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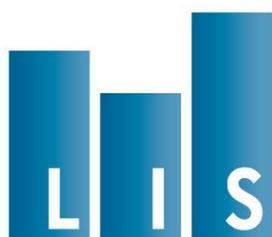
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### The Wealth-Health Gradient Across Adulthood: A Cross-National Comparative Analysis

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# The Wealth–Health Gradient Across Adulthood: A Cross-National Comparative Analysis

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## Abstract

Prior research documents a robust wealth–health gradient, yet comparative evidence is largely confined to older adults and offers limited insight into how wealth–related health inequality is patterned across adulthood and institutional contexts. Drawing on life–course perspectives on age–graded stratification and a healthcare–system typology, we examine how the wealth–health gradient varies across age groups in seven OECD countries. Using harmonized microdata from the Luxembourg Wealth Study (LWS), we pool 30 repeated cross–sections from Australia, Germany, Italy, Luxembourg, Spain, the United Kingdom, and the United States (2002–2022), yielding 450,233 adults aged 25–80. Wealth is measured as gross non–financial and financial assets (ranked into within country–year quintiles), and health is measured with self–rated health. We assess wealth–health inequality by age using Wagstaff–normalized concentration indices and country–specific OLS models with wealth–by–age interactions and covariate adjustment. Across all countries and age groups, health is consistently concentrated among wealthier individuals. Inequality typically rises from ages 25–35 to a late–midlife peak (often 56–65) and attenuates at ages 66–80, with this rise–and–fall pattern most evident in the United States, Australia, and the United Kingdom. Cross–national differences broadly align with Reibling et al.’s OECD healthcare–system typology: private systems show the steepest gradients and regulation–oriented systems more compressed gradients, yet the United Kingdom is a notable outlier, and Italy and Spain show comparatively sustained gradients into older ages. Comparing wealth–health gradients across age groups reveals systematic age–graded patterns that are central to life–course perspectives on stratification.

**Keywords:** wealth–health gradient; comparative health inequality; wealth; healthcare systems; concentration index; Luxembourg Wealth Study (LWS)

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## Data availability

Luxembourg Wealth Study data are publicly available for research purposes, upon registration. Replication code for the analyses is reported in Appendix B: Replication Package

## 1. Introduction

The wealth–health gradient refers to the association between individuals’ wealth and health: within a given societal context, people with greater wealth typically report better health than those with less wealth (Deaton, 2002; Meer et al., 2003). Alongside income and education gradients, this relationship is well established in the social and medical sciences (Braveman et al., 2005; Conti et al., 2010; Marmot, 2015; van Doorslaer, 1997). Yet wealth differs from other socioeconomic resources in important ways: it captures accumulated advantage over the life course and can function both as a means of securing care and as a buffer against health–related economic shocks (Rodems and Pfeffer, 2021). Despite this distinct role, and regardless of the causal direction linking wealth and health (Gugushvili & Wiborg, 2025; Michaud and van Soest, 2008), the wealth–health gradient remains comparatively understudied. First, existing evidence is largely confined to older populations, limiting our ability to assess whether and how wealth–related health inequality varies across age and across stages of adulthood. Second, cross–national evidence is limited to the comparison between the US vs Europe or between private vs public healthcare systems. These gaps are consequential because they constrain the integration of wealth into a life–course perspective on health inequality as well as a more systematic comparison across a wider set of countries and of healthcare system types (Pavalko and Caputo, 2013; Willson et al., 2007).

This study addresses two questions: How does the wealth–health gradient vary across age groups? And does its age profile differ across institutional contexts? Using harmonised, population–representative microdata from the Luxembourg Wealth Study (LWS), we examine wealth–health associations across five age groups (25–80) in seven institutionally diverse high–income countries. We contribute by mapping the age profile of the wealth–health gradient beyond later–life samples and by linking cross–national differences in this profile to healthcare systems that shape the extent to which private resources can be converted into access to care, quality of treatment, and financial protection from health shocks.

Our analysis compares wealth–health gradients across age groups rather than following individuals longitudinally. This age–stratified approach is informative because health needs and healthcare utilisation differ sharply across adulthood, and because the economic meaning of wealth as a buffer against health–related risks, as a means of securing timely and continuous care, and as an expression of accumulated (dis)advantage changes as health risks rise. Comparing gradients across age groups, therefore, provides insight into how wealth–related health inequality is structured across adulthood, setting the stage for a life–course perspective on stratification that is sensitive to institutional context.

## **2. Comparative evidence on the wealth–health gradient**

To date, only a small number of studies have examined the wealth–health gradient from a cross–national perspective. This literature consistently documents pro–rich health inequality, but it is almost exclusively based on older populations and relies on three Health and Retirement surveys: SHARE (Europe), ELSA (UK), and HRS (US). As a result, existing evidence provides limited insight into how the wealth–health gradient is patterned across adulthood or how its age profile may vary across institutional contexts.

Avendano et al. (2009) provide an early comparative contribution by examining chronic conditions and functional limitations among adults aged 50–74 in ten European countries, the UK, and the United States (US). They show that Americans are less healthy than Europeans at all wealth levels, with particularly large disadvantages among the least wealthy, and that wealth–related health disparities are smaller in continental Europe than in the US and UK. This study highlights the importance of national context but remains confined to later working ages and early old age.

Semyonov et al. (2013) extend this evidence using an index of health impairments among older adults in fourteen European countries, the UK, and the US. They confirm a consistent positive association between wealth and health in late adulthood, and show that greater national wealth improves average population health without weakening the wealth–health gradient. Importantly, they

also find flatter gradients in countries with more egalitarian wealth distributions, suggesting that macro-level stratification conditions shape wealth-related health inequality.

Maskileyson (2014) situates the wealth-health gradient within a comparative perspective on healthcare system organization, showing that the gradient is substantially steeper in the United States, characterized by a more private and market-oriented system, than in countries with more state-based healthcare arrangements. The study provides evidence that institutional features may condition how wealth translates into health advantage, but it focuses exclusively on older populations.

More recent work has begun to hint at age variation within later life. Kyriopoulos et al. (2024) assess wealth-related inequalities in self-reported health in the US and fourteen EU countries between 2011 and 2019. While confirming higher inequalities in the US and little evidence of period change, they find larger wealth-related health disparities among individuals aged 50–59 than among those aged 70–79, particularly in the US, and conclude that age differences warrant further investigation. Similarly, Machado et al. (2025), using longitudinal data from SHARE and HRS, show that wealth-mortality associations are strongest at ages 50–59 and weaken at older ages. They emphasize the compounding role of national institutional arrangements but remain limited to later life stages.

Thus, existing comparative studies establish that wealth-related health inequality is pervasive and institutionally patterned, yet they leave two questions largely unanswered: how the wealth-health gradient is structured across adulthood beyond later life, and whether its age profile differs systematically across healthcare systems. Addressing these gaps requires a framework that explicitly links age-graded mechanisms to institutional context.

### **3. Age-related variation in the wealth-health gradient**

The age differences hinted at in existing comparative studies are theoretically expected. The wealth-health gradient is unlikely to be constant across adulthood because both wealth and health evolve over time, and because the channels linking them become more or less salient at different stages of

life. Importantly, observed wealth–health gradients reflect two broad pathways operating in opposite directions—wealth shaping health and health shaping wealth—and both pathways are institutionally conditioned.

First, wealth can “buy health” (Aittomäki et al., 2010; Link & Phelan, 1995; Smith, 1999). Beyond a generic ability to purchase goods and generally more healthy life-conditions, wealth matters because it can be converted into timely access, higher–quality care, and more consistent treatment. This includes the ability to access specialist visits and diagnostics without delay, to afford preventive services and treatments, and to navigate systems to secure better provider choices or treatment options. Wealth thus serves a purchasing function (Pfeffer and Hällsten, 2012), enabling care and health–promoting conditions, and an insurance function (Müller et al., 2023; Rodems and Pfeffer, 2021), buffering health risks by financing care when needs arise and by anticipating deterioration through adaptations, support, and planning.

Second, poor health can “spend wealth” (Boen & Yang, 2016; Michaud & van Soest, 2008; Van Minh et al., 2013). Health shocks can deplete wealth through direct medical out–of–pocket costs, and indirect economic consequences, including income loss, reduced labour market participation, early retirement, and the need to draw on assets to cover health–related expenses or care needs. In this sense, wealth depletion is not only a result of illness; it can also reinforce subsequent health disadvantages by limiting future wealth accumulation.

The outlined mechanisms imply systematic age variation in the wealth–health gradient. In early adulthood, wealth levels are typically lower and less dispersed, while severe health problems and extensive healthcare use are less frequent. As a result, both the capacity to convert wealth into meaningful care benefits and the risk that illness translates into substantial financial strain may be limited. As individuals enter midlife, wealth dispersion increases through differential accumulation trajectories (Hansen and Toft, 2021; Killewald et al., 2017), while chronic conditions and broader health needs become more prevalent. At these ages, healthcare use increases, and the ability to secure timely specialist care, diagnostics, and continuity of care becomes consequential. At the same time,

exposure to illness becomes more salient, and constraints to wealth accumulation might intensify through income loss and reduced labour market attachment. In later life, age-related health deterioration further increases the relevance of both pathways, but the evolution of the gradient need not be strictly monotonic. On the one hand, the insurance function of wealth may expand as older adults face higher risks of costly care needs and more frequent interactions with the healthcare system. On the other hand, the gradient could stabilise or even attenuate at the oldest ages. This may occur because of selective survival, which compresses observed differences among those who reach advanced ages, or because institutional thresholds may reduce the scope for wealth-based stratification by expanding entitlements. At very old ages, health limitations may also become more widespread, potentially narrowing the capacity of wealth to “buy” health altogether.

#### **4. Institutional context and wealth-related health inequality**

Comparative research on health inequalities has frequently drawn on welfare regime theory to explain cross-national differences in population health and stratification (Beckfield & Krieger, 2009; Mackenbach, 2012). However, as Maskileyson (2014) emphasizes, broad welfare regime groupings are often better at accounting for differences in average health than for differences in the steepness of socioeconomic gradients. For wealth-based health inequality in particular, the institutional organization of healthcare, though related to welfare regimes, is a more proximate mechanism: it structures whether private resources can be converted into better access, higher quality, or greater continuity of care, and it conditions the extent to which illness translates into financial strain. These features also suggest that healthcare systems may shape age differences in the wealth-health gradient, particularly at ages when chronic conditions and healthcare use become more prevalent, often in midlife and early old age. We therefore foreground healthcare-system characteristics rather than welfare regimes as the institutional context most directly relevant to the wealth-health gradient (Wendt, 2009).

#### *4.1 Healthcare system typologies*

We use the recent multidimensional OECD typology proposed by Reibling et al. (2019), which extends prior approaches by including five dimensions: resource supply, public–private mix, access regulation, primary care focus, and performance. Reibling et al. (2019) identify five system types; our seven LWS countries fall into three of these categories: the United States is classified as a supply– and performance–oriented private system; Australia, Germany, and Luxembourg as supply– and choice–oriented public systems; and Italy, Spain, and the United Kingdom as regulation–oriented public systems. This typology is helpful for understanding wealth–health gradients because it emphasizes institutional conditions under which private resources can translate into health advantages—such as private financing, cost–sharing, and choice—while also highlighting how public regulation may reduce disparities in access and financial risk.

#### *4.2 Comparative expectations for the wealth–health gradient*

Healthcare institutions are expected to shape wealth–health gradients through two related channels. First, they condition the extent to which private resources can be converted into timely access, provider choice, continuity, and perceived quality of care (i.e., a “purchasing” channel). Second, they structure the degree of financial protection against health shocks through coverage rules, cost–sharing, and out–of–pocket exposure (an “insurance” channel). Because healthcare utilisation and chronic conditions rise with age, both channels suggest that institutional differences should be especially visible from midlife onwards, when needs and potential financial exposure become more salient.

##### **Supply– and performance–oriented private system (United States).**

In contexts where private financing and cost–sharing play a central role, individuals face substantial variation in financial protection and in their ability to access timely, continuous care. Wealth should therefore have particular value for purchasing and insurance (e.g., securing better coverage or care options and buffering health–related economic shocks). We expect the steepest

wealth–health gradient in the United States, together with comparatively pronounced age differences as healthcare needs increase—especially from midlife into early old age, when utilisation and exposure to costs typically intensify.

**Supply– and choice–oriented public systems (Australia, Germany, Luxembourg).**

These systems combine broad coverage and relatively high resource supply with institutional scope for choice and private involvement. Accordingly, we anticipate intermediate gradients overall: formal access barriers should be less stark than in private systems, but wealth may still translate into advantage through navigation, convenience, and the ability to leverage choice. Within this group, some cross-country heterogeneity is expected. In Germany, high supply and extensive choice, coupled with comparatively weaker access regulation, may shift wealth-related inequality away from basic access and toward how care is obtained—timeliness, provider selection, treatment pathways, and continuity—particularly in age groups in which specialist care and chronic-disease management become more intensive. Luxembourg shares the supply/choice orientation and broad coverage; gradients may therefore be moderate on average, but most evident at ages when utilisation increases and when individuals’ ability to navigate and capitalize on choice becomes more consequential. Australia combines broad coverage with scope for private involvement and choice, implying gradients smaller than in the United States but potentially still substantive, especially in midlife and early old age when healthcare needs rise.

**Regulation-oriented public systems (Italy, Spain, United Kingdom).**

Where access is strongly regulated and coverage is universal, wealth-based stratification in formal access and financial risk should be more limited. We therefore expect more compressed gradients overall. Where gradients persist, they are more likely to reflect cumulative advantage and non-medical buffering resources (e.g., living conditions, paid support) rather than differential access to core services.

At the same time, the three regulation-oriented countries may differ in the extent to which wealth continues to matter at the margin. In the United Kingdom, strong public regulation should

limit wealth-based differences in basic access, yet wealth may still operate through channels not fully equalised by formal entitlements, such as navigation of the system, health-enhancing living conditions, and the use of supplementary private options; hence, we anticipate a smaller gradient than in the United States, though not necessarily minimal. In Italy, universal coverage and regulation should similarly moderate access-based disparities; remaining gradients, particularly at older ages, may reflect cumulative socioeconomic advantage and buffering capacity beyond core medical care, implying relatively narrow gradients at younger ages with potential strengthening as later-life needs activate wealth's insurance/buffering functions. Spain is expected to resemble Italy in that access regulation and public funding limit direct translation of wealth into differential access to essential care; remaining gradients may reflect broader stratification (education, employment trajectories, living conditions), with age differences becoming more pronounced as chronic conditions and utilisation increase.

Overall, we expect the wealth–health gradient to be largest in supply– and performance–oriented private systems (the United States), intermediate in supply- and choice-oriented public systems (Australia, Germany, Luxembourg), and more compressed in regulation-oriented public systems (Italy, Spain, United Kingdom). Across contexts, age-group variation should be most pronounced at ages when healthcare needs and utilisation rise, and when institutions afford greater scope for wealth-based stratification in access, quality, continuity, or financial protection.

## **5. Data and Methods**

### *5.1 Data and Sample*

The Luxembourg Wealth Study (LWS) is the first cross-national database providing harmonized, population-representative household- and personal-level data on assets, debts, and other socioeconomic characteristics (Sierminska et al., 2006). As of December 2025, LWS includes 26 countries with multiple survey waves spanning 1987–2024. For this study, we draw on all LWS datasets that include personal-level health information alongside socioeconomic characteristics,

allowing us to examine wealth–health associations at the individual level across adulthood. This selection yields seven countries—Australia, Germany, Italy, Luxembourg, Spain, the United Kingdom, and the United States—covering the period 2002–2022. For all countries except Australia, multiple survey waves are available.

LWS is particularly well-suited to the aims of this study for two reasons. First, it provides population-representative information on the adult population, rather than being limited to older respondents. Second, because LWS is designed to advance research on wealth, it includes detailed measures of assets, debts, and income.

The analytic sample includes respondents aged 25–80 at the time of the interview who are reported as either the household head or the partner of the household head. The restriction is intended to capture individuals with greater control over household assets and is standard in wealth research using household-based surveys. Supplementary analyses selecting one random person per household indicate that the results are not driven by this selection. After listwise deletion of observations with missing information on key variables, the final sample comprises 450,233 observations from 30 survey waves (Table 1).

Following recent work questioning the use of net worth as a measure of wealth (Dräger et al., 2023), we consider gross non-financial and financial assets separately. Non-financial assets capture the gross value of real estate, business equity, consumer goods, and other valuables, while financial assets include deposits, cash holdings, investments, stocks, and shares. In descriptive analyses, we also consider the value of the primary residence and disposable net worth.

All wealth measures are deflated using consumer price indices and converted to 2017 PPP-adjusted US dollars. To address skewness, values are trimmed at the 1st and 99th percentiles. We then rank within each country–year distribution and compute five wealth quintiles. Results are robust to alternative trimming thresholds.

Health is measured using self-rated general health on a 5-point Likert scale, with higher values indicating better health. A measure of long-term disability is available for all countries except Spain,

but due to cross-national inconsistencies, it is used only in supplementary analyses. All models adjust for sex, highest educational attainment, employment status, marital status, household size, total household income, and housing tenure.

## *5.2 Analytical strategy*

We adopt two complementary approaches to estimate the wealth–health gradient across age groups and compare it across countries, capturing both the overall degree of inequality and the shape of the gradient across the wealth distribution. In both approaches, wealth is proxied by either financial or non-financial assets; health is measured as self-rated general health; and age is grouped into five categories (25–35; 36–45; 46–55; 56–65; 66–80), reflecting distinct stages of adulthood while ensuring sufficient sample size within each group. All analyses apply the population survey weights provided by LWS.

The first approach uses the concentration index (CI), a rank-dependent summary measure that captures how unequally health is distributed across the wealth distribution. Intuitively, the CI relates individuals' health to their relative position in the wealth ranking (from least to most wealthy). It is positive when better health is concentrated among wealthier individuals (“pro-rich” inequality) and negative when better health is concentrated among less wealthy individuals. Because self-rated health is bounded, we use the Wagstaff-normalized CI for bounded variables (Wagstaff, 2011), which ensures consistent interpretation and comparability across contexts by explicitly accounting for the outcome's limits. Given its standardized nature, we use the CI for preliminary descriptive comparisons.

The second approach estimates predicted wealth–health gradient profiles using OLS regression models with robust standard errors. Rather than summarizing inequality in a single scalar, this strategy yields an interpretable profile of average health differences across the wealth distribution within each age group and thus reveals whether the gradient is monotonic and how its strength varies with age. Specifically, we estimate country-specific models that include indicators for wealth quintile

position, age-group categories, and their interaction, allowing the wealth–health association to vary across age groups. When pooling multiple waves, we include year fixed effects to absorb systematic differences across survey waves. We then a) compute marginal predicted health for each wealth-by-age combination; b) derive the average predicted differences in health between the first and the fifth wealth quintile; and c) test age-group pairwise contrasts.

For the OLS-based wealth–health profiles, we estimate three model specifications with a cumulative set of covariates. Adjustment is implemented by including confounders in the OLS regressions and deriving marginal predictions conditional on the covariates included. Model 1 adjusts for sex, highest educational attainment, employment status, marital status, and household size, capturing the baseline wealth–health gradient net of sociodemographic composition. Model 2 additionally includes total household income to estimate the wealth–health gradient net of income. Model 3 further includes a binary indicator for homeownership. While Models 2 and 3 account for confounding by other income- and wealth-related characteristics, Model 1 can be interpreted as the baseline gradient after sociodemographic adjustment.

To align the presentation with the comparative expectations outlined in Section 4, we report results following the healthcare system typology: in order from the left to the right we present the United States (private, supply- and performance-oriented); Australia, Germany, and Luxembourg (supply- and choice-oriented public systems); and Italy, Spain, and the United Kingdom (regulation-oriented public systems).

## **6. Results**

### *6.1 Wealth and health across age groups*

Table A1 in the Appendix reports descriptive statistics by country, including mean self-rated health and median levels of wealth components across age groups.

Self-rated health declines with age in all countries, although both levels and the pace of decline vary. The United States shows comparatively modest age declines. Among supply- and choice-oriented public systems (Australia, Germany, Luxembourg), Luxembourg maintains comparatively high levels of self-rated health across age groups, whereas Germany exhibits lower levels at older ages. Among regulation-oriented public systems (Italy, Spain, the United Kingdom), self-rated health declines more clearly with age, with steeper reductions observed in Italy and Spain.

Median wealth generally rises from early adulthood into late midlife and then stabilises or declines at older ages, with substantial cross-national differences in both levels and portfolio composition. In the United States, financial assets are relatively salient at older ages. Among supply- and choice-oriented systems, wealth levels and composition differ markedly, with particularly high wealth in Luxembourg extending into older ages and more limited accumulation in Germany. In regulation-oriented systems, wealth portfolios are more concentrated in housing, with non-financial wealth typically peaking around midlife.

Overall, the age profiles of health and wealth provide a descriptive backdrop for the subsequent analyses: as health declines with age, wealth accumulation into midlife coincides with greater reliance on private resources, whereas wealth decumulation at older ages coincides with increased salience of health shocks and care needs.

## *6.2 Concentration indices across age groups*

Figure 1 displays Wagstaff-normalized concentration indices (CI) for self-rated health, computed separately by country and age group using non-financial wealth (top panel) and financial wealth (bottom panel). Within each country, bars represent age-specific CIs with 95% confidence intervals, while horizontal lines indicate country-specific mean CIs averaged across age groups.

Two general findings emerge. First, better health is disproportionately concentrated among individuals higher in the wealth ranking (positive values) across all countries and age groups. The magnitude of inequality varies substantially across contexts, but it is very similar whether individuals

are ranked by non-financial or financial assets. Averaged across age groups, inequality is high in the United States (mean CI  $\approx 0.17$  in both panels). Among supply- and choice-oriented public systems, inequality is intermediate in Australia ( $\approx 0.14$ ) and generally smaller in Luxembourg ( $\approx 0.10$ ) and Germany ( $\approx 0.08$ ). Among regulation-oriented public systems, Italy shows moderate values ( $\approx 0.10$ ) and Spain comparatively low ones ( $\approx 0.08$ ), while the United Kingdom stands out with the largest inequality overall ( $\approx 0.18$  in both panels).

Second, within countries, the CI typically increases from early adulthood to late midlife, often peaking around ages 46–55 or 56–65, and then declines at ages 66–80. This pattern indicates that wealth-related health inequality is generally strongest in late working ages and weaker at older ages. One exception to this pattern is represented by Italy, for which we do not register any variation over age in the CI, at least for what concerns non-financial wealth.

The cross-national ordering of inequality broadly aligns with the institutional expectations outlined in Section 4. The United States lies at the high end of the distribution, consistent with expectations for a private system with substantial cost-sharing and scope for stratification in access and quality. Supply- and choice-oriented public systems (Australia, Germany, Luxembourg) generally exhibit intermediate levels of inequality, albeit with notable heterogeneity across countries. Regulation-oriented public systems (Italy, Spain, the United Kingdom) tend to display more compressed gradients, with the United Kingdom as a clear outlier within this group.

### *6.3 Wealth–health gradient profiles across age groups*

Figures 2 and 3 display country-specific predicted self-rated health across wealth quintiles (representing the wealth–health gradient) within each age group. Figure 2 ranks individuals by non-financial wealth quintiles, while Figure 3 ranks them by financial wealth quintiles. In both figures, predictions are reported for three model specifications (Models 1, 2, and 3). Within each age group, the vertical gap between the 1<sup>st</sup> and the 5<sup>th</sup> wealth quintile summarises the magnitude of the wealth–health gradient.

Model 1 profiles indicate pro-rich gradients in virtually all countries and age groups, with a pronounced age-graded pattern. Gradients are generally smallest at ages 25–35 and become larger at later ages, most often peaking at ages 56–65, before attenuating at ages 66–80 in several contexts. This pattern is particularly evident in the United States, where the gap in health between the first and the fifth quintile at ages 56–65 is approximately 0.63 for both non-financial and financial wealth and then declines to about 0.53 at ages 66–80. Among supply- and choice-oriented public systems, Australia shows a pronounced late-midlife gradient, especially when ranking by non-financial wealth (about 0.87 at ages 56–65, declining to about 0.59 at ages 66–80). Germany exhibits comparatively smaller gaps across adulthood (typically around 0.11–0.31 for non-financial wealth and 0.19–0.34 for financial wealth). Luxembourg displays a marked late-midlife peak for non-financial wealth (about 0.56 at ages 56–65) and a more age-specific pattern for financial wealth, with gradients close to zero at ages 25–35 and 66–80 but larger in midlife (about 0.40 at ages 56–65). Among regulation-oriented public systems, Italy and Spain show gradients that are larger at older ages, particularly for financial wealth, while the United Kingdom displays among the steepest gradients overall, with late-midlife slopes around 0.75–0.78 and a clear attenuation at ages 66–80 (about 0.50–0.52).

Moving from Model 1 to Model 2, the adjustment for total household income typically attenuates gradients, indicating that part of the wealth–health association reflects income differences. The reduction in the magnitude of the gradient is particularly pronounced in contexts with large gradients, such as the United States (peak gaps shrink by roughly 0.15–0.17) and Italy for financial wealth (from about 0.46 to 0.32 at ages 66–80). Moving from Model 2 to Model 3 yields smaller additional changes overall, with the main exception of the United Kingdom, where adjusting for homeownership noticeably reduces gradients based on non-financial wealth.

Table A2 quantifies these patterns by computing the predicted differences in self-rated health between the 5<sup>th</sup> and 1<sup>st</sup> wealth quintiles within each age group. In Model 1, slopes are generally positive and statistically significant, although they tend to be smaller and sometimes imprecisely estimated at ages 25–35, particularly for Luxembourg when ranking by financial wealth. Table A3

reports age-group pairwise contrasts and confirms that, in countries with a pronounced late-midlife peak, gradients increase significantly from ages 25–35 to 56–65 and then decline at ages 66–80. This rise-and-fall pattern is particularly consistent in Australia and the United Kingdom across both wealth components, and it is also observed in the United States, where the decline from 56–65 to 66–80 is modest but statistically detectable. By contrast, Italy and Spain show little evidence of attenuation at older ages, with differences between ages 56–65 and 66–80 generally small and not statistically distinguishable from zero, consistent with the more sustained gradients visible in the profiles.

## **7. Discussion and Conclusions**

### *7.1 Summary of findings*

This study examined whether the wealth–health gradient varies across age groups and institutional contexts, moving beyond comparative evidence largely confined to older populations. Using harmonised, population-representative data from the Luxembourg Wealth Study, we mapped wealth-related inequality in self-rated health across five age groups (25–80) in seven high-income countries.

Across seven high-income countries, wealth-related inequality in self-rated health is consistently pro-rich: concentration indices are positive in every country and age group and are highly similar when ranking individuals by non-financial versus financial wealth. Cross-national differences are substantial and broadly align with the healthcare system expectations outlined in the background. Inequality is highest in the United States, intermediate in supply- and choice-oriented public systems (with heterogeneity across countries), and generally more compressed in regulation-oriented public systems—although the United Kingdom stands out as an outlier within this group.

Wealth-related health inequality also varies systematically by age. In most contexts, both concentration indices and model-based profiles indicate smaller gradients in early adulthood and larger gradients in late midlife, followed by attenuation at ages 66–80. This rise-and-fall pattern is particularly clear and statistically supported in the United States, Australia, and the United Kingdom.

By contrast, Italy and Spain show weaker evidence of late-life attenuation, with gradients that remain more sustained into older ages, particularly when individuals are ranked by financial wealth.

Finally, adjustment for income attenuates wealth–health gradients across countries, but still confirms the relevance of wealth, beyond income, whereas adding homeownership yields smaller additional changes. Wealth-related health inequality remains statistically significant in most countries in the age groups where inequality is strongest.

## *7.2 Discussion*

By mapping wealth-related health inequality across five age groups in seven high-income countries, this study shows that the wealth–health gradient is pervasive and systematically patterned by both age and institutional context across adulthood. Extending prior comparative research, the findings demonstrate that not only the overall magnitude of the wealth–health gradient but also its age profile differs across countries. Cross-national differences broadly align with healthcare system characteristics that structure how private resources translate into access, quality, continuity, and financial protection (Maskileyson, 2014; Reibling et al., 2019; Wendt, 2009). At the same time, the gradient is not age-invariant: relatively contained in younger ages, it is generally largest in late-midlife but remains more sustained into later life in some contexts, whereas in others it declines in older ages.

These age-graded patterns are consistent with the idea that later working ages represent a period during which chronic conditions and healthcare utilisation increase, making the purchasing and navigation functions of wealth more consequential for securing timely care, continuity, and preferred treatment pathways. At the same time, declining health may “spend” wealth through out-of-pocket costs, reduced labour market attachment, early retirement, and the need to draw down assets, reinforcing disadvantage (Boen & Yang, 2016; Michaud & van Soest, 2008; Van Minh et al., 2013). The attenuation observed at older ages in several countries is also consistent with the expectation that wealth–health gradients need not increase monotonically across age groups.

Selective survival may compress observed differences, and institutional thresholds may expand entitlements or reduce financial exposure later in life. Interestingly, the gradient remains high also in older ages in those countries where life expectation is generally high and thus survival less selective. Similar late-life attenuation has been documented for other dimensions of socioeconomic status, such as education (e.g., Mishra et al., 2004). Importantly, the cross-national heterogeneity observed here suggests that such attenuation is not universal, pointing to institutional and compositional conditions under which wealth continues to structure health disparities into older ages.

Several limitations indicate directions for future research. Most importantly, the analysis relies on repeated cross-sectional data and does not follow individuals longitudinally. Age-group differences may therefore partly reflect cohort variation and selective survival. A fully longitudinal design that simultaneously tracks wealth and health trajectories and institutional exposure across the life course would be ideal, but remains difficult to implement across a broad set of countries. In this sense, the repeated cross-sectional strategy remains informative by documenting age-graded patterns in wealth-related health inequality that were previously unavailable. Relatedly, the analysis begins at age 25 and does not address earlier life stages; extending the framework to childhood and adolescence would be a valuable next step, particularly given the role of wealth in shaping living conditions and developmental environments (Miller et al., 2021). Finally, institutional inference is constrained by country coverage. Countries were included based on the availability of comparable measures of both wealth and self-rated health rather than to ensure full representation of healthcare system types. As a result, the analysis covers only three of the five healthcare system types identified by Reibling et al. (2019) and excludes performance- and primary-care-oriented public systems as well as low-supply and low-performance mixed systems.

In conclusion, this study shows that wealth-related health inequality exhibits a distinctive, context-specific age profile across high-income countries. By documenting how the wealth–health gradient varies across adulthood and institutional contexts, the analysis highlights that both the level and the age pattern of inequality differ systematically across healthcare systems. These findings

provide a foundation for future research that links institutional arrangements more directly to the mechanisms by which wealth is converted into health advantage and health shocks translate into wealth depletion, ideally using longitudinal designs and broader country coverage.

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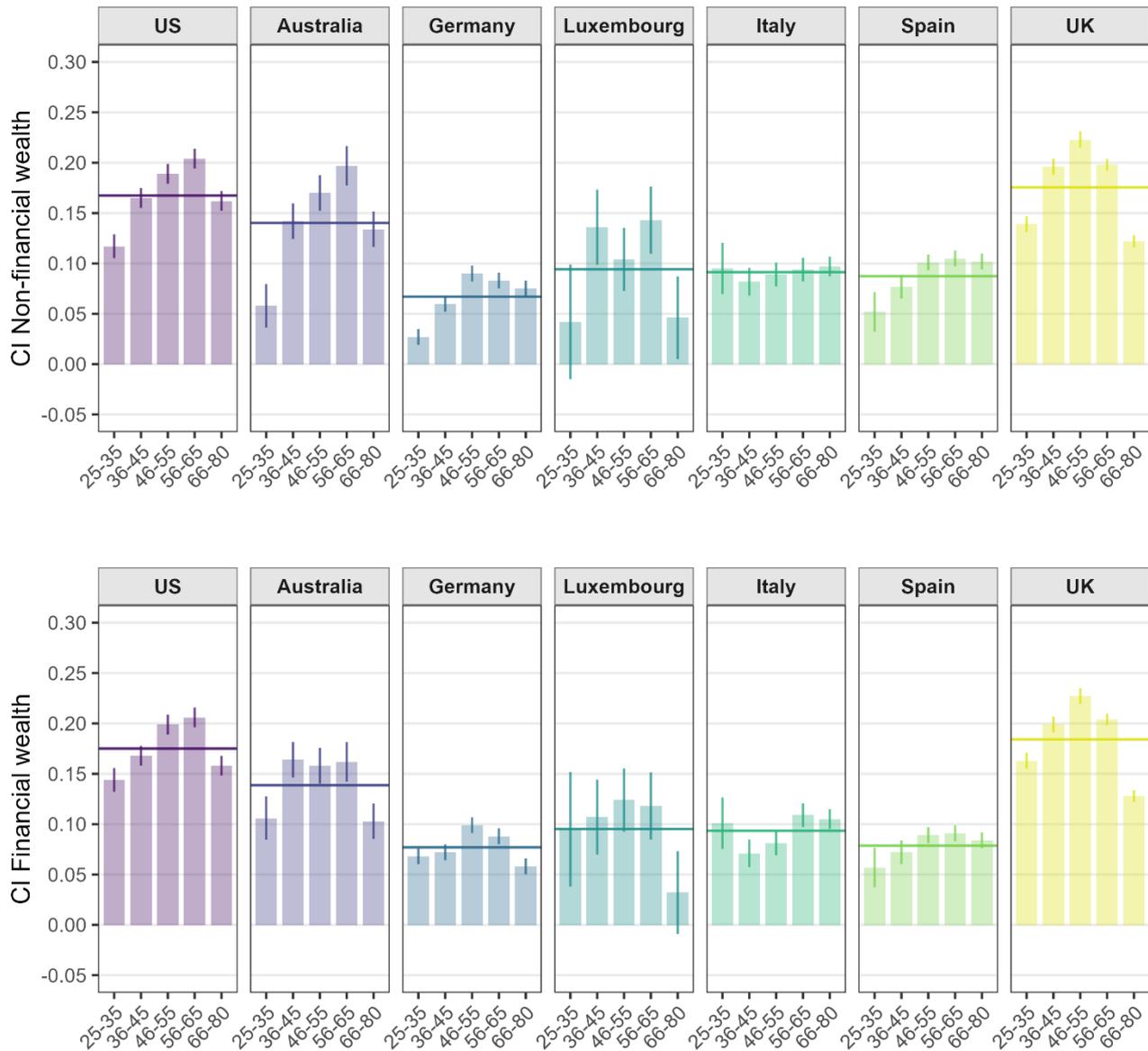
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**Table 1. Country–year combinations and sample sizes included in the analysis (LWS).**

Country	Survey years (Waves)	Initial sample	Analytic sample (head/partner, age 25–80)	Valid observations (complete cases)
United States	2001, 2004, 2007, 2010, 2013, 2016, 2019, 2022	104,722	64,914	64,020
Australia	2020	35,938	22,048	21,622
Germany	2002, 2007, 2012, 2017	145,263	88,950	83,433
Luxembourg	2018, 2021	9,649	5,845	5,845
Italy	2006, 2008, 2010 2002, 2005, 2008,	59,294	36,217	36,211
Spain	2014, 2017, 2021, 2022	110,110	66,183	64,967
United Kingdom	2007, 2011, 2013, 2017, 2019	289,133	198,497	174,405
Total	30	759,109	482,654	450,233

*Note:* Sample selection reflects restrictions to ages 25–80 and head/partner status; valid observations reflect complete cases on all analysis variables.

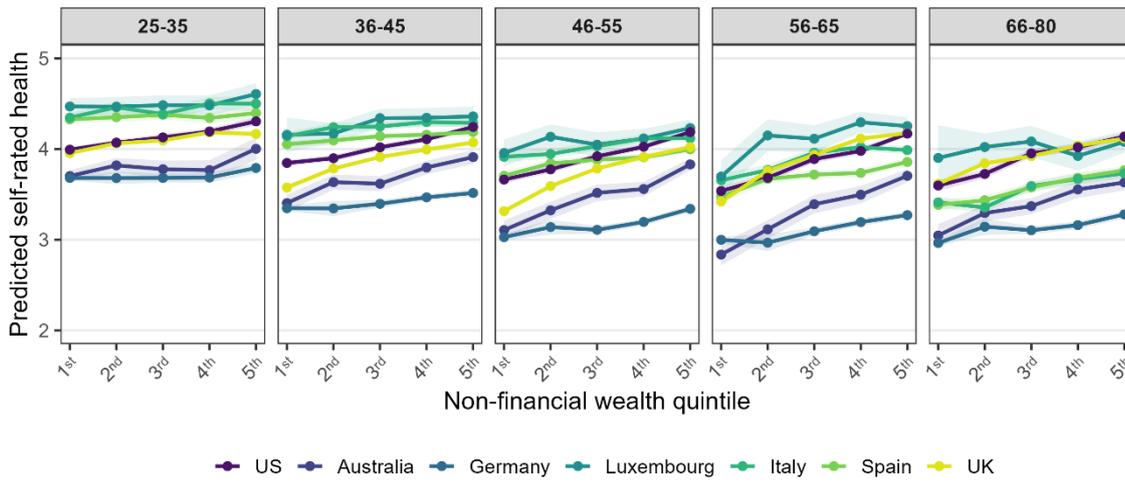
**Figure 1. Wagstaff-normalized concentration indices (CI) of self-rated health by age group, ranked by non-financial wealth (top) and financial wealth (bottom), 2002–2022 (LWS).**



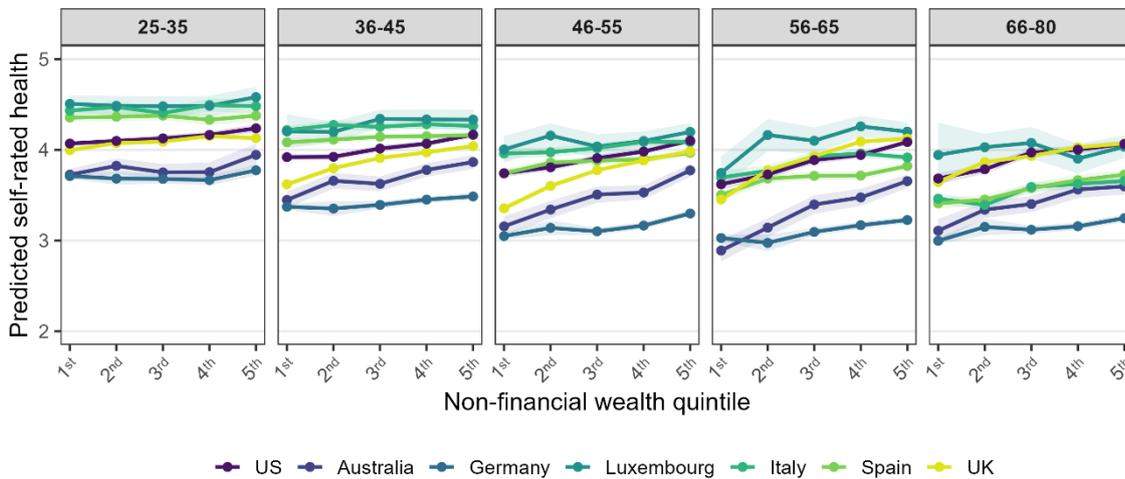
*Note:* Positive values indicate pro-rich inequality; bars show 95% confidence intervals; horizontal lines indicate country averages across age groups.

**Figure 2. Predicted self-rated health by non-financial wealth quintiles and age groups, by country (LWS 2002–2022).**

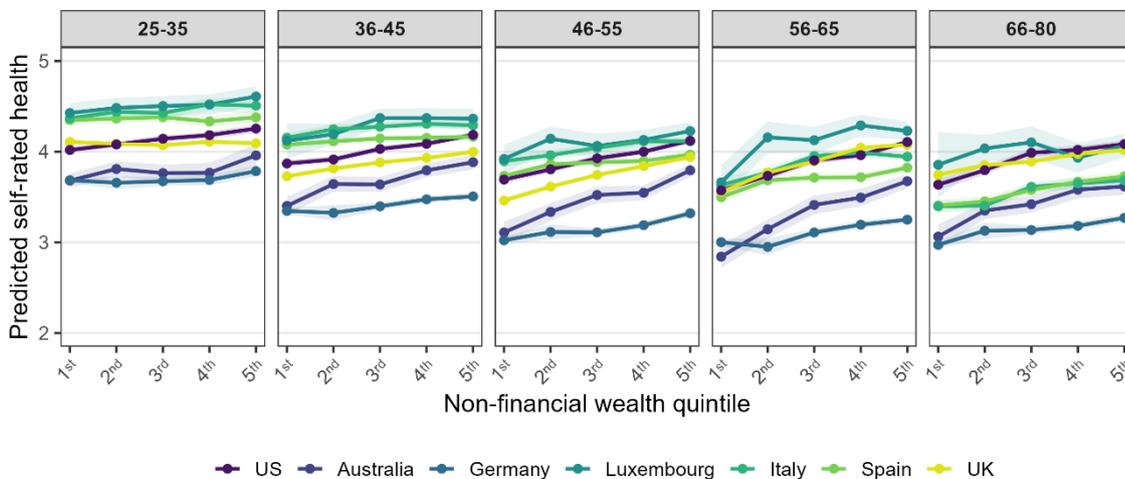
M1



M2



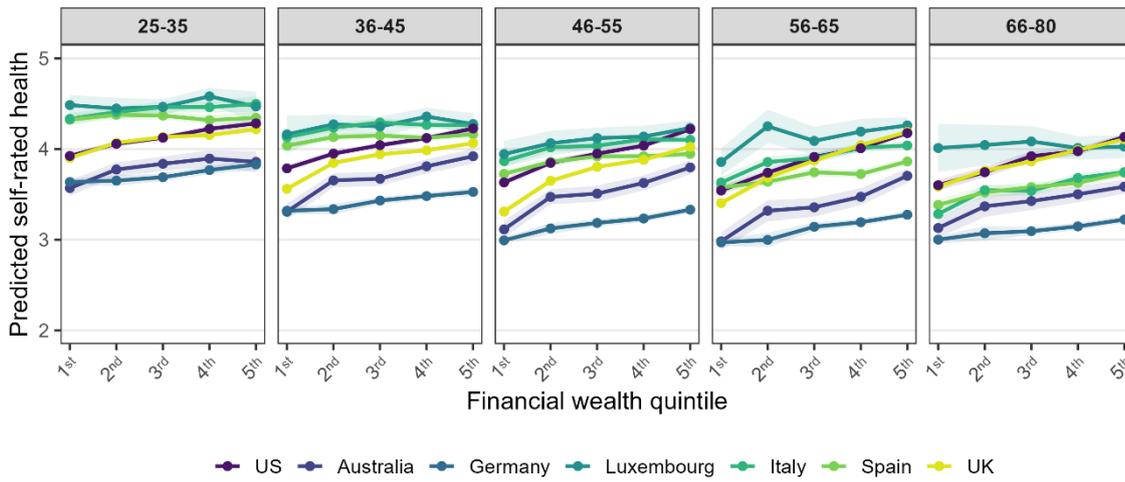
M3



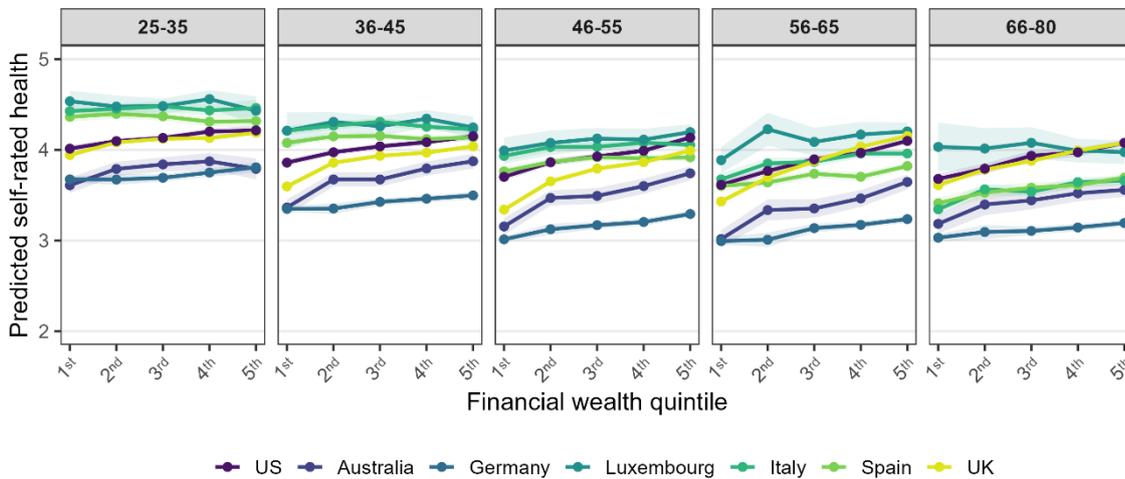
*Note:* Wealth quintiles are defined within each country–year distribution. Predicted values are marginal predictions from country-specific OLS models that include wealth quintile indicators, age-group indicators, and their interaction; models include year fixed effects when multiple waves are pooled. Predictions are averaged over the covariate distribution (at observed values). Model 1 (M1) adjusts for sex, highest educational attainment, employment status, marital status, and household size. Model 2 (M2) additionally adjusts for total household income. Model 3 (M3) further adjusts for housing tenure (homeownership indicator). Local slopes (Q5–Q1 differences within age groups) and age-group pairwise contrasts in slopes are reported in Appendix Tables A2 and A3.

**Figure 3. Predicted self-rated health by financial wealth quintiles and age groups, by country (LWS 2002–2022).**

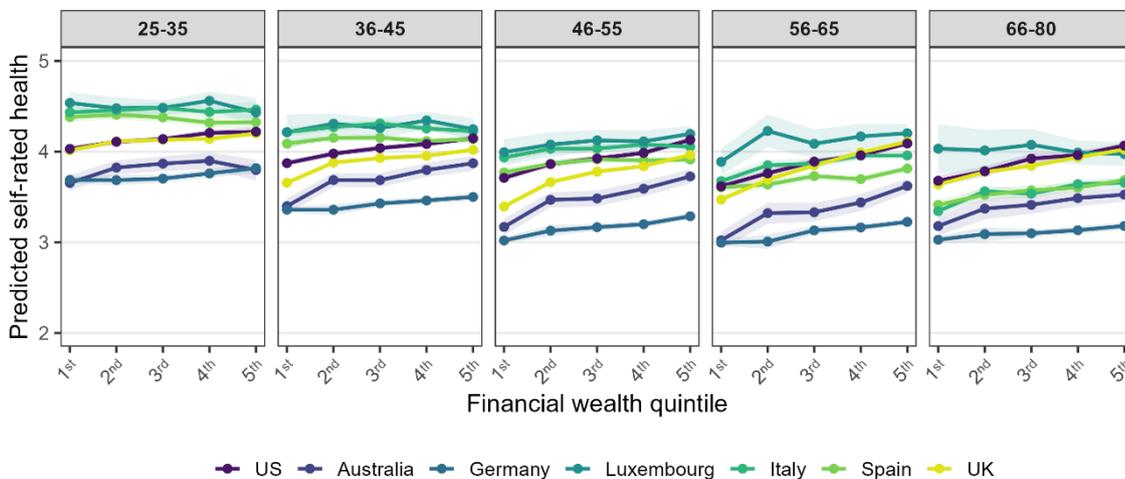
M1



M2



M3



*Note:* Wealth quintiles are defined within each country–year distribution. Predicted values are marginal predictions from country-specific OLS models that include wealth quintile indicators, age-group indicators, and their interaction; models include year fixed effects when multiple waves are pooled. Predictions are averaged over the covariate distribution (at observed values). Model 1 (M1) adjusts for sex, highest educational attainment, employment status, marital status, and household size. Model 2 (M2) additionally adjusts for total household income. Model 3 (M3) further adjusts for housing tenure (homeownership indicator). Local slopes (Q5–Q1 differences within age groups) and age-group pairwise contrasts in slopes are reported in Appendix Tables A2 and A3.

**The Wealth–Health Gradient Across Adulthood:  
A Cross-National Comparative Analysis**

**Appendix A**

**Table A1. Descriptive statistics of self-rated health and wealth components by age group and country (LWS).**

	Obs.	Health Mean (SD)	Non-financial wealth Median (IQR)	Main residence Median (IQR)	Homeownership (proportion)	Financial wealth Median (IQR)	Disposable net worth Median (IQR)
<b>Australia</b>							
25–35	3887	3.9 (1.0)	197.9 (20.2–428.9)	0.0 (0.0–318.6)	0.4	9.8 (1.8–39.8)	82.7 (19.7–238.3)
36–45	4379	3.8 (1.0)	404.4 (58.2–700.0)	275.7 (0.0–459.5)	0.6	11.3 (2.1–56.7)	216.9 (51.5–474.8)
46–55	4434	3.6 (1.0)	511.9 (262.2–863.9)	349.2 (150.1–536.1)	0.8	18.3 (3.2–76.6)	390.9 (155.0–722.5)
56–65	4338	3.3 (1.1)	496.3 (275.1–865.7)	337.0 (183.8–520.8)	0.8	26.3 (4.0–104.2)	478.0 (241.8–868.3)
66–80	4584	3.2 (1.1)	414.2 (237.1–692.7)	306.4 (177.7–490.2)	0.8	30.0 (4.9–122.5)	470.4 (261.0–842.1)
Total	21622	3.6 (1.1)	401.9 (100.5–704.6)	281.8 (0.0–465.7)	0.7	16.5 (3.0–73.9)	305.1 (78.5–624.4)
<b>Germany</b>							
25–35	14541	3.8 (0.8)	0.0 (0.0–154.4)	0.0 (0.0–92.6)	0.2	3.9 (0.0–22.3)	9.9 (0.0–83.9)
36–45	20690	3.5 (0.9)	112.6 (0.0–347.3)	0.0 (0.0–301.0)	0.5	7.7 (0.0–34.2)	64.4 (0.0–249.2)
46–55	18926	3.2 (0.9)	163.8 (0.0–385.9)	118.9 (0.0–312.8)	0.5	11.0 (0.0–44.2)	123.9 (3.1–353.2)
56–65	14750	3.1 (0.9)	157.7 (0.0–379.1)	131.4 (0.0–312.8)	0.6	14.2 (0.0–57.9)	161.2 (10.0–394.2)
66–80	14526	2.9 (0.9)	127.6 (0.0–335.3)	105.1 (0.0–285.3)	0.6	14.4 (0.0–54.1)	148.8 (11.8–379.0)
Total	83433	3.3 (0.9)	105.0 (0.0–334.7)	39.4 (0.0–284.8)	0.5	10.1 (0.0–42.7)	86.4 (2.5–313.8)
<b>Italy</b>							
25–35	2990	4.5 (0.6)	108.4 (22.6–331.2)	0.0 (0.0–265.6)	0.5	7.0 (1.5–17.0)	101.4 (24.8–303.9)
36–45	7176	4.3 (0.6)	251.8 (47.2–445.5)	181.7 (0.0–346.2)	0.6	8.6 (2.3–26.7)	239.2 (53.8–448.6)
46–55	8391	4.1 (0.7)	304.1 (117.3–509.2)	225.8 (0.0–376.3)	0.7	11.7 (3.0–40.2)	310.4 (122.6–538.5)
56–65	8194	3.9 (0.8)	336.4 (168.7–582.9)	257.5 (111.8–419.4)	0.8	15.0 (4.2–50.1)	362.3 (175.9–635.2)
66–80	9460	3.4 (0.9)	260.4 (102.3–478.1)	214.5 (71.5–376.3)	0.8	10.5 (2.3–36.3)	282.9 (111.9–520.2)
Total	36211	4.0 (0.8)	271.2 (65.2–474.2)	209.7 (0.0–357.6)	0.7	10.1 (2.6–34.1)	272.6 (77.7–497.1)
<b>Luxembourg</b>							
25–35	911	4.6 (0.6)	438.4 (14.5–753.5)	336.5 (0.0–678.7)	0.5	20.6 (3.6–64.7)	232.9 (43.9–630.3)
36–45	1478	4.3 (0.7)	622.0 (30.6–1037.4)	530.2 (0.0–862.9)	0.6	22.3 (4.7–90.2)	407.1 (56.6–854.5)
46–55	1681	4.1 (0.8)	731.0 (185.6–1218.7)	611.8 (0.0–969.5)	0.7	31.0 (5.3–135.7)	690.8 (178.4–1238.8)
56–65	1164	4.0 (0.8)	881.3 (458.8–1531.8)	698.0 (224.3–1019.6)	0.8	49.4 (6.8–235.6)	968.0 (470.8–1865.9)
66–80	611	3.9 (0.8)	948.3 (524.6–1636.5)	775.6 (479.2–1019.6)	0.9	97.0 (21.4–251.5)	1098.4 (639.3–2039.2)
Total	5845	4.2 (0.8)	690.3 (145.7–1192.5)	581.7 (0.0–921.0)	0.7	33.9 (5.9–132.6)	625.3 (134.4–1234.7)

**Table A1. (continued).**

	Obs.	Health Mean (SD)	Non-financial wealth Median (IQR)	Main residence Median (IQR)	Homeownership %	Financial wealth Median (IQR)	Disposable net worth Median (IQR)
<b>Spain</b>							
25–35	4735	4.4 (0.6)	176.5 (15.5–312.1)	128.2 (0.0–247.7)	0.6	5.2 (1.1–19.7)	89.6 (11.9–218.0)
36–45	11353	4.2 (0.7)	235.1 (105.6–396.8)	173.9 (25.3–281.4)	0.8	8.4 (1.7–32.8)	171.9 (49.8–347.6)
46–55	14885	3.9 (0.8)	258.9 (122.7–474.5)	176.5 (76.1–309.1)	0.8	10.3 (1.9–40.7)	239.4 (92.7–469.1)
56–65	15694	3.7 (0.8)	294.6 (143.8–557.3)	194.5 (93.0–342.5)	0.9	14.5 (2.5–63.6)	311.7 (140.9–599.8)
66–80	18300	3.4 (0.9)	248.4 (117.4–464.3)	175.9 (84.4–309.1)	0.9	14.1 (2.5–60.0)	279.1 (132.0–537.0)
Total	64967	3.9 (0.8)	243.6 (107.2–437.4)	172.8 (61.7–299.7)	0.8	9.9 (1.8–40.1)	216.0 (76.5–434.8)
<b>UK</b>							
25–35	29106	4.3 (0.8)	232.5 (33.7–440.0)	152.7 (0.0–284.5)	0.6	6.0 (1.4–22.7)	110.0 (30.3–276.7)
36–45	30464	4.0 (0.9)	318.6 (94.1–602.2)	214.5 (0.0–371.4)	0.7	10.1 (1.7–49.6)	237.0 (70.3–531.9)
46–55	33222	3.8 (1.0)	350.5 (147.4–655.9)	237.1 (0.0–395.1)	0.7	19.6 (2.3–84.9)	340.6 (114.7–711.7)
56–65	38201	3.7 (1.0)	367.6 (192.0–655.8)	254.2 (122.1–422.0)	0.8	40.2 (5.8–142.4)	435.2 (203.5–838.9)
66–80	43412	3.5 (1.0)	319.3 (144.9–556.9)	237.1 (79.0–390.4)	0.8	30.0 (6.2–109.0)	380.0 (165.6–710.9)
Total	174405	3.9 (1.0)	311.7 (93.7–574.0)	214.5 (0.0–366.4)	0.7	15.1 (2.4–70.5)	276.0 (73.1–620.9)
<b>United States</b>							
25–35	10251	4.1 (0.7)	90.1 (11.2–249.9)	31.6 (0.0–193.6)	0.5	4.6 (0.9–18.0)	23.8 (1.5–95.5)
36–45	13340	4.1 (0.7)	199.4 (31.6–412.9)	152.3 (0.0–314.8)	0.7	7.1 (1.2–35.8)	80.3 (11.6–259.0)
46–55	15577	4.0 (0.8)	245.2 (87.6–498.7)	180.1 (43.9–357.5)	0.8	10.5 (1.6–63.3)	143.8 (29.8–414.1)
56–65	14086	3.9 (0.9)	259.5 (102.1–538.4)	189.2 (67.1–376.5)	0.8	15.1 (1.9–115.0)	217.3 (58.7–603.6)
66–80	10766	3.7 (0.9)	221.9 (95.5–449.6)	168.4 (67.4–329.8)	0.8	25.7 (2.5–168.5)	241.9 (80.2–614.9)
Total	64020	4.0 (0.8)	201.3 (38.7–416.9)	153.2 (0.0–311.5)	0.7	9.3 (1.5–56.8)	111.4 (16.3–357.1)

*Note:* Wealth values are in 2017 PPP-adjusted US dollars (thousands), trimmed at the 1st/99th percentiles.

**Table A2. Predicted difference in self-rated health between Q5 and Q1 of the wealth distribution within each age group, by country (OLS marginal predictions; LWS).**

	Non-financial wealth						Financial wealth					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value
<b>Australia</b>												
25–35	0.30	<0.001	0.22	0.002	0.28	<0.001	0.29	<0.001	0.18	0.013	0.14	0.050
36–45	0.51	<0.001	0.42	<0.001	0.48	<0.001	0.61	<0.001	0.51	<0.001	0.47	<0.001
46–55	0.72	<0.001	0.62	<0.001	0.68	<0.001	0.68	<0.001	0.59	<0.001	0.56	<0.001
56–65	0.87	<0.001	0.77	<0.001	0.83	<0.001	0.72	<0.001	0.63	<0.001	0.60	<0.001
66–80	0.59	<0.001	0.49	<0.001	0.55	<0.001	0.46	<0.001	0.38	<0.001	0.35	<0.001
<b>Germany</b>												
25–35	0.11	0.001	0.06	0.054	0.10	0.004	0.19	<0.001	0.13	<0.001	0.13	<0.001
36–45	0.17	<0.001	0.11	<0.001	0.16	<0.001	0.21	<0.001	0.15	<0.001	0.14	<0.001
46–55	0.31	<0.001	0.25	<0.001	0.30	<0.001	0.34	<0.001	0.28	<0.001	0.27	<0.001
56–65	0.27	<0.001	0.20	<0.001	0.25	<0.001	0.31	<0.001	0.24	<0.001	0.23	<0.001
66–80	0.31	<0.001	0.25	<0.001	0.30	<0.001	0.22	<0.001	0.16	<0.001	0.15	<0.001
<b>Italy</b>												
25–35	0.15	0.002	0.05	0.327	0.14	0.011	0.17	0.003	0.03	0.551	0.03	0.593
36–45	0.15	<0.001	0.05	0.162	0.14	<0.001	0.13	<0.001	0.02	0.669	0.01	0.748
46–55	0.20	<0.001	0.13	<0.001	0.22	<0.001	0.24	<0.001	0.12	0.001	0.12	0.001
56–65	0.33	<0.001	0.22	<0.001	0.31	<0.001	0.41	<0.001	0.28	<0.001	0.28	<0.001
66–80	0.32	<0.001	0.20	<0.001	0.28	<0.001	0.46	<0.001	0.32	<0.001	0.31	<0.001
<b>Luxembourg</b>												
25–35	0.14	0.065	0.07	0.316	0.18	0.026	–0.02	0.877	–0.10	0.301	–0.10	0.302
36–45	0.20	0.074	0.13	0.247	0.24	0.039	0.11	0.336	0.04	0.765	0.03	0.770
46–55	0.28	0.001	0.19	0.029	0.31	0.001	0.29	<0.001	0.20	0.017	0.20	0.019
56–65	0.56	<0.001	0.45	<0.001	0.57	<0.001	0.40	<0.001	0.32	<0.001	0.31	<0.001
66–80	0.18	0.345	0.09	0.632	0.21	0.277	0.01	0.920	–0.06	0.701	–0.06	0.694
<b>Spain</b>												
25–35	0.07	0.103	0.02	0.607	0.03	0.512	0.02	0.627	–0.05	0.291	–0.06	0.195
36–45	0.13	<0.001	0.08	0.008	0.09	0.011	0.13	<0.001	0.06	0.044	0.05	0.098
46–55	0.29	<0.001	0.23	<0.001	0.24	<0.001	0.22	<0.001	0.16	<0.001	0.14	<0.001
56–65	0.38	<0.001	0.32	<0.001	0.33	<0.001	0.29	<0.001	0.22	<0.001	0.21	<0.001
66–80	0.38	<0.001	0.32	<0.001	0.32	<0.001	0.35	<0.001	0.28	<0.001	0.27	<0.001

**Table A2. (continued).**

	Non-financial wealth						Financial wealth					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value	Slope	p-value
<b>UK</b>												
25–35	0.21	<0.001	0.13	<0.001	-0.02	0.487	0.31	<0.001	0.25	<0.001	0.19	<0.001
36–45	0.50	<0.001	0.42	<0.001	0.27	<0.001	0.50	<0.001	0.44	<0.001	0.36	<0.001
46–55	0.71	<0.001	0.63	<0.001	0.48	<0.001	0.71	<0.001	0.65	<0.001	0.57	<0.001
56–65	0.75	<0.001	0.67	<0.001	0.52	<0.001	0.78	<0.001	0.72	<0.001	0.64	<0.001
66–80	0.50	<0.001	0.42	<0.001	0.27	<0.001	0.52	<0.001	0.47	<0.001	0.39	<0.001
<b>United States</b>												
25–35	0.31	<0.001	0.17	<0.001	0.24	<0.001	0.36	<0.001	0.20	<0.001	0.19	<0.001
36–45	0.40	<0.001	0.25	<0.001	0.32	<0.001	0.44	<0.001	0.29	<0.001	0.28	<0.001
46–55	0.52	<0.001	0.36	<0.001	0.43	<0.001	0.59	<0.001	0.43	<0.001	0.42	<0.001
56–65	0.63	<0.001	0.47	<0.001	0.53	<0.001	0.63	<0.001	0.48	<0.001	0.47	<0.001
66–80	0.54	<0.001	0.38	<0.001	0.45	<0.001	0.53	<0.001	0.40	<0.001	0.39	<0.001

*Note:* Based on country-specific OLS regressions with year fixed effects (where multiple waves are pooled). Model 1 adjusts for sex, highest educational attainment, employment status, marital status, and household size. Model 2 additionally adjusts for total household income. Model 3 further adjusts for housing tenure (homeownership indicator). See Data and Methods for details.

**Table A3. Contrasts in Q5–Q1 differences (slopes) from OLS regressions of self-rated health on wealth quintiles by age group and country (LWS).**

	Non-financial wealth						Financial wealth					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value
<b>Australia</b>												
36–45 vs 25–35	0.21	0.024	0.20	0.027	0.20	0.024	0.32	0.001	0.33	<0.001	0.33	<0.001
46–55 vs 25–35	0.42	<0.001	0.40	<0.001	0.41	<0.001	0.39	<0.001	0.41	<0.001	0.41	<0.001
56–65 vs 25–35	0.57	<0.001	0.55	<0.001	0.55	<0.001	0.43	<0.001	0.45	<0.001	0.46	<0.001
66–80 vs 25–35	0.29	0.005	0.27	0.009	0.28	0.008	0.17	0.083	0.19	0.044	0.20	0.036
46–55 vs 36–45	0.22	0.012	0.20	0.021	0.20	0.020	0.07	0.386	0.08	0.365	0.08	0.320
56–65 vs 36–45	0.36	<0.001	0.35	<0.001	0.35	<0.001	0.11	0.195	0.12	0.166	0.13	0.139
66–80 vs 36–45	0.08	0.404	0.07	0.465	0.07	0.462	-0.15	0.073	-0.13	0.122	-0.13	0.143
56–65 vs 46–55	0.14	0.125	0.15	0.114	0.15	0.115	0.04	0.659	0.04	0.619	0.04	0.616
66–80 vs 46–55	-0.14	0.157	-0.13	0.194	-0.13	0.187	-0.23	0.009	-0.21	0.016	-0.21	0.016
66–80 vs 56–65	-0.28	0.006	-0.28	0.007	-0.28	0.006	-0.27	0.003	-0.25	0.004	-0.25	0.004
<b>Germany</b>												
36–45 vs 25–35	0.06	0.152	0.05	0.205	0.06	0.129	0.02	0.711	0.02	0.706	0.01	0.785
46–55 vs 25–35	0.20	<0.001	0.19	<0.001	0.20	<0.001	0.15	<0.001	0.15	<0.001	0.14	0.001
56–65 vs 25–35	0.16	<0.001	0.13	0.001	0.15	<0.001	0.11	0.007	0.11	0.010	0.10	0.018
66–80 vs 25–35	0.20	<0.001	0.19	<0.001	0.20	<0.001	0.03	0.490	0.03	0.480	0.02	0.581
46–55 vs 36–45	0.14	<0.001	0.14	<0.001	0.14	<0.001	0.13	<0.001	0.13	<0.001	0.13	0.001
56–65 vs 36–45	0.10	0.004	0.08	0.021	0.09	0.016	0.10	0.009	0.09	0.012	0.09	0.017
66–80 vs 36–45	0.15	<0.001	0.13	<0.001	0.14	<0.001	0.01	0.717	0.01	0.707	0.01	0.750
56–65 vs 46–55	-0.04	0.279	-0.05	0.155	-0.05	0.170	-0.03	0.363	-0.04	0.304	-0.04	0.302
66–80 vs 46–55	0.00	0.932	-0.00	0.987	-0.00	0.998	-0.12	0.001	-0.12	0.002	-0.11	0.002
66–80 vs 56–65	0.04	0.255	0.05	0.171	0.05	0.183	-0.08	0.025	-0.08	0.035	-0.08	0.041

**Table A3. (continued).**

	<b>Non-financial wealth</b>						<b>Financial wealth</b>					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value
<b>Italy</b>												
36-45 vs 25-35	-0.01	0.921	-0.00	0.965	-0.00	0.976	-0.03	0.607	-0.02	0.779	-0.02	0.775
46-55 vs 25-35	0.05	0.384	0.08	0.200	0.08	0.185	0.07	0.286	0.09	0.184	0.09	0.184
56-65 vs 25-35	0.18	0.005	0.17	0.008	0.17	0.007	0.24	<0.001	0.25	<0.001	0.25	<0.001
66-80 vs 25-35	0.17	0.007	0.15	0.018	0.15	0.020	0.30	<0.001	0.28	<0.001	0.28	<0.001
46-55 vs 36-45	0.06	0.230	0.08	0.093	0.08	0.085	0.10	0.042	0.11	0.034	0.11	0.033
56-65 vs 36-45	0.19	<0.001	0.17	0.001	0.18	0.001	0.28	<0.001	0.27	<0.001	0.27	<0.001
66-80 vs 36-45	0.17	0.001	0.15	0.003	0.15	0.003	0.33	<0.001	0.30	<0.001	0.30	<0.001
56-65 vs 46-55	0.13	0.018	0.09	0.084	0.09	0.085	0.17	0.001	0.16	0.002	0.16	0.002
66-80 vs 46-55	0.11	0.029	0.07	0.182	0.07	0.208	0.23	<0.001	0.19	<0.001	0.19	<0.001
66-80 vs 56-65	-0.01	0.806	-0.03	0.660	-0.03	0.615	0.05	0.317	0.03	0.564	0.03	0.559
<b>Luxembourg</b>												
36-45 vs 25-35	0.07	0.616	0.06	0.658	0.06	0.631	0.13	0.405	0.14	0.365	0.14	0.365
46-55 vs 25-35	0.14	0.220	0.12	0.284	0.13	0.259	0.30	0.018	0.31	0.016	0.31	0.017
56-65 vs 25-35	0.42	0.001	0.38	0.002	0.39	0.002	0.42	0.001	0.42	0.001	0.42	0.001
66-80 vs 25-35	0.04	0.839	0.02	0.932	0.03	0.881	0.03	0.864	0.05	0.782	0.05	0.792
46-55 vs 36-45	0.07	0.603	0.06	0.655	0.06	0.648	0.17	0.238	0.17	0.251	0.17	0.254
56-65 vs 36-45	0.35	0.019	0.32	0.033	0.32	0.033	0.29	0.052	0.28	0.056	0.28	0.057
66-80 vs 36-45	-0.02	0.913	-0.04	0.857	-0.03	0.887	-0.10	0.593	-0.09	0.627	-0.09	0.626
56-65 vs 46-55	0.28	0.035	0.26	0.049	0.26	0.050	0.11	0.337	0.11	0.337	0.11	0.336
66-80 vs 46-55	-0.10	0.639	-0.10	0.622	-0.10	0.646	-0.27	0.095	-0.26	0.117	-0.26	0.117
66-80 vs 56-65	-0.38	0.079	-0.36	0.089	-0.36	0.097	-0.39	0.020	-0.37	0.026	-0.37	0.026

**Table A3. (continued).**

	<b>Non-financial wealth</b>						<b>Financial wealth</b>					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value
<b>Spain</b>												
36-45 vs 25-35	0.06	0.211	0.06	0.267	0.06	0.269	0.10	0.041	0.11	0.039	0.11	0.039
46-55 vs 25-35	0.22	<0.001	0.21	<0.001	0.21	<0.001	0.20	<0.001	0.20	<0.001	0.20	<0.001
56-65 vs 25-35	0.31	<0.001	0.30	<0.001	0.30	<0.001	0.27	<0.001	0.27	<0.001	0.26	<0.001
66-80 vs 25-35	0.31	<0.001	0.29	<0.001	0.29	<0.001	0.33	<0.001	0.33	<0.001	0.33	<0.001
46-55 vs 36-45	0.16	<0.001	0.15	<0.001	0.15	<0.001	0.09	0.025	0.10	0.021	0.09	0.026
56-65 vs 36-45	0.25	<0.001	0.24	<0.001	0.24	<0.001	0.16	<0.001	0.16	<0.001	0.16	<0.001
66-80 vs 36-45	0.25	<0.001	0.24	<0.001	0.24	<0.001	0.23	<0.001	0.22	<0.001	0.22	<0.001
56-65 vs 46-55	0.09	0.074	0.09	0.065	0.09	0.068	0.07	0.133	0.06	0.160	0.07	0.147
66-80 vs 46-55	0.09	0.055	0.09	0.060	0.09	0.067	0.13	0.004	0.13	0.006	0.13	0.005
66-80 vs 56-65	0.00	0.969	-0.00	0.958	-0.00	0.945	0.07	0.187	0.06	0.214	0.06	0.205
<b>UK</b>												
36-45 vs 25-35	0.29	<0.001	0.29	<0.001	0.29	<0.001	0.19	<0.001	0.19	<0.001	0.18	<0.001
46-55 vs 25-35	0.49	<0.001	0.50	<0.001	0.50	<0.001	0.40	<0.001	0.41	<0.001	0.38	<0.001
56-65 vs 25-35	0.54	<0.001	0.54	<0.001	0.54	<0.001	0.47	<0.001	0.48	<0.001	0.45	<0.001
66-80 vs 25-35	0.29	<0.001	0.29	<0.001	0.29	<0.001	0.21	<0.001	0.22	<0.001	0.20	<0.001
46-55 vs 36-45	0.21	<0.001	0.21	<0.001	0.21	<0.001	0.21	<0.001	0.21	<0.001	0.21	<0.001
56-65 vs 36-45	0.26	<0.001	0.25	<0.001	0.25	<0.001	0.28	<0.001	0.28	<0.001	0.27	<0.001
66-80 vs 36-45	0.00	0.941	0.00	0.986	0.00	0.891	0.02	0.509	0.03	0.349	0.02	0.433
56-65 vs 46-55	0.05	0.115	0.04	0.172	0.04	0.142	0.07	0.008	0.07	0.009	0.07	0.011
66-80 vs 46-55	-0.21	<0.001	-0.21	<0.001	-0.21	<0.001	-0.19	<0.001	-0.18	<0.001	-0.18	<0.001
66-80 vs 56-65	-0.25	<0.001	-0.25	<0.001	-0.25	<0.001	-0.26	<0.001	-0.25	<0.001	-0.25	<0.001

**Table A3. (continued)**

	<b>Non-financial wealth</b>						<b>Financial wealth</b>					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value	Contrast	p-value
<b>United States</b>												
36–45 vs 25–35	0.09	0.012	0.08	0.020	0.08	0.018	0.08	0.036	0.09	0.024	0.09	0.027
46–55 vs 25–35	0.21	<0.001	0.19	<0.001	0.19	<0.001	0.23	<0.001	0.23	<0.001	0.23	<0.001
56–65 vs 25–35	0.32	<0.001	0.30	<0.001	0.30	<0.001	0.28	<0.001	0.28	<0.001	0.28	<0.001
66–80 vs 25–35	0.23	<0.001	0.21	<0.001	0.21	<0.001	0.17	<0.001	0.20	<0.001	0.20	<0.001
46–55 vs 36–45	0.13	<0.001	0.11	<0.001	0.11	<0.001	0.15	<0.001	0.14	<0.001	0.14	<0.001
56–65 vs 36–45	0.24	<0.001	0.22	<0.001	0.22	<0.001	0.19	<0.001	0.19	<0.001	0.20	<0.001
66–80 vs 36–45	0.14	<0.001	0.13	0.001	0.13	0.001	0.09	0.021	0.11	0.007	0.11	0.005
56–65 vs 46–55	0.11	0.003	0.11	0.004	0.11	0.004	0.05	0.181	0.05	0.136	0.05	0.122
66–80 vs 46–55	0.02	0.690	0.02	0.614	0.02	0.639	-0.06	0.163	-0.03	0.383	-0.03	0.433
66–80 vs 56–65	-0.09	0.038	-0.09	0.053	-0.09	0.052	-0.10	0.014	-0.09	0.036	-0.08	0.040

*Note:* Based on country-specific OLS regressions with year fixed effects (where multiple waves are pooled). Model 1 adjusts for sex, highest educational attainment, employment status, marital status, and household size. Model 2 additionally adjusts for total household income. Model 3 further adjusts for housing tenure (homeownership indicator). See Data and Methods for details.

# Appendix B: Replication Package

## The Wealth–Health Gradient Across Adulthood: A Cross-National Comparative Analysis

### Overview

To replicate the analyses, three steps must be followed: (1) data preparation and analysis in Stata via LISSY, (2) conversion of text-based output to CSV format using R, and (3) visualization using R. All analyses use harmonized microdata from the Luxembourg Wealth Study (LWS).

### Data Access

The Luxembourg Wealth Study (LWS) data are restricted and not publicly available. Access is granted only through LISSY, the secure remote-execution platform operated by LIS Team. To execute the analyses, register at <https://www.lisdatacenter.org/> and submit a data access request.

### Analysis Workflow

#### Stage 1: Data Preparation (Stata – via LISSY)

Execute the Stata scripts (dofile1.do through dofile8.do) within LISSY. Download the text-based output files to your local machine.

#### Stage 2: Data Transformation (R – Local)

Using script1.R, parse the Stata text output and convert it to CSV format.

#### Stage 3: Visualization (R – Local)

Using script2.R and script3.R, read the CSV files and generate publication-ready figures (PNG format).

## Script Guide – Execution Order

**1. Stata Script 1 (dofile1.do):** Sample size and selection criteria

Output: Table 1

**2. Stata Script 2 (dofile2.do):** Concentration indices (non-financial wealth)

Output: conindex\_han.txt (for Figure 1 top panel)

**3. Stata Script 3 (dofile3.do):** Concentration indices (financial wealth)

Output: conindex\_haf.txt (for Figure 1 bottom panel)

**4. Stata Script 4 (dofile4.do):** Regression models (non-financial wealth)

Output: whg\_tables\_han.txt (for Figure 2)

**5. Stata Script 5 (dofile5.do):** Regression models (financial wealth)

Output: whg\_tables\_haf.txt (for Figure 3)

**6. Stata Script 6 (dofile6.do):** Descriptive statistics (PPP-adjusted)

Output: Table A1

**7. Stata Script 7 (dofile7.do):** Slope comparisons (non-financial wealth)

Output: Tables A2-A3 (supplement)

**8. Stata Script 8 (dofile8.do):** Slope comparisons (financial wealth)

Output: Tables A2-A3 (supplement)

**9. R Script 1 (script1.R):** Parse text output and create CSV files

Input: conindex\_han.txt, conindex\_haf.txt, whg\_tables\_han.txt, whg\_tables\_haf.txt

Output: conindex\_han.csv, conindex\_haf.csv, whg\_tables\_parsed\_han.csv, whg\_tables\_parsed\_haf.csv

**10. R Script 2 (script2.R):** Create Figure 1

Input: conindex\_han.csv, conindex\_haf.csv

Output: CI\_han.png, CI\_haf.png

**11. R Script 3 (script3.R):** Create Figures 2 and 3

Input: whg\_tables\_parsed\_han.csv, whg\_tables\_parsed\_haf.csv

Output: han\_m1.png, han\_m2.png, han\_m3.png (Figure 2); haf\_m1.png, haf\_m2.png, haf\_m3.png (Figure 3)

# STATA SCRIPTS

## Stata Script 1: Sample Selection and Size Calculation (dofile1.do)

**Purpose:** Constructs the analytical sample and reports size statistics for Table 1. Applies age and relation restrictions, creates age groups, trims wealth variables at 1st/99th percentiles, computes quintiles, and reports sample sizes at each step.

```
set more off
capture program drop whg_sample
program define whg_sample, rclass
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
use `$a'.p, clear
keep if inum == 1
quietly merge m:1 hid inum using `$a'.h, ///
keepusing(dnw haf han hpopwgt nhmmem hitotal own) keep(3) nogen
count
local N_pre_a = r(N)
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
count
local N_sel_a = r(N)
gen health_rev = 6 - health_c
gen str6 dset = "`a'"
gen long N_pre = `N_pre_a'
gen long N_sel = `N_sel_a'
keep health_rev dnw haf han hitotal hpopwgt age dset sex educ emp nhmmem own N_pre N_sel
if (`first') {
save `pool', replace
local first = 0
}
else {
append using `pool'
save `pool', replace
}
}
use `pool', clear
preserve
keep dset N_pre N_sel
duplicates drop dset, force
egen long N_pre_pool = total(N_pre)
egen long N_sel_pool = total(N_sel)
keep in 1
return scalar N_pre = N_pre_pool[1]
return scalar N_sel = N_sel_pool[1]
restore
gen byte agegrp = .
replace agegrp = 1 if inrange(age, 25, 35)
replace agegrp = 2 if inrange(age, 36, 45)
replace agegrp = 3 if inrange(age, 46, 55)
replace agegrp = 4 if inrange(age, 56, 65)
replace agegrp = 5 if inrange(age, 66, 80)
quietly levelsof dset, local(DS)
foreach y of local DS {
quietly summarize han if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
replace han = `p1' if dset=="`y'" & han < `p1'
replace han = `p99' if dset=="`y'" & han > `p99'
quietly summarize hitotal if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
replace hitotal = `p1' if dset=="`y'" & hitotal < `p1'
replace hitotal = `p99' if dset=="`y'" & hitotal > `p99'
}
gquantiles han_pct = han [pw=hpopwgt], xtiles nq(100) by(dset)
gquantiles hitotal_pct = hitotal [pw=hpopwgt], xtiles nq(100) by(dset)
gquantiles han_quintile = han_pct [pw=hpopwgt], xtiles nq(5) by(dset agegrp)
gquantiles hitotal_quintile = hitotal_pct [pw=hpopwgt], xtiles nq(5) by(dset agegrp)
egen byte nmiss_reg = rowmiss(health_rev han_quintile agegrp hitotal_quintile sex educ emp nhmmem hpopwgt own)
count if nmiss_reg==0
```

```

return scalar N_reg = r(N)
end
local au "au20"
local de "de02 de07 de12 de17"
local lu "lu18 lu21"
local it "it06 it08 it10"
local es "es02 es05 es08 es14 es17 es21 es22"
local uk "uk07 uk11 uk13 uk15 uk17 uk19"
local us "us01 us04 us07 us10 us13 us16 us19 us22"
local countries "au de lu it es uk us"
local R : word count `countries'
matrix RES3 = J(`R', 3, .)
matrix colnames RES3 = N_pre N_sel N_reg
matrix rownames RES3 = `countries'
local i = 1
foreach cc of local countries {
local grp ``cc''
di as txt "---- Running counts for `cc' (`grp') ----"
capture noisily whg_sample `grp'
if (_rc==0) {
matrix RES3[`i',1] = r(N_pre)
matrix RES3[`i',2] = r(N_sel)
matrix RES3[`i',3] = r(N_reg)
}
else {
di as err "FAILED for `cc' (rc=" _rc ")"
}
local ++i
}
di as txt "====="
di as res "Sample size by country: pre-selection, post-selection, listwise"
di as txt "====="
matlist RES3, format(%12.0fc)

```

## Stata Script 2: Concentration Indices – Non-Financial Wealth (dofile2.do)

**Purpose:** Computes Wagstaff-normalized concentration indices for self-rated health ranked by non-financial wealth across age groups. Output feeds into Figure 1 (top panel).

```
capture program drop whg_country
program define whg_country
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hpopwgt nhmem hitotal own) ///
keep(3) nogen
quietly keep if inrange(age,25,80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str2 country = substr("`a'",1,2)
quietly capture drop dsid
quietly gen str6 dsid = "`a'"
quietly keep health_rev dnw haf han hpopwgt age country dsid ///
sex educ emp nhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age,25,35)
quietly replace agegrp = 2 if inrange(age,36,45)
quietly replace agegrp = 3 if inrange(age,46,55)
quietly replace agegrp = 4 if inrange(age,56,65)
quietly replace agegrp = 5 if inrange(age,66,80)
label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
label values agegrp agegrp
quietly levelsof country, local(CLIST)
foreach C of local CLIST {
di as txt "======"
di as txt " COUNTRY: `C'"
di as txt "======"
preserve
quietly keep if country == "`C'"
quietly levelsof dsid, local(DSLIST)
foreach y of local DSLIST {
quietly summarize han if dsid=="`y'" [aw=hpowgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace han = `p1' if dsid=="`y'" & han < `p1'
quietly replace han = `p99' if dsid=="`y'" & han > `p99'
quietly summarize hitotal if dsid=="`y'" [aw=hpowgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace hitotal = `p1' if dsid=="`y'" & hitotal < `p1'
quietly replace hitotal = `p99' if dsid=="`y'" & hitotal > `p99'
}
quietly gquantiles han_pct = han [pw=hpowgt], xtile nq(100) by(dsid)
quietly gquantiles hitotal_pct = hitotal [pw=hpowgt], xtile nq(100) by(dsid)
quietly gquantiles han_quintile = han_pct [pw=hpowgt], xtile nq(5) by(dsid)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpowgt], xtile nq(5) by(dsid)
quietly capture drop nmiss_reg
egen byte nmiss_reg = rowmiss(health_rev han_quintile agegrp hitotal_quintile ///
sex educ emp nhmem hpopwgt own)
quietly levelsof agegrp, local(AGLIST)
local nA : word count `AGLIST'
matrix AgeCI = J(`nA', 2, .)
matrix colnames AgeCI = rawCI rawSE
local rn ""
local row = 1
foreach ag of local AGLIST {
```

```

quietly conindex health_rev [aw=hpopwgt] if agegrp==`ag' & nmiss_reg==0, ///
rank(han Quintile) bounded limits(1 5) wagstaff
local rawCI = r(CI)
local rawSE = r(CIse)
matrix AgeCI[`row',1] = round(`rawCI', 0.001)
matrix AgeCI[`row',2] = round(`rawSE', 0.001)
local lbl : label (agegrp) `ag'
local rn `rn' `"'`lbl'""
local ++row
}
matrix rownames AgeCI = `rn'
esttab matrix(AgeCI), ///
title("Concentration indices by age group - `C'") ///
nomtitles nonumbers ///
cells("rawCI(fmt(3)) rawSE(fmt(3))")
restore
}
end
whg_country au20
whg_country de02 de07 de12 de17
whg_country lu18 lu21
whg_country it06 it08 it10
whg_country es02 es05 es08 es14 es17 es21 es22
whg_country uk07 uk11 uk13 uk15 uk17 uk19
whg_country us01 us04 us07 us10 us13 us16 us19 us22

```

### Stata Script 3: Concentration Indices – Financial Wealth (dofile3.do)

**Purpose:** Computes Wagstaff-normalized concentration indices for self-rated health ranked by financial wealth across age groups. Output feeds into Figure 1 (bottom panel).

```
capture program drop whg_country
program define whg_country
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hpopwgt nhmem hitotal own) ///
keep(3) nogen
quietly keep if inrange(age,25,80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str2 country = substr("`a'",1,2)
quietly capture drop dsid
quietly gen str6 dsid = "`a'"
quietly keep health_rev dnw haf han hpopwgt age country dsid ///
sex educ emp nhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age,25,35)
quietly replace agegrp = 2 if inrange(age,36,45)
quietly replace agegrp = 3 if inrange(age,46,55)
quietly replace agegrp = 4 if inrange(age,56,65)
quietly replace agegrp = 5 if inrange(age,66,80)
label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
label values agegrp agegrp
quietly levelsof country, local(CLIST)
foreach C of local CLIST {
di as txt "======"
di as txt " COUNTRY: `C'"
di as txt "======"
preserve
quietly keep if country == "`C'"
quietly levelsof dsid, local(DSLIST)
foreach y of local DSLIST {
quietly summarize haf if dsid=="`y'" [aw=hpowgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace haf = `p1' if dsid=="`y'" & haf < `p1'
quietly replace haf = `p99' if dsid=="`y'" & haf > `p99'
quietly summarize hitotal if dsid=="`y'" [aw=hpowgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace hitotal = `p1' if dsid=="`y'" & hitotal < `p1'
quietly replace hitotal = `p99' if dsid=="`y'" & hitotal > `p99'
}
quietly gquantiles haf_pct = haf [pw=hpowgt], xtile nq(100) by(dsid)
quietly gquantiles hitotal_pct = hitotal [pw=hpowgt], xtile nq(100) by(dsid)
quietly gquantiles haf_quintile = haf_pct [pw=hpowgt], xtile nq(5) by(dsid)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpowgt], xtile nq(5) by(dsid)
quietly capture drop nmiss_reg
egen byte nmiss_reg = rowmiss(health_rev haf_quintile agegrp hitotal_quintile ///
sex educ emp nhmem hpopwgt own)
quietly levelsof agegrp, local(AGLIST)
local nA : word count `AGLIST'
matrix AgeCI = J(`nA', 2, .)
matrix colnames AgeCI = rawCI rawSE
local rn ""
local row = 1
foreach ag of local AGLIST {
```

```

quietly conindex health_rev [aw=hpopwgt] if agegrp==`ag' & nmiss_reg==0, ///
rank(haf Quintile) bounded limits(1 5) wagstaff
local rawCI = r(CI)
local rawSE = r(CIse)
matrix AgeCI[`row',1] = round(`rawCI', 0.001)
matrix AgeCI[`row',2] = round(`rawSE', 0.001)
local lbl : label (agegrp) `ag'
local rn `rn' `"'`lbl'""
local ++row
}
matrix rownames AgeCI = `rn'
esttab matrix(AgeCI), ///
title("Concentration indices by age group (rank=haf) - `C'") ///
nomtitles nonumbers ///
cells("rawCI(fmt(3)) rawSE(fmt(3))")
restore
}
end
whg_country au20
whg_country de02 de07 de12 de17
whg_country lu18 lu21
whg_country it06 it08 it10
whg_country es02 es05 es08 es14 es17 es21 es22
whg_country uk07 uk11 uk13 uk15 uk17 uk19
whg_country us01 us04 us07 us10 us13 us16 us19 us22

```

## Stata Script 4: OLS Regression Models – Non-Financial Wealth (dofile4.do)

**Purpose:** Estimates OLS regression models with interactions between non-financial wealth quintiles and age groups. Produces marginal predictions for Figure 2 with three model specifications (M1, M2, M3).

```
capture program drop whg_country
program define whg_country
version 16
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hpopwgt nhmem hitotal own) keep(3) nogen
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str6 dset = "`a'"
quietly keep health_rev dnw haf han hpopwgt age dset sex educ emp nhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age, 25, 35)
quietly replace agegrp = 2 if inrange(age, 36, 45)
quietly replace agegrp = 3 if inrange(age, 46, 55)
quietly replace agegrp = 4 if inrange(age, 56, 65)
quietly replace agegrp = 5 if inrange(age, 66, 80)
quietly label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
quietly label values agegrp agegrp
quietly levelsof dset, local(AL)
foreach y of local AL {
quietly summarize han if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace han = `p1' if dset=="`y'" & han < `p1'
quietly replace han = `p99' if dset=="`y'" & han > `p99'
quietly summarize hitotal if dset=="`y'" [aw=hpopwgt], detail
local pl = r(p1)
local p99 = r(p99)
quietly replace hitotal = `pl' if dset=="`y'" & hitotal < `pl'
quietly replace hitotal = `p99' if dset=="`y'" & hitotal > `p99'
}
quietly gquantiles han_pct = han [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles hitotal_pct = hitotal [pw=hpopwgt], xtile nq(100) by(dset)
quietly label var han_pct "Percentile position of han (by year)"
quietly label var hitotal_pct "Percentile position of hitotal (by year)"
quietly gquantiles han_quintile = han_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly label var han_quintile "Wealth quintile (by year)"
quietly label var hitotal_quintile "Total wealth quintile (by year)"
quietly gen byte homeownership = .
quietly replace homeownership = 1 if inlist(own, 100, 110, 120)
quietly replace homeownership = 0 if inlist(own, 200, 210, 211, 212, 220)
quietly label define homeown 0 "No" 1 "Yes", replace
quietly label values homeownership homeown
quietly label var homeownership "Homeownership (Y/N)"
di as txt "======"
di as res "Country: " substr("`1'",1,2)
di as txt "======"
local N_dset : word count `AL'
if (`N_dset' > 1) {
encode dset, gen(year_fe)
}
capture drop miss_m3 sample_m3
egen byte miss_m3 = rowmiss(health_rev han_quintile agegrp hitotal_quintile ///
sex educ emp nhmem homeownership)
```

```

gen byte sample_m3 = (miss_m3==0)
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins han_quintile#agegrp, post
estimates store M1
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins han_quintile#agegrp, post
estimates store M2
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins han_quintile#agegrp, post
estimates store M3
esttab M1 M2 M3, ///
cells("b(fmt(3)) ci_l(fmt(3)) ci_u(fmt(3))") ///
label ///
mtitles("M1: base" "M2: + hitotal" "M3: + homeowner")
end

whg_country au20
whg_country de02 de07 de12 de17
whg_country lu18 lu21
whg_country it06 it08 it10
whg_country es02 es05 es08 es14 es17 es21 es22
whg_country uk07 uk11 uk13 uk15 uk17 uk19
whg_country us01 us04 us07 us10 us13 us16 us19 us22

```

## Stata Script 5: OLS Regression Models – Financial Wealth (dofile5.do)

**Purpose:** Estimates OLS regression models with interactions between financial wealth quintiles and age groups. Produces marginal predictions for Figure 3 with three model specifications (M1, M2, M3).

```
capture program drop whg_country
program define whg_country
version 16
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hpopwgt nhhmem hitotal own) keep(3) nogen
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str6 dset = "`a'"
quietly keep health_rev dnw haf han hpopwgt age dset sex educ emp nhhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age, 25, 35)
quietly replace agegrp = 2 if inrange(age, 36, 45)
quietly replace agegrp = 3 if inrange(age, 46, 55)
quietly replace agegrp = 4 if inrange(age, 56, 65)
quietly replace agegrp = 5 if inrange(age, 66, 80)
quietly label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
quietly label values agegrp agegrp
quietly levelsof dset, local(AL)
foreach y of local AL {
quietly summarize haf if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace haf = `p1' if dset=="`y'" & haf < `p1'
quietly replace haf = `p99' if dset=="`y'" & haf > `p99'
quietly summarize hitotal if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace hitotal = `p1' if dset=="`y'" & hitotal < `p1'
quietly replace hitotal = `p99' if dset=="`y'" & hitotal > `p99'
}
quietly gquantiles haf_pct = haf [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles hitotal_pct = hitotal [pw=hpopwgt], xtile nq(100) by(dset)
quietly label var haf_pct "Percentile position of haf (by year)"
quietly label var hitotal_pct "Percentile position of hitotal (by year)"
quietly gquantiles haf_quintile = haf_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly label var haf_quintile "Wealth quintile (by year)"
quietly label var hitotal_quintile "Total wealth quintile (by year)"
quietly gen byte homeownership = .
quietly replace homeownership = 1 if inlist(own, 100, 110, 120)
quietly replace homeownership = 0 if inlist(own, 200, 210, 211, 212, 220)
quietly label define homeown 0 "No" 1 "Yes", replace
quietly label values homeownership homeown
quietly label var homeownership "Homeownership (Y/N)"
di as txt "======"
di as res "Country: " substr("`1'",1,2)
di as txt "======"
local N_dset : word count `AL'
if (`N_dset' > 1) {
encode dset, gen(year_fe)
}
capture drop miss_m3 sample_m3
egen byte miss_m3 = rowmiss(health_rev haf_quintile agegrp hitotal_quintile ///
sex educ emp nhhmem homeownership)
```

```

gen byte sample_m3 = (miss_m3==0)
if (`N_dset' == 1) {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.year_fe i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins haf Quintile#agegrp, post
estimates store M1
if (`N_dset' == 1) {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.hitotal Quintile i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.year_fe i.hitotal Quintile i.sex i.educ i.emp nhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins haf Quintile#agegrp, post
estimates store M2
if (`N_dset' == 1) {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.hitotal Quintile i.sex i.educ i.emp nhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.haf Quintile##i.agegrp ///
i.year_fe i.hitotal Quintile i.sex i.educ i.emp nhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
quietly margins haf Quintile#agegrp, post
estimates store M3
esttab M1 M2 M3, ///
cells("b(fmt(3)) ci_l(fmt(3)) ci_u(fmt(3))") ///
label ///
mtitles("M1: base" "M2: + hitotal" "M3: + homeowner")
end

whg_country au20
whg_country de02 de07 de12 de17
whg_country lu18 lu21
whg_country it06 it08 it10
whg_country es02 es05 es08 es14 es17 es21 es22
whg_country uk07 uk11 uk13 uk15 uk17 uk19
whg_country us01 us04 us07 us10 us13 us16 us19 us22

```

## Stata Script 6: Descriptive Statistics (PPP-Adjusted) (dofile6.do)

**Purpose:** Computes descriptive statistics for health and wealth variables by country and age group, with PPP adjustment and trimming. Output for Table A1. Reports means/SDs for health and medians/IQR for wealth.

```
capture program drop whg_descriptives_ext
program define whg_descriptives_ext
version 16
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hanrp hpopwgt nhmmem own) keep(3) nogen
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str6 dset = "`a'"
capture confirm variable cname
local has_cname = (_rc==0)
capture confirm variable year
local has_year = (_rc==0)
if (`has_cname' & `has_year') {
quietly keep health_rev han hanrp haf dnw hpopwgt age dset sex educ emp nhmmem own cname year
}
else {
quietly gen str2 cname = substr(dset,1,2)
quietly gen int year = 2000 + real(substr(dset,3,2))
quietly keep health_rev han hanrp haf dnw hpopwgt age dset sex educ emp nhmmem own cname year
}
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen str2 country = substr(dset,1,2)
capture drop _merge
quietly merge m:1 cname year using "$myincl/ppp_2017.dta", keepusing(lisppp)
quietly keep if _merge==3 & !missing(lisppp)
quietly drop _merge
foreach v in han hanrp haf dnw {
quietly gen double `v'_ppp = `v' / lisppp
}
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age, 25, 35)
quietly replace agegrp = 2 if inrange(age, 36, 45)
quietly replace agegrp = 3 if inrange(age, 46, 55)
quietly replace agegrp = 4 if inrange(age, 56, 65)
quietly replace agegrp = 5 if inrange(age, 66, 80)
label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
label values agegrp agegrp
quietly gen byte homeownership = .
quietly replace homeownership = 1 if inlist(own, 100, 110, 120)
quietly replace homeownership = 0 if inlist(own, 200, 210, 211, 212, 220)
quietly levelsof dset, local(DSLIST)
foreach y of local DSLIST {
quietly summarize han_ppp if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace han_ppp = `p1' if dset=="`y'" & han_ppp < `p1'
quietly replace han_ppp = `p99' if dset=="`y'" & han_ppp > `p99'
quietly summarize hanrp_ppp if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace hanrp_ppp = `p1' if dset=="`y'" & hanrp_ppp < `p1'
quietly replace hanrp_ppp = `p99' if dset=="`y'" & hanrp_ppp > `p99'
quietly summarize haf_ppp if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
```

```

quietly replace haf_ppp = `p1' if dset=="`y'" & haf_ppp < `p1'
quietly replace haf_ppp = `p99' if dset=="`y'" & haf_ppp > `p99'
quietly summarize dnw_ppp if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace dnw_ppp = `p1' if dset=="`y'" & dnw_ppp < `p1'
quietly replace dnw_ppp = `p99' if dset=="`y'" & dnw_ppp > `p99'
}
capture drop miss_final sample_final
egen byte miss_final = rowmiss(health_rev han_ppp hanrp_ppp haf_ppp dnw_ppp hpopwgt agegrp ///
sex educ emp nhmem homeownership)
gen byte sample_final = (miss_final==0)
gen double han_lk = han_ppp/1000
gen double hanrp_lk = hanrp_ppp/1000
gen double haf_lk = haf_ppp/1000
gen double dnw_lk = dnw_ppp/1000
quietly levelsof country, local(CLIST)
foreach C of local CLIST {
di as txt "======"
di as res "Country: `C'"
di as txt "======"
matrix RES = J(6, 16, .)
matrix colnames RES = ///
N ///
health_mean health_sd ///
han_p50 han_p25 han_p75 ///
hanrp_p50 hanrp_p25 hanrp_p75 ///
homeowner_share ///
haf_p50 haf_p25 haf_p75 ///
dnw_p50 dnw_p25 dnw_p75
matrix rownames RES = "25-35" "36-45" "46-55" "56-65" "66-80" "Total"
forvalues g = 1/5 {
quietly count if country=="`C'" & agegrp=="`g'" & sample_final==1
matrix RES[`g',1] = r(N)
quietly summarize health_rev [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1
matrix RES[`g',2] = round(r(mean), .1)
matrix RES[`g',3] = round(r(sd), .1)
quietly _pctile han_lk [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1, p(25 50 75)
matrix RES[`g',4] = round(r(r2), .1)
matrix RES[`g',5] = round(r(r1), .1)
matrix RES[`g',6] = round(r(r3), .1)
quietly _pctile hanrp_lk [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1, p(25 50 75)
matrix RES[`g',7] = round(r(r2), .1)
matrix RES[`g',8] = round(r(r1), .1)
matrix RES[`g',9] = round(r(r3), .1)
quietly summarize homeownership [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1
matrix RES[`g',10] = round(r(mean), .1)
quietly _pctile haf_lk [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1, p(25 50 75)
matrix RES[`g',11] = round(r(r2), .1)
matrix RES[`g',12] = round(r(r1), .1)
matrix RES[`g',13] = round(r(r3), .1)
quietly _pctile dnw_lk [aw=hpopwgt] if country=="`C'" & agegrp=="`g'" & sample_final==1, p(25 50 75)
matrix RES[`g',14] = round(r(r2), .1)
matrix RES[`g',15] = round(r(r1), .1)
matrix RES[`g',16] = round(r(r3), .1)
}
local g = 6
quietly count if country=="`C'" & sample_final==1
matrix RES[`g',1] = r(N)
quietly summarize health_rev [aw=hpopwgt] if country=="`C'" & sample_final==1
matrix RES[`g',2] = round(r(mean), .1)
matrix RES[`g',3] = round(r(sd), .1)
quietly _pctile han_lk [aw=hpopwgt] if country=="`C'" & sample_final==1, p(25 50 75)
matrix RES[`g',4] = round(r(r2), .1)
matrix RES[`g',5] = round(r(r1), .1)
matrix RES[`g',6] = round(r(r3), .1)
quietly _pctile hanrp_lk [aw=hpopwgt] if country=="`C'" & sample_final==1, p(25 50 75)
matrix RES[`g',7] = round(r(r2), .1)
matrix RES[`g',8] = round(r(r1), .1)
matrix RES[`g',9] = round(r(r3), .1)
quietly summarize homeownership [aw=hpopwgt] if country=="`C'" & sample_final==1
matrix RES[`g',10] = round(r(mean), .1)
quietly _pctile haf_lk [aw=hpopwgt] if country=="`C'" & sample_final==1, p(25 50 75)
matrix RES[`g',11] = round(r(r2), .1)
matrix RES[`g',12] = round(r(r1), .1)

```

```

matrix RES[`g',13] = round(r(r3), .1)
quietly _pctile dnw_lk [aw=hpopwgt] if country=="`C'" & sample_final==1, p(25 50 75)
matrix RES[`g',14] = round(r(r2), .1)
matrix RES[`g',15] = round(r(r1), .1)
matrix RES[`g',16] = round(r(r3), .1)
esttab matrix(RES), ///
nontitles nonumbers compress ///
title("Final sample (PPP+trim): mean(SD) and median(p25,p75) (x1,000 PPP) - `C'") ///
cells("N(fmt(%9.0f)) health_mean(fmt(%9.2f)) health_sd(fmt(%9.2f)) han_p50(fmt(%12.2f)) han_p25(fmt(%12.2f))
han_p75(fmt(%12.2f)) hanrp_p50(fmt(%12.2f)) hanrp_p25(fmt(%12.2f)) hanrp_p75(fmt(%12.2f))
homeowner_share(fmt(%9.2f)) haf_p50(fmt(%12.2f)) haf_p25(fmt(%12.2f)) haf_p75(fmt(%12.2f)) dnw_p50(fmt(%12.2f))
dnw_p25(fmt(%12.2f)) dnw_p75(fmt(%12.2f))")
}
end
whg_descriptives_ext au20
whg_descriptives_ext de02 de07 de12 de17
whg_descriptives_ext lu18 lu21
whg_descriptives_ext it06 it08 it10
whg_descriptives_ext es02 es05 es08 es14 es17 es21 es22
whg_descriptives_ext uk07 uk11 uk13 uk15 uk17 uk19
whg_descriptives_ext us01 us04 us07 us10 us13 us16 us19 us22

```

## Stata Script 7: Slope Comparisons – Non-Financial Wealth (dofile7.do)

**Purpose:** Computes marginal effects and pairwise contrasts for non-financial wealth quintile 5 vs. quintile 1 across age groups. Assesses statistical significance of age-related differences. Output for Tables A2-A3.

```
capture program drop whg_slope
program define whg_slope
version 16
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf han hpopwgt nhhmem hitotal own) keep(3) nogen
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str6 dset = "`a'"
quietly keep health_rev dnw haf han hpopwgt age dset sex educ emp nhhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age, 25, 35)
quietly replace agegrp = 2 if inrange(age, 36, 45)
quietly replace agegrp = 3 if inrange(age, 46, 55)
quietly replace agegrp = 4 if inrange(age, 56, 65)
quietly replace agegrp = 5 if inrange(age, 66, 80)
quietly label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
quietly label values agegrp agegrp
quietly levelsof dset, local(AL)
foreach y of local AL {
quietly summarize han if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace han = `p1' if dset=="`y'" & han < `p1'
quietly replace han = `p99' if dset=="`y'" & han > `p99'
quietly summarize hitotal if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace hitotal = `p1' if dset=="`y'" & hitotal < `p1'
quietly replace hitotal = `p99' if dset=="`y'" & hitotal > `p99'
}
quietly gquantiles han_pct = han [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles hitotal_pct = hitotal [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles han_quintile = han_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gen byte homeownership = .
quietly replace homeownership = 1 if inlist(own, 100, 110, 120)
quietly replace homeownership = 0 if inlist(own, 200, 210, 211, 212, 220)
quietly label define homeown 0 "No" 1 "Yes", replace
quietly label values homeownership homeown
di as txt "======"
di as res "Country: " substr("`1'",1,2)
di as txt "======"
local N_dset : word count `AL'
if (`N_dset' > 1) {
encode dset, gen(year_fe)
}
capture drop miss_m3 sample_m3
egen byte miss_m3 = rowmiss(health_rev han_quintile agegrp hitotal_quintile ///
sex educ emp nhhmem homeownership)
gen byte sample_m3 = (miss_m3==0)
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
}
```

```

else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M1: dydx(5.han_quintile) -----"
margins agegrp, dydx(5.han_quintile)
margins agegrp, dydx(5.han_quintile) pwcompare(pv)
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M2: dydx(5.han_quintile) -----"
margins agegrp, dydx(5.han_quintile)
margins agegrp, dydx(5.han_quintile) pwcompare(pv)
if (`N_dset' == 1) {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.han_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M3: dydx(5.han_quintile) -----"
margins agegrp, dydx(5.han_quintile)
margins agegrp, dydx(5.han_quintile) pwcompare(pv)
end
whg_slope au20
whg_slope de02 de07 de12 de17
whg_slope lu18 lu21
whg_slope it06 it08 it10
whg_slope es02 es05 es08 es14 es17 es21 es22
whg_slope uk07 uk11 uk13 uk15 uk17 uk19
whg_slope us01 us04 us07 us10 us13 us16 us19 us22

```

## Stata Script 8: Slope Comparisons – Financial Wealth (dofile8.do)

**Purpose:** Computes marginal effects and pairwise contrasts for financial wealth quintile 5 vs. quintile 1 across age groups. Assesses statistical significance of age-related differences. Output for Tables A2-A3.

```
capture program drop whg_slope
program define whg_slope
version 16
syntax namelist(min=1)
tempfile pool
local first = 1
foreach a of local namelist {
quietly use `$a'p, clear
quietly keep if inum == 1
quietly merge m:1 hid inum using `$a'h, ///
keepusing(dnw haf hpopwgt nhhmem hitotal own) keep(3) nogen
quietly keep if inrange(age, 25, 80) & inlist(relation, 1000, 2000, 2100, 2200)
quietly gen health_rev = 6 - health_c
quietly gen str6 dset = "`a'"
quietly keep health_rev dnw haf hpopwgt age dset sex educ emp nhhmem hitotal own
if (`first') {
quietly save `pool', replace
local first = 0
}
else {
quietly append using `pool'
quietly save `pool', replace
}
}
quietly use `pool', clear
quietly gen byte agegrp = .
quietly replace agegrp = 1 if inrange(age, 25, 35)
quietly replace agegrp = 2 if inrange(age, 36, 45)
quietly replace agegrp = 3 if inrange(age, 46, 55)
quietly replace agegrp = 4 if inrange(age, 56, 65)
quietly replace agegrp = 5 if inrange(age, 66, 80)
quietly label define agegrp 1 "25-35" 2 "36-45" 3 "46-55" 4 "56-65" 5 "66-80", replace
quietly label values agegrp agegrp
quietly levelsof dset, local(AL)
foreach y of local AL {
quietly summarize haf if dset=="`y'" [aw=hpopwgt], detail
local p1 = r(p1)
local p99 = r(p99)
quietly replace haf = `p1' if dset=="`y'" & haf < `p1'
quietly replace haf = `p99' if dset=="`y'" & haf > `p99'
quietly summarize hitotal if dset=="`y'" [aw=hpopwgt], detail
local pl = r(pl)
local p99 = r(p99)
quietly replace hitotal = `pl' if dset=="`y'" & hitotal < `pl'
quietly replace hitotal = `p99' if dset=="`y'" & hitotal > `p99'
}
quietly gquantiles haf_pct = haf [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles hitotal_pct = hitotal [pw=hpopwgt], xtile nq(100) by(dset)
quietly gquantiles haf_quintile = haf_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gquantiles hitotal_quintile = hitotal_pct [pw=hpopwgt], xtile nq(5) by(dset)
quietly gen byte homeownership = .
quietly replace homeownership = 1 if inlist(own, 100, 110, 120)
quietly replace homeownership = 0 if inlist(own, 200, 210, 211, 212, 220)
quietly label define homeown 0 "No" 1 "Yes", replace
quietly label values homeownership homeown
di as txt "======"
di as res "Country: " substr("`1'",1,2)
di as txt "======"
local N_dset : word count `AL'
if (`N_dset' > 1) {
encode dset, gen(year_fe)
}
capture drop miss_m3 sample_m3
egen byte miss_m3 = rowmiss(health_rev haf_quintile agegrp hitotal_quintile ///
sex educ emp nhhmem homeownership)
gen byte sample_m3 = (miss_m3==0)
if (`N_dset' == 1) {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
}
```

```

else {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.year_fe i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M1: dydx(5.haf_quintile) -----"
margins agegrp, dydx(5.haf_quintile)
margins agegrp, dydx(5.haf_quintile) pwcompare(pv)
if (`N_dset' == 1) {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhhmem [pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M2: dydx(5.haf_quintile) -----"
margins agegrp, dydx(5.haf_quintile)
margins agegrp, dydx(5.haf_quintile) pwcompare(pv)
if (`N_dset' == 1) {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.hitotal_quintile i.sex i.educ i.emp nhhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
else {
quietly regress health_rev i.haf_quintile##i.agegrp ///
i.year_fe i.hitotal_quintile i.sex i.educ i.emp nhhmem i.homeownership ///
[pw=hpopwgt] if sample_m3==1, vce(robust)
}
di as txt "----- M3: dydx(5.haf_quintile) -----"
margins agegrp, dydx(5.haf_quintile)
margins agegrp, dydx(5.haf_quintile) pwcompare(pv)
end
whg_slope au20
whg_slope de02 de07 de12 de17
whg_slope lu18 lu21
whg_slope it06 it08 it10
whg_slope es02 es05 es08 es14 es17 es21 es22
whg_slope uk07 uk11 uk13 uk15 uk17 uk19
whg_slope us01 us04 us07 us10 us13 us16 us19 us22

```

# R SCRIPTS

## R Script 1: Parse Stata Output and Create CSV Files (script1.R)

**Purpose:** Reads text-based output files from Stata and parses them using regular expressions. Converts parsed data into CSV format for subsequent visualization scripts.

```
library(stringr)
library(dplyr)
library(tidyr)
library(readr)
library(purrr)

infile <- "whg_tables_haf.txt"
outfile <- "whg_tables_parsed_haf.csv"
txt <- readLines(infile, warn = FALSE)
country_by_line <- txt |>
str_match("Country:\\s*([A-Za-z]{2})") |>
(\\(m) ifelse(is.na(m[,2]), NA_character_, tolower(m[,2])))()
country_by_line <- tidyr::fill(
  tibble(country = country_by_line),
  country,
  .direction = "down"
)$country
pat <- "^\\s*([0-9]+)\\.\\.haf Quintile#([0-9]+)\\.\\.([^\s]+\s+)" %>%
paste0("([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+",
"([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+",
"([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s*$")
rows <- str_match(txt, pat)
df <- tibble(
  country = country_by_line,
  quintile = suppressWarnings(as.integer(rows[,2])),
  agegrp = suppressWarnings(as.integer(rows[,3])),
  b1 = suppressWarnings(as.double(rows[,4])),
  l1 = suppressWarnings(as.double(rows[,5])),
  u1 = suppressWarnings(as.double(rows[,6])),
  b2 = suppressWarnings(as.double(rows[,7])),
  l2 = suppressWarnings(as.double(rows[,8])),
  u2 = suppressWarnings(as.double(rows[,9])),
  b3 = suppressWarnings(as.double(rows[,10])),
  l3 = suppressWarnings(as.double(rows[,11])),
  u3 = suppressWarnings(as.double(rows[,12]))
) |>
filter(!is.na(quintile), !is.na(agegrp), !is.na(country))
out <- df %>%
pivot_longer(
  cols = matches("(b|l|u)[123]$"),
  names_to = c(".value", "model"),
  names_pattern = "^(blu)[123]$"
) %>%
mutate(model = as.integer(model)) %>%
rename(min95 = l, max95 = u) %>%
select(country, model, agegrp, quintile, b, min95, max95) %>%
arrange(country, model, agegrp, quintile)
write_csv(out, outfile)
outfile

infile <- "whg_tables_han.txt"
outfile <- "whg_tables_parsed_han.csv"
txt <- readLines(infile, warn = FALSE)
country_by_line <- txt |>
str_match("Country:\\s*([A-Za-z]{2})") |>
(\\(m) ifelse(is.na(m[,2]), NA_character_, tolower(m[,2])))()
country_by_line <- tidyr::fill(
  tibble(country = country_by_line),
  country,
  .direction = "down"
)$country
pat <- "^\\s*([0-9]+)\\.\\.han Quintile#([0-9]+)\\.\\.([^\s]+\s+)" %>%
paste0("([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+",
"([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+",
"([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s+([0-9]*\\.?.?[0-9]+)\\.\\.s*$")
rows <- str_match(txt, pat)
df <- tibble(
```

```

country = country_by_line,
quintile = suppressWarnings(as.integer(rows[,2])),
agegrp = suppressWarnings(as.integer(rows[,3])),
b1 = suppressWarnings(as.double(rows[,4])),
l1 = suppressWarnings(as.double(rows[,5])),
u1 = suppressWarnings(as.double(rows[,6])),
b2 = suppressWarnings(as.double(rows[,7])),
l2 = suppressWarnings(as.double(rows[,8])),
u2 = suppressWarnings(as.double(rows[,9])),
b3 = suppressWarnings(as.double(rows[,10])),
l3 = suppressWarnings(as.double(rows[,11])),
u3 = suppressWarnings(as.double(rows[,12]))
) |>
filter(!is.na(quintile), !is.na(agegrp), !is.na(country))
out <- df %>%
pivot_longer(
cols = matches("(b|l|u)[123]"),
names_to = c(".value", "model"),
names_pattern = "^(blu)[123]$"
) %>%
mutate(model = as.integer(model)) %>%
rename(min95 = l, max95 = u) %>%
select(country, model, agegrp, quintile, b, min95, max95) %>%
arrange(country, model, agegrp, quintile)
write_csv(out, outfile)
outfile
parse_conindex_listing <- function(path_in, path_out = NULL) {
x <- readLines(path_in, warn = FALSE)
country_rows <- tibble(i = seq_along(x), line = x) %>%
mutate(country = str_match(line, "\\s*COUNTRY:\\s*([A-Za-z]{2})\\s*$")[,2]) %>%
filter(!is.na(country))
if (nrow(country_rows) == 0) stop("No 'COUNTRY: xx' rows found.")
out <- map_dfr(seq_len(nrow(country_rows)), function(k) {
ctry <- tolower(country_rows$country[k])
start <- country_rows$i[k]
end <- if (k < nrow(country_rows)) country_rows$i[k+1] - 1 else length(x)
block <- x[start:end]
m <- str_match(
block,
"^\\s*(\\d{2}-\\d{2})\\s+([+-]?\\d*\\.?.\\d+)\\s+([+-]?\\d*\\.?.\\d+)\\s*$"
)
m <- m[!is.na(m[,1]), , drop = FALSE]
if (nrow(m) == 0) return(tibble(country = character(), agegrp = character(),
rawCI = numeric(), rawSE = numeric()))
tibble(
country = ctry,
agegrp = m[,2],
rawCI = as.numeric(m[,3]),
rawSE = as.numeric(m[,4])
)
) %>%
mutate(
agegrp = factor(agegrp, levels = c("25-35", "36-45", "46-55", "56-65", "66-80"))
) %>%
arrange(country, agegrp)
if (!is.null(path_out)) write_csv(out, path_out)
out
}
df_ci <- parse_conindex_listing(
path_in = "conindex_han.txt",
path_out = "conindex_han.csv"
)
df_hf <- parse_conindex_listing(
path_in = "conindex_haf.txt",
path_out = "conindex_haf.csv"
)

```

## R Script 2: Create Figure 1 – Concentration Indices (script2.R)

**Purpose:** Reads CSV files and creates two publication-ready visualizations displaying Wagstaff-normalized concentration indices by age group for each country, organized by healthcare system typology.

```
library(tidyverse)
library(viridis)
country_levels <- c(
  "US",
  "Australia", "Germany", "Luxembourg",
  "Italy", "Spain", "UK"
)
make_ci_plot <- function(csv_path, outfile, ylab_text,
  y_lim = c(-0.05, 0.30),
  y_breaks = seq(-0.05, 0.30, 0.05)) {
  df <- read_csv(csv_path, show_col_types = FALSE) %>%
  mutate(
    agegrp = factor(agegrp, levels = c("25-35", "36-45", "46-55", "56-65", "66-80")),
    country = toupper(country),
    country = recode(country,
      "AU" = "Australia", "DE" = "Germany", "LU" = "Luxembourg", "IT" = "Italy",
      "ES" = "Spain", "UK" = "UK", "US" = "US"),
    country = factor(country, levels = country_levels),
    raw_low = rawCI - 1.96 * rawSE,
    raw_high = rawCI + 1.96 * rawSE
  )
  df_mean <- df %>%
  group_by(country) %>%
  summarise(mean_rawCI = mean(rawCI, na.rm = TRUE), .groups = "drop")
  p <- ggplot(df, aes(x = agegrp, group = country)) +
  geom_col(aes(y = rawCI, fill = country),
    alpha = 0.35, width = 0.8, show.legend = FALSE) +
  geom_linerange(aes(ymin = raw_low, ymax = raw_high, color = country),
    linewidth = 0.6, alpha = 0.8, show.legend = FALSE) +
  geom_hline(data = df_mean, aes(yintercept = mean_rawCI, color = country),
    linewidth = 0.7, alpha = 0.9, show.legend = FALSE, linetype = "solid") +
  scale_fill_viridis_d(option = "D", drop = FALSE, begin = 0.05, end = 0.95) +
  scale_color_viridis_d(option = "D", drop = FALSE, begin = 0.05, end = 0.95) +
  facet_wrap(~ country, nrow = 1) +
  scale_y_continuous(limits = y_lim, breaks = y_breaks) +
  labs(x = "", y = ylab_text) +
  theme_bw(base_size = 14) +
  theme(
    panel.grid.minor = element_blank(),
    panel.grid.major.x = element_blank(),
    panel.border = element_rect(linewidth = 0.6),
    strip.background = element_rect(fill = "grey90", color = "grey50"),
    strip.text = element_text(face = "bold"),
    axis.text.x = element_text(angle = 45, hjust = 1)
  )
  ggsave(outfile, p, width = 9, height = 4.2, bg = "white", dpi = 300)
  p
}
p_ci_han <- make_ci_plot("conindex_han.csv", "CI_han.png", "CI Non-financial wealth")
p_ci_haf <- make_ci_plot("conindex_haf.csv", "CI_haf.png", "CI Financial wealth")
```

## R Script 3: Create Figures 2 and 3 – OLS Predictions (script3.R)

**Purpose:** Reads CSV files and creates six polished visualizations. Figure 2 displays predicted self-rated health by wealth quintiles and age groups for non-financial wealth. Figure 3 displays the same for financial wealth.

```
library(tidyverse)
library(viridis)
prep_df <- function(path) {
  read_csv(path, show_col_types = FALSE) %>%
  mutate(
    agegrp = factor(as.integer(agegrp),
      levels = 1:5,
      labels = c("25-35", "36-45", "46-55", "56-65", "66-80")),
    quintile = as.integer(quintile),
    model = factor(as.integer(model), levels = 1:3, labels = c("M1", "M2", "M3")),
    country = toupper(country),
    country = recode(country,
      "AU" = "Australia", "DE" = "Germany", "LU" = "Luxembourg", "IT" = "Italy",
      "ES" = "Spain", "UK" = "UK", "US" = "US")
  )
}
country_levels <- c(
  "US",
  "Australia", "Germany", "Luxembourg",
  "Italy", "Spain", "UK"
)
make_plot <- function(d, mdl, xlab) {
  d2 <- d %>%
  mutate(country = factor(country, levels = country_levels)) %>%
  filter(model == mdl)
  d2 %>%
  ggplot(aes(x = quintile, y = b, color = country, group = country)) +
  geom_ribbon(aes(ymin = min95, ymax = max95, fill = country),
    alpha = 0.12, color = NA, show.legend = FALSE) +
  geom_line(linewidth = 1.0) +
  geom_point(size = 2.0) +
  facet_grid(. ~ agegrp) +
  scale_x_continuous(
    breaks = 1:5,
    labels = c("1st", "2nd", "3rd", "4th", "5th")
  ) +
  scale_y_continuous(limits = c(2, 5), breaks = 2:5) +
  scale_color_viridis_d(option = "D", drop = FALSE, begin = 0.05, end = 0.95) +
  scale_fill_viridis_d(option = "D", drop = FALSE, begin = 0.05, end = 0.95) +
  labs(
    title = mdl,
    x = xlab,
    y = "Predicted self-rated health",
    color = ""
  ) +
  theme_bw(base_size = 14) +
  theme(
    plot.title = element_text(face = "bold", hjust = 0, size = 12),
    plot.title.position = "plot",
    plot.margin = margin(t = 2, r = 5, b = 5, l = 5),
    panel.grid.minor = element_blank(),
    panel.grid.major.x = element_blank(),
    strip.text = element_text(face = "bold"),
    legend.position = "bottom",
    legend.box = "horizontal",
    axis.text.x = element_text(angle = 45, hjust = 1)
  ) +
  guides(color = guide_legend(nrow = 1, byrow = TRUE))
}
df_han <- prep_df("whg_tables_parsed_han.csv")
df_haf <- prep_df("whg_tables_parsed_haf.csv")
han_m1 <- make_plot(df_han, "M1", "Non-financial wealth quintile")
han_m2 <- make_plot(df_han, "M2", "Non-financial wealth quintile")
han_m3 <- make_plot(df_han, "M3", "Non-financial wealth quintile")
haf_m1 <- make_plot(df_haf, "M1", "Financial wealth quintile")
haf_m2 <- make_plot(df_haf, "M2", "Financial wealth quintile")
haf_m3 <- make_plot(df_haf, "M3", "Financial wealth quintile")
w_in <- 9
h_in <- 4.2
dpi_v <- 300
ggsave("han_m1.png", han_m1, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
```

```
ggsave("han_m2.png", han_m2, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
ggsave("han_m3.png", han_m3, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
ggsave("haf_m1.png", haf_m1, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
ggsave("haf_m2.png", haf_m2, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
ggsave("haf_m3.png", haf_m3, width = w_in, height = h_in, units = "in", dpi = dpi_v, bg = "white")
```