Weighting Study — Findings

Summary

The global CHIP estimate varies significantly with the choice of aggregation weights — from $1.67/hr (labor-weighted) to $2.85/hr (freedom-weighted), a spread of $1.17 (51%). This means the weighting choice is a **first-order methodological decision**, not a minor tuning parameter.

The five schemes tested, from highest to lowest CHIP value:

Scheme	CHIP ($/hr)	Countries	Top Contributor	Top Weight
Freedom-weighted	$2.85	79	USA	27.1%
GDP-weighted	$2.68	85	USA	24.0%
HDI-weighted	$2.20	85	Switzerland	1.5%
Unweighted	$2.00	85	(equal)	1.2%
Labor-weighted	$1.67	85	USA	8.0%

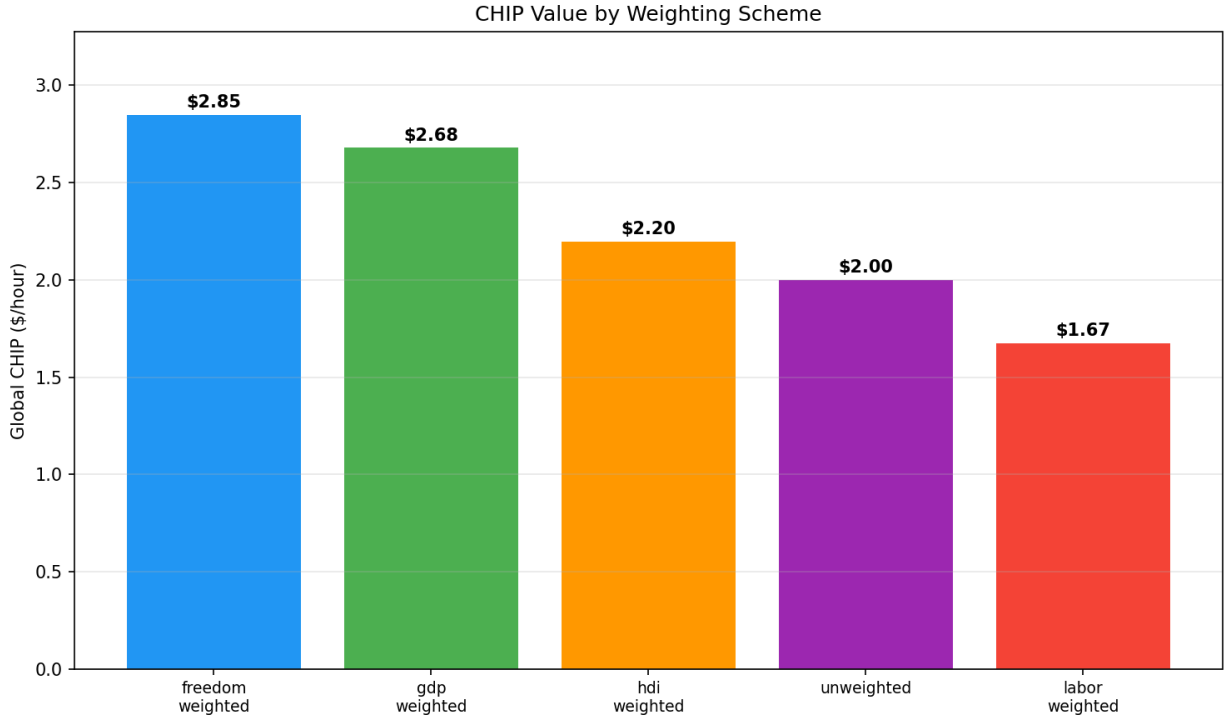

Figure 1: CHIP value by weighting scheme

Hypothesis Assessment

Hypothesis: Labor-weighted CHIP is lower than GDP-weighted. Confirmed. Labor-weighted ($1.67) is 38% below GDP-weighted ($2.68). Countries with large labor forces (India, China, Indonesia, Bangladesh) have low unskilled wages, pulling the average down sharply.

Hypothesis: Unweighted CHIP is lower still. Confirmed. Unweighted ($2.00) is 25% below GDP-weighted. Each country counts equally, so the many low-wage developing countries outnumber the few high-wage developed ones.

Hypothesis: Freedom-weighted falls between GDP and unweighted. Not confirmed. Freedom-weighted ($2.85) is the *highest* of all five schemes — 6% above GDP-weighted. This is because the Heritage freedom index correlates with GDP per capita, and the GDP × freedom multiplication amplifies the weight of wealthy, economically free countries. The USA alone accounts for 27% of freedom-weighted CHIP vs 24% of GDP-weighted.

Hypothesis: HDI-weighted falls near GDP-weighted. Partially confirmed but lower. HDI-weighted ($2.20) is 18% below GDP-weighted. While HDI correlates with income, it is a 0–1 scale where all developed countries cluster near 0.95–0.97. This compresses the weight differential: Switzerland (HDI 0.966) gets barely more weight than the USA (HDI 0.921), despite GDP differences of 100×. The result is closer to an unweighted average than to GDP-weighting.

Key Findings

1. Weighting Scheme Is a First-Order Choice

The coefficient of variation across the five schemes is 21%. This is not noise — it reflects a genuine philosophical question: *whose labor defines the global CHIP?*

- **GDP-weighting** says: the global economy as a whole, weighted by economic output. Rich-country wages dominate.
- **Labor-weighting** says: the average worker, regardless of which country they're in. Developing-world wages dominate.
- **Unweighted** says: each country's labor market counts equally.
- **Freedom-weighting** says: countries with freer markets better approximate the competitive equilibrium.
- **HDI-weighting** says: countries with higher living standards better reflect what wages would be in a well-functioning market.

2. The Original GDP-Weighted Approach Is Defensible

GDP-weighting ($2.68) is the second-highest result, close to freedom- weighted ($2.85), and the original study's methodology. It produces a value that is: - Not dominated by any single country (USA = 24%, next is China at ~18%) - Reasonably close to the median of all five schemes ($2.20) - Familiar and reproducible (GDP data is the most widely available)

3. Country Multipliers Reveal Large Dispersion

Using the GDP-weighted global CHIP ($2.68/hr) as the reference:

- **22 countries** have multipliers above 1.0 (workers paid above global CHIP). These are predominantly Western European, Australasian, and East Asian economies.
- **63 countries** have multipliers below 1.0 (workers paid below global CHIP). The median multiplier is 0.64.
- **Top 5:** Switzerland (2.39×), Ireland (2.01×), Austria (1.92×), Germany (1.86×), Norway (1.83×)
- **Bottom 5:** Uganda (0.06×), Tanzania (0.06×), Mali (0.05×), Pakistan (0.05×), Egypt (0.04×)

The distribution is heavily right-skewed: most countries pay well below the global CHIP, while a small number of wealthy nations pay significantly above it. This is consistent with the original study's finding that global labor markets are far from equilibrium.

4. HDI-Weighting Is the Most "Balanced" Alternative

HDI-weighting produces the most even distribution of weights. Because HDI is bounded 0–1 and developed countries cluster at the top, no single country dominates. The top contributor (Switzerland) has only 1.5% of the weight — compared to 24–27% for USA in GDP/freedom schemes.

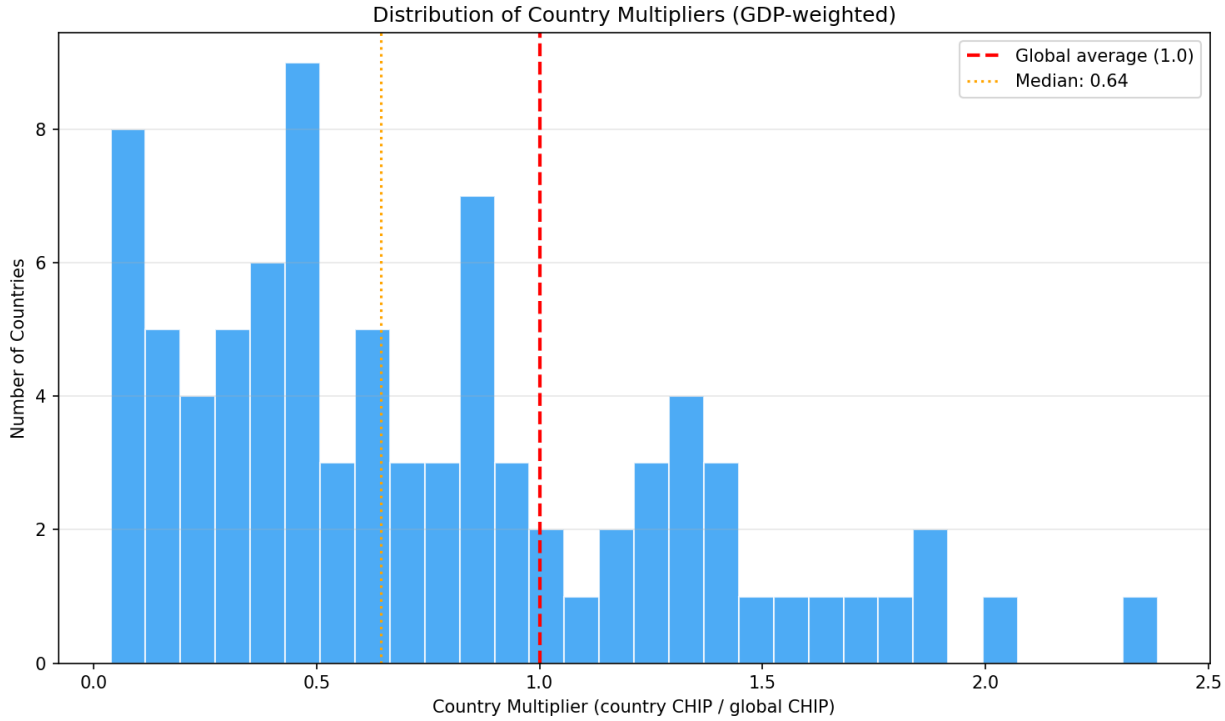

Figure 2: Distribution of country multipliers

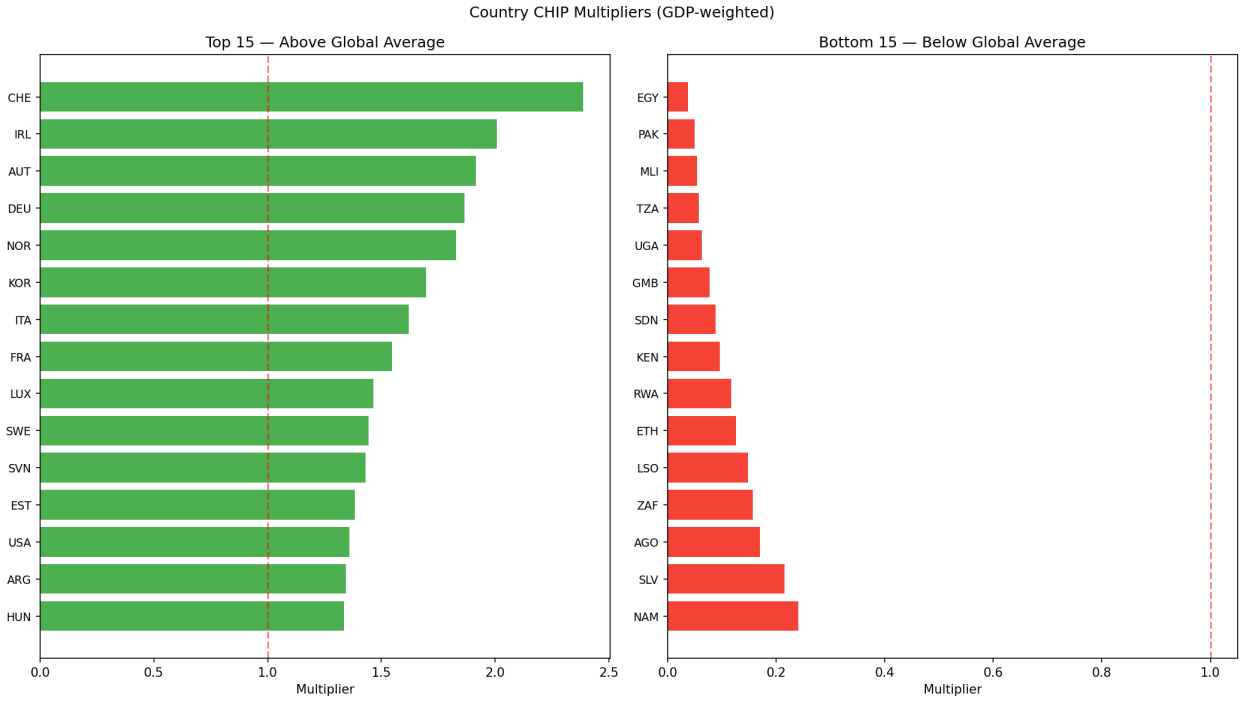

Figure 3: Top and bottom country multipliers

If the goal is to give more weight to countries "where markets work well" without letting any one economy dominate, HDI-weighting is a strong candidate. Its $2.20 value is lower than GDP-weighted but higher than the simple average.

5. Freedom-Weighting Amplifies Rich-Country Bias

Rather than correcting for market distortions, freedom-weighting reinforces the GDP bias. The Heritage freedom index strongly correlates with GDP per capita, so GDP × freedom gives wealthy countries even more weight. This makes freedom-weighting the most extreme scheme, not the most balanced.

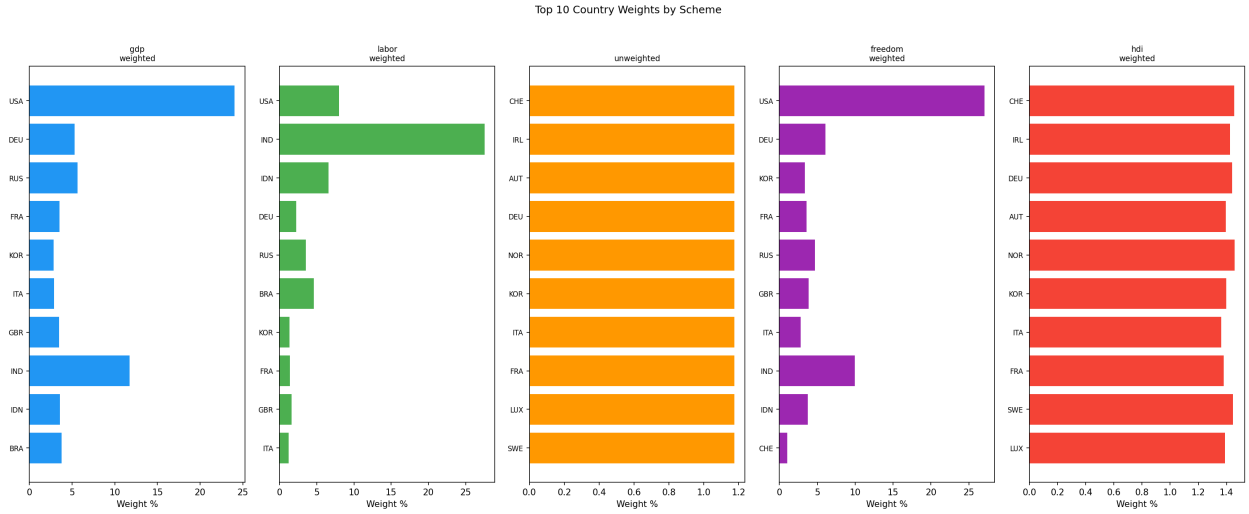

Figure 4: Top 10 contributors by scheme

Recommendations

1. **Retain GDP-weighting as the primary methodology.** It is the original study's approach, well-understood, and reproducible. The value ($2.68) is defensible and not an outlier among the five schemes.
2. **Report the full five-scheme range** in published materials. Transparency about the sensitivity to weighting strengthens credibility.
3. **Publish country multipliers** alongside the global CHIP. These give users in any country an immediate sense of local labor valuation relative to the global norm. The multiplier table is available at `output/csv/country_multipliers.csv`.
4. **Consider HDI-weighting as a robustness check.** Its balanced weight distribution makes it a useful "second opinion" to GDP-weighting. If GDP-weighted and HDI-weighted values diverge sharply in a future year, that would signal a structural change worth investigating.
5. **Freedom-weighting is informative but not recommended as primary.** It amplifies the GDP bias and depends on a politically opinionated index. It is worth including for transparency.

Limitations

- **85 countries** in the pipeline (of ~195 sovereign states). Missing countries are those without ILOSTAT wage data or PWT coverage. This disproportionately excludes small and conflict-affected states.
- **Heritage matching:** 79/85 countries matched (93%). Six countries in our pipeline lack Heritage scores — these are excluded only from freedom-weighting.

- **Employment data:** PWT employment (`emp`) is used for labor-weighting. This is total employment, not unskilled employment specifically.
- **Single time window:** Results are averaged over 2018–2022. Weighting sensitivity may change over time.

Data Sources

Source	Coverage	Status
ILOSTAT wages/employment	85 countries (2018–2022 window)	Complete
PWT 11.0	GDP, capital, employment to 2023	Complete
Heritage Foundation 2025	176 countries, 79 matched	Complete
UNDP HDI 2022	203 countries, 85 matched	Complete