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Measuring Plutonomy Intensity Under Data Deprivation: An Axiomatic Index

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Abstract

Measuring top-income inequality typically requires household surveys merged with tax records, or Pareto tails fitted to survey data, resources unavailable across much of the developing world. In this note, we propose a simple plutonomy intensity index estimable from alternative sources. Three axioms, within-group irrelevance, joint income scaling invariance, and plutocratic income monotonicity, characterize the class of indices ranking distributions exactly as the plutocrat-to-ordinary mean income ratio does. The index also satisfies anonymity, population invariance, and a restricted transfer principle. We illustrate its use in the Arab region, approximating it using the Forbes Billionaires List and World Bank macroeconomic data.

Key words: *Inequality, top incomes, plutonomy, data deprivation.*

JEL Classification: I31, I32.

1 Introduction

In September 2011, protesters occupying Zuccotti Park popularized a slogan that reframed economic grievance not as aggregate dispersion but as a claim about the vast economic distance between a narrow elite and everyone else: "We are the 99%". Krugman (2011) sharpened the point, arguing that even the top 1 percent understated this extreme divergence, since much of the top tail's income had itself accrued to the top 0.1 percent. Both formulations compare the average position of a small, income-defined elite to that of the rest of the population, rather than comparing every individual to every other, as conventional inequality indices do.

Conventional, dispersion-based indices are ill-suited to this kind of top-driven concentration, since they are shaped by the whole distribution and can remain stable even as the very top pulls away from everyone else. The top-incomes literature instead reconstructs concentration from administrative tax records (Atkinson, Piketty and Saez, 2011; Piketty, 2013) or from Pareto tails fitted to the upper portion of survey distributions (Charpentier and Flachaire, 2022). Closer to our normative structure, Makdissi and Yazbeck (2015) propose dominance criteria for plutonomy rankings based on the position of a small top group relative to the rest, in the spirit of the 99% framing.

This conceptual gap is compounded by a practical one: statistical capacity is correlated with development, and many low-income and middle-income countries lack the household surveys, tax records, or fitted Pareto tails that conventional top-income measurement requires. Against this backdrop, Atamanov *et al.* (2020) call on researchers to complement official statistics with alternative sources.

We propose a plutonomy intensity index built around both concerns. It measures the ratio of the average income of "plutocrats," those above an exogenous threshold, to the average income of everyone else, a formal counterpart to the "we" versus "the 1%" comparison.

Because it depends on the distribution only through these two group means, it is possible to approximate it from alternative sources, directly answering Atamanov *et al.*'s (2020) call.

The rest of the note runs as follow. In Section 2, we characterize the class of indices consistent with this structure. Section 3 illustrates it using the Forbes Billionaires List and World Bank data for a set of Arab countries. Finally, Section 4 presents a conclusion and a few directions for future research.

2 Characterization of the index

Let $\mathscr{N} = \{1, \dots, n\}$ denote a population of $n \geq 2$ individuals and $y = (y_1, \dots, y_n) \in \mathbb{R}^n_{++}$ an income distribution, where $\mathbb{R}_{++}$ is the set of strictly positive real numbers. Let $\mathscr{D} = \bigcup_{n \geq 2} \mathbb{R}^n_{++}$ denote the set of all feasible distributions across populations of arbitrary size. For an exogenous plutonomy line $\omega \in \mathbb{R}_{++}$, let $\mathscr{P}(\omega) = \{i \in \mathscr{N} : y_i \geq \omega\}$ denote the set of plutocrats and $\mathscr{O}(\omega) = \mathscr{N} \setminus \mathscr{P}(\omega)$ the set of ordinary citizens, with cardinalities $n_{\mathscr{P}}$ and $n_{\mathscr{O}}$. We restrict attention to pairs (y, ω) such that $1 \leq n_{\mathscr{P}}(\omega) \leq n - 1$, denoted

$$\mathscr{D}^{\circ} = \{(y, \omega) \in \mathscr{D} \times \mathbb{R}_{++} : 1 \leq n_{\mathscr{P}}(\omega) \leq n - 1\},$$

so that group means

$$\mu_{\mathscr{P}}(y) = \frac{1}{n_{\mathscr{P}}} \sum_{i \in \mathscr{P}(\omega)} y_i, \qquad \mu_{\mathscr{O}}(y) = \frac{1}{n_{\mathscr{O}}} \sum_{i \in \mathscr{O}(\omega)} y_i$$

are well defined. We write $R(y; \omega) := \mu_{\mathscr{P}}(y)/\mu_{\mathscr{O}}(y)$ for the plutocrat-to-ordinary-citizen mean income ratio; since $\mu_{\mathscr{P}}(y) \geq \omega > \mu_{\mathscr{O}}(y)$ throughout $\mathscr{D}^{\circ}$, $R(y; \omega) \in (1, \infty)$.

Definition 1. *A plutonomy index is a function $I : \mathscr{D}^{\circ} \to \mathbb{R}_+$ assigning to every $(y, \omega) \in \mathscr{D}^{\circ}$ a value $I(y; \omega)$ measuring the intensity of plutonomy in y for a given plutonomy line ω.*

For a fixed plutonomy line, ω, we characterize the class of plutonomy indices satisfying three axioms.

Axiom 1. ***Within-group irrelevance:*** *For $y, \dot{y} \in \mathscr{D}$ with $\mu_{\mathscr{P}}(y) = \mu_{\mathscr{P}}(\dot{y})$ and $\mu_{\mathscr{O}}(y) = \mu_{\mathscr{O}}(\dot{y})$, I obeys within-group irrelevance if and only if $I(y;\omega) = I(\dot{y};\omega)$.*

$I(\cdot;\omega)$ depends on y only through $(\mu_{\mathscr{P}}(y), \mu_{\mathscr{O}}(y))$: neither group size nor within-group dispersion matters, echoing the "we are the 99%" framing, which treats each side of the line as internally undifferentiated.

Axiom 2. ***Joint income scaling invariance:*** *For $\dot{y}_i = \lambda y_i$, all i, $\lambda \in \mathbb{R}_{++}$, ω fixed, and $\mathscr{P}(\dot{y}) = \mathscr{P}(y)$, I obeys joint income scaling invariance if and only if $I(\dot{y};\omega) = I(y;\omega)$.*

A perfectly equally shared growth of the economy, at rate λ for everyone, leaves measured plutonomy unaffected; the index responds only to growth that is unequally distributed between plutocrats and ordinary citizens.

Axiom 3. ***Plutocratic income monotonicity:*** *For $\dot{y}_i = \lambda y_i$ if $i \in \mathscr{P}(\omega)$ and $\dot{y}_i = y_i$ otherwise, $\lambda \in \mathbb{R}_{++}$, $\mathscr{P}(\dot{y}) = \mathscr{P}(y)$, I obeys plutocratic income monotonicity if and only if $\lambda \mapsto I(\dot{y};\omega)$ is strictly increasing on $\{\lambda \in \mathbb{R}_{++} : \mathscr{P}(\dot{y}) = \mathscr{P}(y)\}$, for every y with $(y,\omega) \in \mathscr{D}^{\circ}$.*

This is the central axiom: holding the mean income of ordinary citizens fixed, a higher mean income among plutocrats must translate into strictly higher measured plutonomy, formalizing the idea that the top pulling away from everyone else should always register as more plutonomy.

Proposition 1. *For fixed $\omega \in \mathbb{R}_{++}$, $I(\cdot;\omega)$ satisfies Within-group Irrelevance, Joint Income Scaling Invariance, and Plutocratic Income Monotonicity if and only if $I(y;\omega)$ is of the form $g(R(y;\omega))$ for some strictly increasing $g : (1,\infty) \to \mathbb{R}_{+}$, for all y with $(y,\omega) \in \mathscr{D}^{\circ}$.*

Proof. All proofs are in the Appendix □

Since g is strictly increasing, every index in this class ranks distributions, at a given ω, exactly as $R(y;\omega)$ does. For the purpose of establishing rankings, we may therefore work directly with $R(y;\omega)$ without loss of generality. To facilitate the cardinal comparisons in our empirical application, we adopt the natural identity function $g(x) = x$, using the raw ratio $R(y;\omega)$ as our specific plutonomy intensity index throughout.

$R(\cdot;\omega)$ also satisfies three standard properties from the inequality measurement literature.

Axiom 4. ***Anonymity:*** *Let M be an n-permutation matrix and $\dot{y} = My$. I obeys anonymity if and only if $I(y;\omega) = I(\dot{y};\omega)$.*

Axiom 5. ***Population invariance:*** *Let $\dot{y} = (y_1, \dot{y}_1, \ldots, y_n, \dot{y}_n)$ with $y_j = \dot{y}_j$, $j = 1, \ldots, n$. I obeys population invariance if and only if $I(y;\omega) = I(\dot{y};\omega)$.*

Axiom 6. ***Intergroup plutocratic Pigou-Dalton:*** *Let $\eta > 0$ and $\dot{y} = (y_1, \ldots, y_j + \eta, \ldots, y_k - \eta, \ldots, y_n)$ with $j \notin \mathscr{P}(\omega)$, $k \in \mathscr{P}(\omega)$, $\mathscr{P}(\dot{y}) = \mathscr{P}(y)$. I obeys the intergroup plutocratic Pigou-Dalton principle if and only if $I(\dot{y};\omega) < I(y;\omega)$.*

Because every plutocrat's income exceeds every ordinary citizen's by construction, such a transfer is unambiguously progressive whatever its size, a genuine Robin Hood version of the classical Pigou-Dalton principle. None of these three properties was assumed in deriving Proposition 1.

Proposition 2. *Every plutonomy index $I(y;\omega) = g(R(y;\omega))$ in the class characterized by Proposition 1 also satisfies Anonymity, Population Invariance, and the Intergroup Plutocratic Pigou-Dalton principle.*

3 Empirical illustration: Plutonomy in the Arab World

We illustrate the index in the Arab region, where data constraints are especially acute. Household surveys are frequently missing, outdated, or inaccessible. Arezki et al. (2020) estimate that MENA's below-expected statistical capacity resulted in a cumulative loss of 7 to 14 percent of GDP per capita between 2005 and 2018. In this context, Atamanov *et al.* (2020) call on researchers to complement official statistics with alternative sources, a call Makdissi, Marrouch and Yazbeck (2025) answer for Lebanon specifically and that we take up here for the region as a whole.

The region is also where survey-based inequality measures have proven most contested. The World Bank's "Arab inequality puzzle" noted that, from an international perspective, household survey Ginis in the region are low as the Arab Spring suggested grievances over extreme concentration at the top. To explain this discrepancy, Devarajan and Ianchovichina (2018) located the uprisings in a broken social contract rather than inequality itself, while Alvaredo, Assouad and Piketty (2019), combining survey, tax, and national accounts data, found the Middle East to be the world's most unequal region. Our exercise offers a third route to the latter conclusion, bypassing survey and tax microdata altogether.

We construct $R(y;\omega)$ for eight Arab countries plus the Arab regional, world, and G7 benchmarks, using the Forbes Billionaires List (scraped September 1, 2026, with individuals assigned by listed citizenship) for $\mathscr{P}(\omega)$ and the most recent available value of the World Bank GNI per capita (Atlas method, current USD) for $\mu_{\mathscr{O}}(y)$. For historical trends, we match annual Forbes data with the corresponding year's GNI per capita.[1] Billionaire wealth is converted to a simulated income using Piketty's (2013) 5% long-run average return on capital, almost certainly conservative since realized returns rise with fortune size. GNI per capita, which captures cross-border income flows like remittances, while not strictly household income, is the most widely available proxy for the average citizen's economic position where survey data are precisely what is missing.

Figure 1 reports the snapshot as of September 1, 2026: Egypt's plutonomy intensity

[1]No country or benchmark has 2026 GNI data published yet, so the current snapshot uses each entity's latest available year: 2025 for most countries and for the World and Arab Region benchmarks; 2024 for the UAE, Lebanon and Oman. For the World and Arab Region GNI per capita, we use the World Bank's own published World and Arab World aggregates directly, and we sum the wealth of all listed billionaires in those respective regions for the numerator.

index is almost three times the Arab average, almost twice the world benchmark, and almost ten times the G7 benchmark,[2] while the wealthy Gulf economies register the lowest values despite substantial billionaire wealth, since high GNI per capita mechanically compresses the ratio. Saudi Arabia's index is close to the G7 benchmark (1.13 times), while the UAE (0.85 times) and Qatar (0.39 times) fall below it. Figure 2 traces the index since 2010 for the Arab countries. We estimate the index on July 1st of each year. For 2026, we also add the September 1st estimate as our up-to-date value. Egypt remains persistently high, while Lebanon's plutonomy intensity index more than triples relative to its 2019 pre-collapse low, coinciding with its currency collapse (explained in detail in Makdissi, Marrouch and Yazbeck, 2025). Figure 3 checks, for Lebanon, whether this reflects the choice of GNI per capita as denominator: recomputing $\mu_{\mathscr{O}}(y)$ net of simulated billionaire income yields a nearly indistinguishable, marginally higher series, confirming our simpler proxy is if anything conservative.

4 Conclusion

This note has proposed a plutonomy intensity index built on the comparison between plutocrats and everyone else that animated the "we are the 99%" movement. Three axioms characterize the index as an increasing transformation of the plutocrat-to-ordinary-citizen mean income ratio, which also satisfies anonymity, population invariance, and a genuinely progressive Pigou-Dalton principle. Because it depends on the distribution only through two group means, it can be approximated from billionaire wealth rankings and macroeconomic aggregates alone. Applied to the Arab region, it provides suggestive evidence of extreme top-tail divergence, particularly in Egypt. It adds support to the view that the region's

[2] Each benchmark is the unweighted mean of the individual PII of its constituent billionaire-holding countries, that is, each country's own index is computed first, then averaged across the group, rather than a single ratio of pooled wealth over pooled income. The Arab average covers the 22 Arab League countries; the world benchmark, all countries recognized by the World Bank; the G7 benchmark, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

inequality puzzle reflects the limits of survey-based measurement rather than the absence of extreme concentration.

Future work could extend the characterization to link rankings across different choices of the exogenous line ω, in the spirit of the dominance criteria in Makdissi and Yazbeck (2015); allow the simulated return on billionaire wealth to vary with fortune size; and extend the illustration beyond Arab countries and billionaires to the broader set of countries and elites for which comparable wealth data exist.

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A Proofs or propositions

Proof of Proposition 1. Sufficiency. Suppose $I(y;\omega) = g(R(y;\omega))$ for some strictly increasing g. Within-group Irrelevance holds immediately, since $I(\cdot;\omega)$ depends on y only through $(\mu_{\mathscr{P}}(y), \mu_{\mathscr{O}}(y))$. For Joint Income Scaling Invariance, scaling every entry of y by λ gives $\mu_{\mathscr{P}}(\dot{y}) = \lambda\mu_{\mathscr{P}}(y)$ and $\mu_{\mathscr{O}}(\dot{y}) = \lambda\mu_{\mathscr{O}}(y)$, so $R(\dot{y};\omega) = R(y;\omega)$ and hence $I(\dot{y};\omega) = I(y;\omega)$. For Plutocratic Income Monotonicity, fix y such that $(y,\omega) \in \mathscr{D}^{\circ}$ and let λ range over $\{\lambda \in \mathbb{R}_{++} : \mathscr{P}(\dot{y}) = \mathscr{P}(y)\}$; scaling only the plutocrat sub-vector by such a λ leaves $\mu_{\mathscr{O}}(y)$ unchanged and gives $\mu_{\mathscr{P}}(\dot{y}) = \lambda\mu_{\mathscr{P}}(y)$, so $R(\dot{y};\omega) = \lambda R(y;\omega)$. Since $R(y;\omega) > 0$ is fixed and g is strictly increasing, $\lambda \mapsto g(\lambda R(y;\omega)) = I(\dot{y};\omega)$ is strictly increasing on this set.

Necessity. Suppose $I(\cdot;\omega)$ satisfies the three axioms.

Step 1: reduction to group means. By Within-group Irrelevance, $I(y;\omega)$ depends on y only through $(\mu_{\mathscr{P}}(y), \mu_{\mathscr{O}}(y))$, so we may define

$$h(a,b) := I(y;\omega), \qquad \text{for any } y \text{ such that } (y,\omega) \in \mathscr{D}^{\circ} \text{ and } (\mu_{\mathscr{P}}(y), \mu_{\mathscr{O}}(y)) = (a,b).$$

For every pair (a,b) with $a \geq \omega > b > 0$, such a y exists (a two-person population with one plutocrat at income a and one ordinary citizen at income b), and $h(a,b)$ is independent of which such y is chosen, again by Within-group Irrelevance. Hence h is well defined on $\{(a,b) : a \geq \omega > b > 0\}$.

Step 2: homogeneity forces dependence on the ratio alone. Fix $r > 1$ and let (a,b) and (a',b') be two pairs in this domain with $a/b = a'/b' = r$, and set $\lambda := a'/a = b'/b$. Take y to consist of a single plutocrat at income a and a single ordinary citizen at income b; then $\dot{y} := \lambda y$ has a plutocrat at income $\lambda a = a' \geq \omega$ and an ordinary citizen at income $\lambda b = b' < \omega$, so $\mathscr{P}(\dot{y}) = \mathscr{P}(y)$ and Joint Income Scaling Invariance applies, giving

$$h(a',b') = I(\dot{y};\omega) = I(y;\omega) = h(a,b).$$

Since (a,b) and (a',b') were arbitrary subject to $a/b = a'/b'$, h depends on (a,b) only through the ratio $r = a/b$: there exists $g : (1, \infty) \to \mathbb{R}_+$ such that $h(a, b) = g(a/b)$ for all (a, b) in the domain, and therefore

$$I(y; \omega) = g\big(R(y; \omega)\big) \qquad \text{for all } y \text{ such that } (y, \omega) \in \mathscr{D}^\circ.$$

This dependence on the ratio alone is not assumed by either axiom individually: Within-group Irrelevance and Joint Income Scaling Invariance jointly amount to the condition $h(\lambda a, \lambda b) = h(a, b)$ for every admissible λ, that is, homogeneity of degree zero, whose only solutions are functions of a/b.

Step 3: monotonicity pins down g. Let $r > r' > 1$. Consider the two-person population $y_0 = (\omega, \omega/r')$, consisting of a plutocrat with income exactly ω and an ordinary citizen with income $\omega/r' < \omega$, so that $(y_0, \omega) \in \mathscr{D}^\circ$ and $R(y_0; \omega) = \omega/(\omega/r') = r'$. Let $\dot{y}_0(\lambda)$ denote the vector obtained from y_0 by scaling the plutocrat's income by $\lambda \geq 1$, leaving the ordinary citizen's income unchanged. Since the plutocrat's income only ever increases from ω along this path, $\mathscr{P}(\dot{y}_0(\lambda)) = \mathscr{P}(y_0)$ for every $\lambda \geq 1$, so the entire path lies in the domain of Plutocratic Income Monotonicity. At $\lambda = 1$, $\dot{y}_0(1) = y_0$, so $I(\dot{y}_0(1); \omega) = I(y_0; \omega) = g(r')$. At $\lambda = r/r' > 1$, scaling the plutocrat's income by λ gives $R(\dot{y}_0(\lambda); \omega) = \lambda\omega/(\omega/r') = \lambda r' = r$, so $I(\dot{y}_0(\lambda); \omega) = g(r)$. Since $\lambda = r/r' > 1$ and $\lambda \mapsto I(\dot{y}_0(\lambda); \omega)$ is strictly increasing on $[1, \infty)$ by Plutocratic Income Monotonicity, we obtain

$$g(r) = I(\dot{y}_0(r/r'); \omega) > I(\dot{y}_0(1); \omega) = g(r').$$

As $r, r' > 1$ were arbitrary, g is strictly increasing on $(1, \infty)$. □

Proof of Proposition 2. Anonymity, Population Invariance, and the Intergroup Plutocratic Pigou-Dalton principle each compare I at a *single, fixed* ω, and each is stated as an equality or a strict inequality between two values of I. Since g is strictly increasing, it preserves equalities ($a = b \Rightarrow g(a) = g(b)$) and strict inequalities ($a < b \Rightarrow g(a) < g(b)$), so it suffices to verify each of these three properties for the ratio $R(\cdot;\omega)$ itself; the conclusion for $I = g \circ R$ then follows automatically for every strictly increasing g.

Anonymity. Let $\dot{y} = My$ for some n-permutation matrix M. Since $\mathscr{P}(\omega) = \{i \in N : y_i \geq \omega\}$ is defined by income level rather than identity, permuting y permutes membership in $\mathscr{P}$ correspondingly, so $\{\dot{y}_i : i \in \mathscr{P}(\dot{y})\} = \{y_i : i \in \mathscr{P}(y)\}$ and $\{\dot{y}_i : i \notin \mathscr{P}(\dot{y})\} = \{y_i : i \notin \mathscr{P}(y)\}$ as multisets. Hence $\mu_{\mathscr{P}}(\dot{y}) = \mu_{\mathscr{P}}(y)$ and $\mu_{\mathscr{O}}(\dot{y}) = \mu_{\mathscr{O}}(y)$, so $R(\dot{y};\omega) = R(y;\omega)$ and therefore $I(\dot{y};\omega) = I(y;\omega)$ for every $I = g\circ R$ in the class. (This also follows directly from Within-group Irrelevance, of which Anonymity is a special case.)

Population invariance. Let $\dot{y} = (y_1, \dot{y}_1, y_2, \dot{y}_2, \dots, y_n, \dot{y}_n)$ with $y_j = \dot{y}_j$ for $j = 1, \dots, n$, i.e., $\dot{y}$ replicates each entry of y once. Then $\mathscr{P}(\dot{y})$ replicates $\mathscr{P}(y)$ entry for entry, and likewise for $\mathscr{O}$, so

$$\mu_{\mathscr{P}}(\dot{y}) = \frac{1}{2n_{\mathscr{P}}}\left(2\sum_{i\in\mathscr{P}(y)} y_i\right) = \mu_{\mathscr{P}}(y), \qquad \mu_{\mathscr{O}}(\dot{y}) = \frac{1}{2n_{\mathscr{O}}}\left(2\sum_{i\in\mathscr{O}(y)} y_i\right) = \mu_{\mathscr{O}}(y).$$

Hence $R(\dot{y};\omega) = R(y;\omega)$ and $I(\dot{y};\omega) = I(y;\omega)$ for every $I = g \circ R$ in the class. (Again, this also follows directly from Within-group Irrelevance.)

Intergroup plutocratic Pigou-Dalton. Let $\eta > 0$, and let $\dot{y} = (y_1, \dots, y_j + \eta, \dots, y_k - \eta, \dots, y_n)$ with $j \in \mathscr{O}(\omega)$, $k \in \mathscr{P}(\omega)$, $y_j + \eta \leq y_k - \eta$, and $\mathscr{P}(\dot{y}) = \mathscr{P}(y)$. Since $k \in \mathscr{P}$ loses η and no other plutocrat's income changes,

$$\mu_{\mathscr{P}}(\dot{y}) = \mu_{\mathscr{P}}(y) - \frac{\eta}{n_{\mathscr{P}}} < \mu_{\mathscr{P}}(y).$$

Since $j \in \mathscr{O}$ gains η and no other non-plutocrat's income changes,

$$\mu_{\mathscr{O}}(\dot{y}) = \mu_{\mathscr{O}}(y) + \frac{\eta}{n_{\mathscr{O}}} > \mu_{\mathscr{O}}(y).$$

Since the numerator strictly decreases and the denominator strictly increases,

$$R(\dot{y};\omega) = \frac{\mu_{\mathscr{P}}(\dot{y})}{\mu_{\mathscr{O}}(\dot{y})} < \frac{\mu_{\mathscr{P}}(y)}{\mu_{\mathscr{O}}(y)} = R(y;\omega),$$

and therefore $I(\dot{y};\omega) < I(y;\omega)$ for every $I = g \circ R$ in the class. □

Figures

Figure 1: Plutonomy intensity in the Arab World

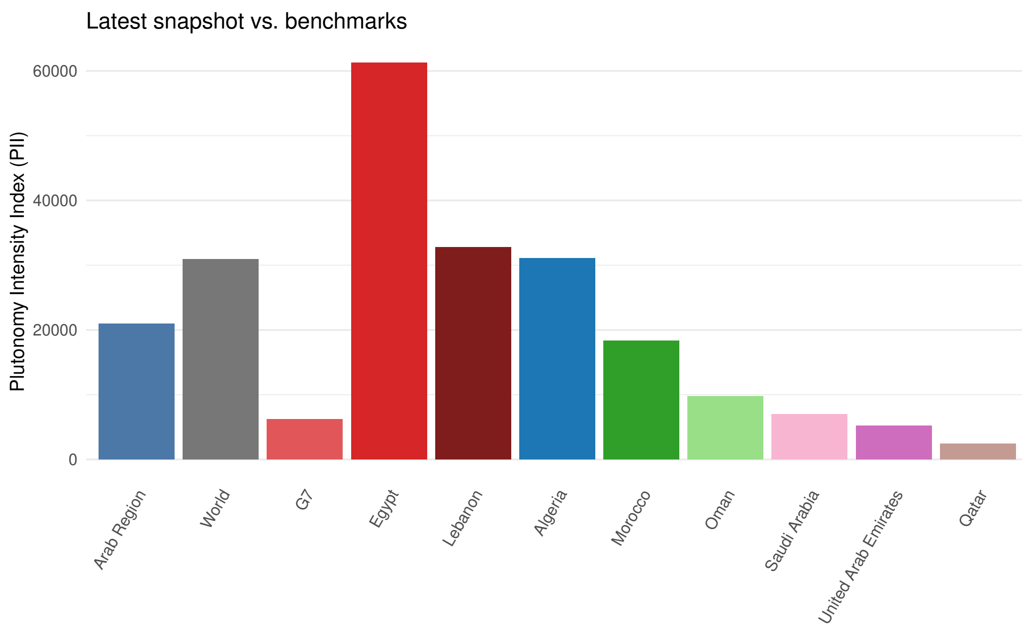

Figure 2: Trends in plutonomy intensity in the Arab World

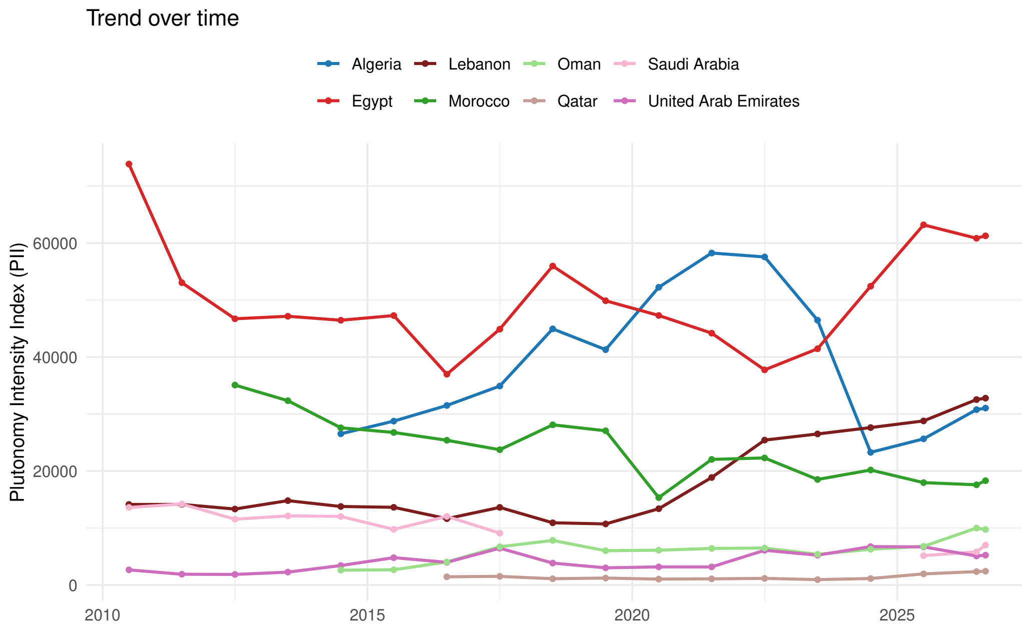

Figure 3: Robustness check: alternative approximations of $\mu_{\mathscr{O}}(y)$, the case of Lebanon