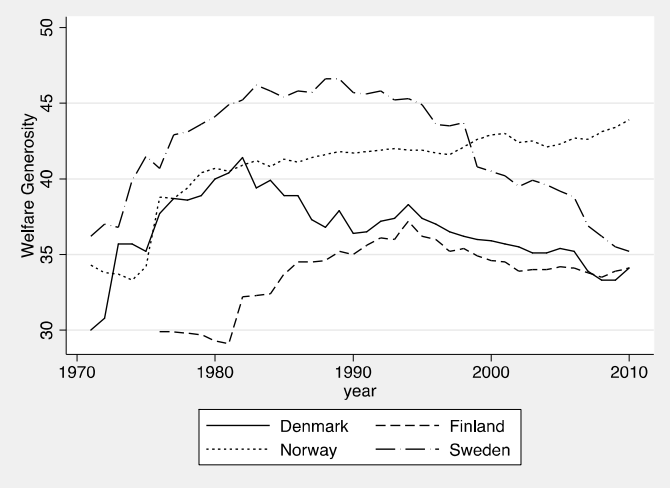
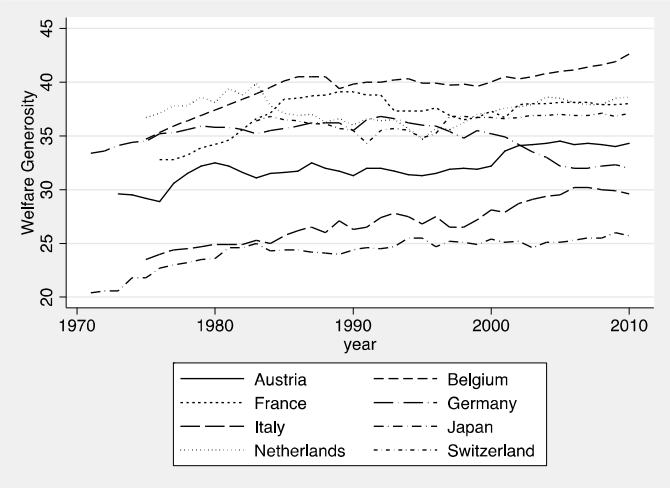


Figure 2. Long-Term Trends in Overall Welfare Generosity





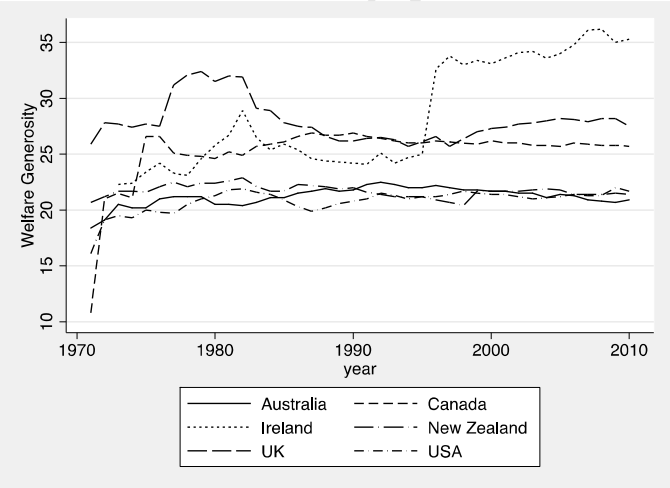


Table 1. Fixed-Effects and Autocorrelation-Corrected Regressions of Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, and Pension Benefit Generosity (n=637)

Model:	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	0.293***	0.313***	0.302***	0.297***	0.297***
	(10.83)	(11.98)	(11.37)	(11.02)	(11.62)
Generosity		0.167***			
		(7.07)			
Unemployment			0.225***		
			(4.82)		
Sickness				0.113*	
				(2.42)	
Pension					0.439***
					(7.60)
Constant	69.83***	63.50***	67.19***	68.49***	64.33***
	(1087.16)	(766.31)	(924.09)	(930.81)	(789.60)

Notes:

t-statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 2. Fixed-Effects and Autocorrelation-Corrected Regressions of Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, and Pension Benefit Generosity; Covariates Lagged Ten Years (n=455)

Model:	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	0.386***	0.405***	0.373***	0.398***	0.408***
	(7.94)	(9.24)	(8.21)	(8.31)	(9.17)
Generosity		0.435***			
		(10.05)			
Unemployment			0.736***		
			(7.88)		
Sickness				0.369***	
				(3.96)	
Pension					0.975***
					(9.27)
Constant	70.72***	55.84***	63.52***	66.44***	58.43***
	(511.92)	(281.27)	(389.70)	(376.02)	(308.34)

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 3. Fixed-Effects and Autocorrelation-Corrected Regressions of Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, Pension Benefit, Log Real GDP Per Capita, Population Aged 65 and Older as % of Total, and Public and Mandatory Private Social Expenditure (n=465)

Model:	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	-0.00126	0.00331	-0.00237	0.000294	0.00715
	(-0.08)	(0.22)	(-0.15)	(0.02)	(0.49)
GDP p.c. (log)	5.688***	5.591***	5.713***	5.650***	5.533***
	(53.99)	(50.21)	(52.86)	(52.59)	(52.76)
Age 65+ % of Pop.	0.239***	0.241***	0.239***	0.237***	0.251***
	(4.29)	(4.38)	(4.29)	(4.30)	(4.71)
Social Expenditure	0.125***	0.119***	0.127***	0.124***	0.112***
	(9.04)	(8.56)	(9.09)	(9.03)	(8.16)
Generosity		0.0426*			
		(2.48)			
Unemployment			-0.0324		
			(-0.99)		
Sickness				0.0563	
				(1.60)	
Pension					0.193***
					(4.86)
Constant	-2.975***	-3.102***	-2.993***	-3.071***	-3.365***
	(-25.03)	(-26.18)	(-25.17)	(-25.82)	(-28.79)

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 4. Fixed-Effects and Autocorrelation-Corrected Regressions of Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, Pension Benefit, Log Real GDP Per Capita, Population Aged 65 and Older as % of Total, and Public and Mandatory Private Social Expenditure; Covariates Lagged Ten Years (n=283)

Model:	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	-0.0412*	-0.0331*	-0.0412*	-0.0332*	-0.0320
	(-2.51)	(-1.99)	(-2.50)	(-2.01)	(-1.89)
GDP p.c. (log)	6.091***	6.012***	6.090***	6.035***	6.013***
	(63.61)	(57.67)	(60.77)	(61.77)	(57.59)
Age 65+ % of Pop.	0.198**	0.186*	0.198**	0.174*	0.192*
	(2.61)	(2.47)	(2.61)	(2.29)	(2.55)
Social Expenditure	0.114***	0.111***	0.114***	0.116***	0.109***
	(6.90)	(6.71)	(6.84)	(7.06)	(6.47)
Generosity		0.0330			
		(1.61)			
Unemployment			-0.000159		
			(-0.00)		
Sickness				0.0803*	
				(2.01)	
Pension					0.0893
					(1.65)
Constant	-4.470***	-4.469***	-4.470***	-4.487***	-4.522***
	(-32.11)	(-31.77)	(-31.97)	(-32.14)	(-32.25)

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 5. Regression Decomposition of the US Life Expectancy Disadvantage

US vs. 17 OECD Nations:

	US	OECD
b_{Year} (s.e.)	.149 (.005)	.221 (.004)
$b_{Generosity}$ (s.e.)	.311 (.050)	.006 (.007)
Constant (s.e.)	65.7 (.987)	71.9 (.231)

Endowments effect (change in US LE if US had OECD-average generosity): 3.77 (s.e. = .657)

Coefficients effect change in US LE if US had OECD coefficients): 1.29 (s.e. = .146)

Interaction between endowments effect and coefficients effect: -3.38 (s.e. = .590)

US vs. Nordic Nations (Denmark, Finland, Norway and Sweden)

	US	Nordic
b_{Year} (s.e.)	.149 (.005)	.168 (.006)
$b_{Generosity}$ (s.e.)	.311 (.050)	.154 (.016)
Constant (s.e.)	65.7 (.987)	67.4 (.231)

Endowments effect (change in US LE if US had Nordic-average generosity): 5.56 (s.e. = .950)

Coefficients effect change in US LE if US had Nordic coefficients): -1.24 (s.e. = .302)

Interaction between endowments effect and coefficients effect: -2.74 (s.e. = .928)

Table 6. Fixed-Effects and Autocorrelation-Corrected Regressions of Life Expectancy at Age 65 on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, and Pension Benefit Generosity (n=637)

Model	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	0.168***	0.173***	0.168***	0.169***	0.168***
	(17.99)	(19.28)	(18.51)	(18.66)	(20.02)
Generosity		0.0659***			
		(6.44)			
Unemployment			0.0496*		
			(2.41)		
Sickness				0.0678***	
				(3.34)	
Pension					0.199***
					(8.43)
Constant	13.14***	10.78***	12.63***	12.38***	10.72***
	(508.47)	(283.03)	(399.70)	(388.02)	(309.13)

Notes:

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 7. Fixed-Effects and Autocorrelation-Corrected Regressions of Female Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, and Pension Benefit Generosity (n=641)

Model	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	0.231***	0.252***	0.241***	0.235***	0.237***
	(8.06)	(9.14)	(8.57)	(8.26)	(8.89)
Generosity		0.166***			
		(6.90)			
Unemployment			0.211***		
			(4.54)		
Sickness				0.109*	
				(2.32)	
Pension					0.449***
					(7.54)
Constant	74.87***	68.50***	72.27***	73.56***	69.11***
	(1136.11)	(810.59)	(989.01)	(984.65)	(821.27)

Notes:

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 8. Fixed-Effects and Autocorrelation-Corrected Regressions of Male Life Expectancy at Birth on Linear Trend, Overall Welfare Generosity, Unemployment Insurance Generosity, Sickness Insurance Generosity, and Pension Benefit Generosity (n=641)

Model	(1)	(2)	(3)	(4)	(5)
Year (0=1970)	0.320***	0.341***	0.326***	0.325***	0.328***
	(12.85)	(14.10)	(13.42)	(13.08)	(13.78)
Generosity		0.163***			
		(7.11)			
Unemployment			0.234***		
			(5.03)		
Sickness				0.121**	
				(2.66)	
Pension					0.397***
					(7.27)
Constant	66.12***	59.93***	63.55***	64.66***	60.93***
	(1073.51)	(739.57)	(884.83)	(907.50)	(788.53)

Notes:

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Highlights

1. The US combines a laggard welfare state with shorter life expectancy compared to the OECD.
2. Fixed-effects models show associations between life expectancy and social policy generosity.
3. US life expectancy would be 3.77 years longer if the US welfare state were just average.