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Author: Vojtech Royce

Labor participation and longevity gaps share little common ordering

An exploratory study of 182 economies using published World Bank series for 2024

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Abstract

How similarly do female-minus-male labor-force-participation and life-expectancy gaps order economies? We examine four frozen World Bank series for 2024, retaining all 182 economies with complete female and male values from a frame of 217 nonaggregate economies. Female-minus-male participation gaps average -18.53 percentage points; life-expectancy gaps average +5.09 years. Their signed Pearson correlation is 0.186, but their Spearman rank correlation is 0.058. Only 51.9% of nontied economy pairs have concordant signed ordering. Region-centered Pearson correlation is -0.028, and excluding the World Bank's Middle East, North Africa, Afghanistan & Pakistan group changes the pooled correlation to -0.032. Relative-gap specifications retain weak rank association. These published estimates support little common ordering across these two dimensions in the included economies. They do not establish a causal tradeoff, independence, or a comprehensive equality ranking. Model dependence, unequal coverage, age composition and unresolved country-specific source status limit interpretation.

Why compare these two gaps?

International comparisons often place labor-market participation and health outcomes on the same dashboard. Their juxtaposition invites a question that should be answered before they are collapsed into a score: do they actually order economies similarly? This paper addresses that narrow empirical question using one common reference year. It expands the geographical scope of WEI's initial occupational description while retaining a clear boundary around what the available measurements can establish.

The two outcomes differ substantively. Labor-force participation describes engagement with the labor market. Period life expectancy summarizes mortality across ages. A negative female-minus-male participation gap and a positive life-expectancy gap can coexist without contradiction. Whether a particular difference is desirable, preventable, coercive, or fair requires further evidence and explicit values. Zero is a numerical reference in this analysis, not an asserted optimal health or employment outcome.

We therefore distinguish signed gaps, which preserve the direction of the difference, from absolute gaps, which measure distance from zero. Neither is called an overall equality rank.

The analysis asks about the association and ordering of published economy-level point estimates. It does not ask which sex contributes more, has greater ability, deserves more rights, or could maintain essential services after a hypothetical population shock.

Data, definitions and source vintage

The analysis uses the World Bank's female and male labor-force-participation indicators, SL.TLF.CACT.FE.ZS and SL.TLF.CACT.MA.ZS, and female and male life expectancy at birth, SP.DYN.LE00.FE.IN and SP.DYN.LE00.MA.IN. All observations carry the reference year 2024. Five complete API responses, including the country roster, were retrieved on September 8, 2026 UTC and retained with retrieval timestamps and SHA-256 checksums. We join by the published economy codes and exclude the roster's aggregate groups. The resulting frame contains countries and territories, so “economy” is used throughout. World Bank female participation, male participation, female life expectancy and male life expectancy.

Participation is the labor force divided by the population of the same sex aged 15 and over, multiplied by 100. The labor force includes employed people and unemployed people seeking work. Thus a female rate is neither women's share of all workers nor the proportion of women who hold paid jobs. Differences are percentage points, not percentages of the male rate. The broad age denominator includes older adults and does not standardize economies to a common age structure. World Bank participation metadata.

Unpaid domestic and care activities are work, but those activities alone do not establish labor-force participation. Someone can perform unpaid care alongside employment, and some unpaid family work falls within employment concepts. Treating everyone outside the labor force as inactive in a broader social sense would therefore misread the indicator. ILO forms of work.

Life expectancy at birth is a period life-table measure: the expected years lived under the age-specific mortality schedule for the reference period. It is not the average age of people currently alive, a forecast of any particular newborn's lifespan, or a measure of years lived in good health. A gap may reflect mortality differences at infancy, working ages or older ages; these four series cannot separate those contributions. World Bank life-expectancy metadata.

These are published estimates with mixed empirical and model inputs. ILO modeled series combine nationally reported information and imputation, and the ILO cautions against treating estimates for information-poor countries as directly observed data. WDI life-expectancy metadata names UN World Population Prospects, national statistical offices and Eurostat. ILO modeled-estimate methodology and World Bank demographic sources.

The distinction matters especially for 2024. The UN's 2024 revision estimates calendar years through 2023 and projects 2024 onward. Its mortality projection procedure models the female-minus-male life-expectancy gap jointly with female longevity. The frozen WDI responses do not identify each row's observed, imputed or projected status: their observation-status fields are blank. We cannot label every value as an observed 2024 outcome or allocate a particular model to each economy from these files. UN WPP 2024 methodology, introduction and mortality projections.

Analytical choices

We retained every economy with all four values, without imputation, trimming or population weights. The primary quantities are L = female LFPR minus male LFPR and E = female life expectancy minus male life expectancy. Every economy receives equal weight. A mean over this roster describes the average included economy; it does not describe the average person or the share of the world's population experiencing a condition.

An internal plan specified the comparisons before the implementing analyst calculated associations. Coverage and some source rows were already known, and another analyst could examine the public data concurrently. This is exploratory analysis with a documented workflow, not preregistration or blinded confirmation. The source year and indicators were already selected for WEI's global context; we did not search across years for a favorable correlation.

We report means, medians, interquartile ranges, population standard deviations and ranges. Quantiles use linear interpolation at position (N-1)p. Pearson correlation describes linear covariation; Spearman correlation applies Pearson's formula to average ranks and describes monotonic ordering. We also count all unordered economy pairs, recording concordance, discordance and ties. Source-decimal subtraction preserves mathematically equal gaps that ordinary binary arithmetic can separate by tiny numerical errors.

The roster is not a random sample with an asserted sampling design, and source-specific uncertainty is not supplied here. We therefore calculate no sampling confidence intervals or significance tests. Deleting an economy or region describes sensitivity to composition, not a confidence interval. These checks do not resolve measurement or model uncertainty.

The gaps share little country ordering

Participation pairs are available for 182 economies, or 83.9% of the 217-economy frame. Life-expectancy pairs are available for all 217. The common sample is therefore determined entirely by participation coverage. In it, female participation is below male participation in 180 economies. The two positive differences are Burundi (+2.513 points) and Moldova (+0.040 points). These are the complete set of sign exceptions, not selected examples. Moldova's tiny positive modeled difference should not be interpreted as a well-established substantive advantage.

Female life expectancy exceeds male life expectancy in every economy in the full frame and common sample. This establishes the direction of the published point estimates, not that every woman outlives every man. The distributions also differ in scale and shape: the participation mean is more negative than its median, while the life-expectancy mean lies closer to its median.

Quantity, common sample N = 182	Mean	Median	Middle 50%	Minimum	Maximum	Population SD
Female minus male participation, points	-18.535	-14.147	-24.202 to -9.292	-64.831	+2.513	13.515

Quantity, common sample N = 182	Mean	Median	Middle 50%	Minimum	Maximum	Population SD
Absolute participation gap, points	18.563	14.147	9.292 to 24.202	0.040	64.831	13.477
Female minus male life expectancy, years	+5.093	+4.900	4.000 to 6.032	+0.455	+10.620	1.781

Calculations use the frozen four-series release. Full precision, economy codes and every excluded row are preserved in the study supplement.

The primary signed Pearson correlation is **0.1862**. In broad terms, economies with less negative participation gaps tend to have somewhat larger positive life gaps in this pooled linear description. The Spearman correlation, however, is only **0.0575**. Knowing the ordering on one measure supplies little corresponding ordering on the other.

Among 16,471 unordered economy pairs, 8,541 are concordant and 7,917 discordant; 13 tie on the life gap. Concordance among nontied pairs is **51.9%**. Here concordance means that both signed gaps increase in the same pair. It does not mean that a country ranks “better” on both outcomes, and the pair count is not an independent sample size for inference.

Absolute gaps give Pearson -0.1878 and Spearman -0.0581. This near sign reversal is expected: all life gaps are positive, whereas almost every participation gap is negative. Taking absolute participation gaps mostly negates the horizontal variable. It is a change in the descriptive question, not evidence of an opposing causal mechanism.

Regional structure changes the pooled result

The positive pooled correlation does not characterize every region. The table reports all World Bank regions, using the labels in the frozen September 2026 roster. These are metadata classifications used for this analysis, not a reconstruction of classifications in force during 2024. In particular, Afghanistan and Pakistan appear in the explicitly named Middle East and North Africa group.

Region	Complete / frame	Mean participation gap, points	Mean life gap, years	Pearson r	Spearman rho
East Asia & Pacific	29 / 37	-14.719	5.387	-0.032	-0.205
Europe & Central Asia	48 / 58	-13.172	5.740	-0.121	-0.298
Latin America & Caribbean	31 / 42	-20.369	5.955	+0.196	+0.196
Middle East, North Africa, Afghanistan & Pakistan	21 / 23	-43.990	3.601	-0.012	-0.005
North America	2 / 3	-9.773	4.580	-1.000*	-1.000*
South Asia	6 / 6	-33.424	3.765	-0.046	-0.086

Region	Complete / frame	Mean participation gap, points	Mean life gap, years	Pearson r	Spearman rho
Sub-Saharan Africa	45 / 48	-11.976	4.517	-0.046	-0.035

With only two distinct observations, correlation must be +1 or -1. The North America value is not evidence of a stable regional relationship. South Asia also has very few included economies. Regional means are equal-economy averages, not official population-weighted aggregates.

Subtracting each region's mean from both metrics gives a pooled centered Pearson correlation of **-0.0280**. The original covariance is 4.483 point-years, composed of a between-region component of +4.877 and a within-region component of -0.394. The positive pooled covariance therefore arises from differences between region means that are partly offset within regions. This is an arithmetic decomposition, not explained variance, causal attribution, or proof that region is the correct adjustment set.

Deleting the Middle East, North Africa, Afghanistan & Pakistan group changes Pearson to -0.0317 and Spearman to -0.1213 among 161 remaining economies. Deleting Sub-Saharan Africa instead produces Pearson 0.3037 and Spearman 0.1425. Across all seven regional deletions, Pearson ranges from -0.032 to +0.304. All deletions are reported in the supplement; no preferred subset replaces the primary sample.

Individual deletion has a smaller effect. Across 182 leave-one-economy-out calculations, Pearson remains between 0.1680 and 0.2080, while Spearman remains between 0.0431 and 0.0741. The five largest absolute Pearson changes come from omitting Togo, Nigeria, Bahrain, Kuwait and Afghanistan, in that order under the declared selection rule. None changes the primary sign. This contrasts single-economy influence with sensitivity to the larger regional composition.

Relative scales do not restore a common ordering

An equal point difference can represent a different proportional difference at different baseline levels. We therefore calculate female/male ratios and symmetric relative gaps, defined as 200(F-M)/(F+M). The latter expresses the difference as a percentage of the two-sex arithmetic mean. It does not pool people or give the actual population participation rate.

Specification, N = 182 throughout	Pearson r	Spearman rho
Signed points versus signed years	+0.1862	+0.0575
Absolute points versus absolute years	-0.1878	-0.0581
Female/male ratio for each indicator	+0.1535	+0.0349
Symmetric relative gap for each indicator	+0.1705	+0.0349
Absolute symmetric relative gaps	-0.1709	-0.0351
Participation points versus relative life gap	+0.1900	+0.0575

Specification, N = 182 throughout	Pearson r	Spearman rho
Relative participation gap versus life years	+0.1756	+0.0246

Ratios and signed symmetric gaps necessarily give identical ranks for positive inputs because one is a strictly increasing transformation of the other. Their matching Spearman values are an algebraic property, not two independent confirmations. These alternatives change economic meaning through normalization; converting years to months alone would leave both correlations unchanged. The reported alternatives retain little monotonic association, while none solves the underlying age-composition or source-uncertainty problems.

Who is missing?

All 35 incomplete economies lack both participation series; none lacks a life series. Coverage varies from 66.7% in North America and 73.8% in Latin America & Caribbean to 93.8% in Sub-Saharan Africa and 100% in the six-economy South Asia group. Region size and coverage must be read together: one missing economy changes a three-economy region substantially.

The excluded economies have a mean life gap of 5.521 years and median 5.164, compared with 5.093 and 4.900 among included economies. The full-frame life-gap mean is 5.162. Thus omission is associated with a different observed life-gap distribution. That comparison neither proves a missing-at-random mechanism nor determines what the unobserved participation values would do to the correlation. We make no claim that 83.9% economy coverage equals 83.9% population coverage.

Interpretation and limits

The result supports a limited substantive conclusion: these two published 2024 gaps provide little common economy ordering, and their pooled linear association is region-sensitive. It does not establish independence. Nonlinear patterns, relationships within particular age groups, or associations concealed by measurement error remain possible. Region centering removes group means; it does not control income, institutions, migration, labor demand, education, health risks, or household responsibilities.

Existing research reinforces the need to keep the mechanisms separate. Goldin's historical and cross-country study of married women's participation develops a U-shaped relationship with economic development. Its population and question differ from this all-women, age-15-plus comparison. It supplies a reason to avoid interpreting participation as a single linear development or freedom scale, rather than an explanation tested by our correlations. Goldin, 1994.

Zarulli and colleagues study seven historical populations exposed to extreme mortality conditions, finding a female life-expectancy advantage with a qualification for one slavery case. That evidence concerns sex differences in survival under specific demographic environments. It cannot identify the causes of the present cross-economy pattern, establish a parity target, or test hypothetical workforce-removal scenarios. Zarulli et al., 2018.

The age-15-plus participation denominator and an all-age period mortality schedule describe different populations and time constructions. A common year does not align cohorts or

survey collection dates. The data also preserve the providers' female/male categories; they do not describe gender identity comprehensively or reveal distributions within either category. Economy-level associations cannot be transferred to individuals.

Source errors need not be independent. ILO's methodology uses UN WPP demographic inputs, while WPP also underlies part of the life series. WPP mortality projections jointly model sex differences. Reproducing the four point series verifies our arithmetic, not the underlying models or their joint uncertainty. Estimating that uncertainty would require richer provenance and suitable joint source draws or model information. ILO modeled-estimate methodology and UN WPP 2024 methodology.

A next study could use age-specific participation rates, age-decomposed mortality and source-quality flags across multiple years. Its identification question, population weighting and missing-data assumptions would need to be specified separately. This release provides neither a causal estimate nor a composite equality score, and it does not test WEI's H7 resilience hypothesis.

Reproduction, authorship and source register

The release preserves the analysis plan, all 217 analytical rows, every deletion result, seven scale specifications, and reader-facing figure data. The pipeline validates raw-file checksums and reproduces the normalized observations before calculating the study. Its default mode compares derived outputs byte for byte with the frozen artifacts. Tests cover mathematical ties, missing values, quantiles, correlation edge cases, covariance decomposition and source integrity. An independent implementation also checked the raw inputs and derived results. These checks are reproducibility and internal analytical checks, not external peer review.

The numerical dataset is identified by the SHA-256 of data/global/observations.json, recorded alongside the five raw-file hashes in results.json. checksums.json binds the results, CSV, figure payload, pipeline and analysis plan. Supplemental methodology snapshots have a separate source register with URLs, access dates, storage paths and hashes. Direct ILO downloads were unavailable; their preserved materials are explicitly labeled web-retrieval text extractions. This release retains the retrieved data vintage and does not silently refresh historical values.

The primary statistical sources are the four World Bank indicator series linked above, distributed under CC BY 4.0, and their country roster. Methodological references are the World Bank indicator glossaries, ILO's modeled-estimate documentation and forms-of-work definitions, and UN DESA's *World Population Prospects 2024: Methodology of the United Nations population estimates and projections*. Research context is Claudia Goldin's NBER Working Paper 4707 (1994), DOI 10.3386/w4707, and Virginia Zarulli and colleagues' PNAS article (2018), DOI 10.1073/pnas.1701535115. Those studies contextualize interpretation; they are not additional rows in the analysis.

This archived manuscript has not undergone external peer review or external preregistration.