Income Inequality
A Scenario Model

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The Goal

- A scenario model of income inequality
  - Link to storylines
  - Provide quantitative values at national level over several decades
- But first
  - Inequality of what?
  - Why does it matter?
  - What influences income inequality?

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Inequality of What?

- Varieties of inequality
  - Market: wealth, income, expenditure
  - Political: access, influence
  - Categorical: gender, race, class, professional accreditation, religion
- They often go together
  - Women get paid less for equivalent work (categorical → market)
  - Wealth provides entrée into social class (market → categorical)
  - Campaign spending gains political influence (market → political)
- But they do not always go together and for many substantive issues they are **not** proxies for each other

This Model

- Income inequality
  - Most available data
  - Links to resource use and other interesting variables
- Some questions to ask
  - Include wages, interest income, rents, dividends?
  - Include in-kind income (household production, gifts, "perks")?
  - Before (gross) or after (net) taxes and transfers?
  - Household, person, or "person equivalent"?
  - Has it been "top-coded"?
- Sometimes income data is not available, and have to use expenditure data

Sources of Data

- World Bank
  - Good quality and reasonable meta-data
  - Not good coverage
  - Good for quick studies that include other World Bank data

- UNU-WIDER World Income Inequality Dataset (WIID)
  - Very thorough meta-data
  - Multiple options for many country-year combinations
  - Good for statistical studies

- The Standardized World Income Inequality Database
  - Well-documented
  - Reasonably comparable values, two per country-year combination (net & market)
  - Good for scenarios

- Luxembourg Income Survey
  - Comparable analysis for all OECD and a few non-OECD countries
  - A major source for WIID and SWIID
  - Good for statistical studies
  - Some data are top-coded

The Gini Coefficient
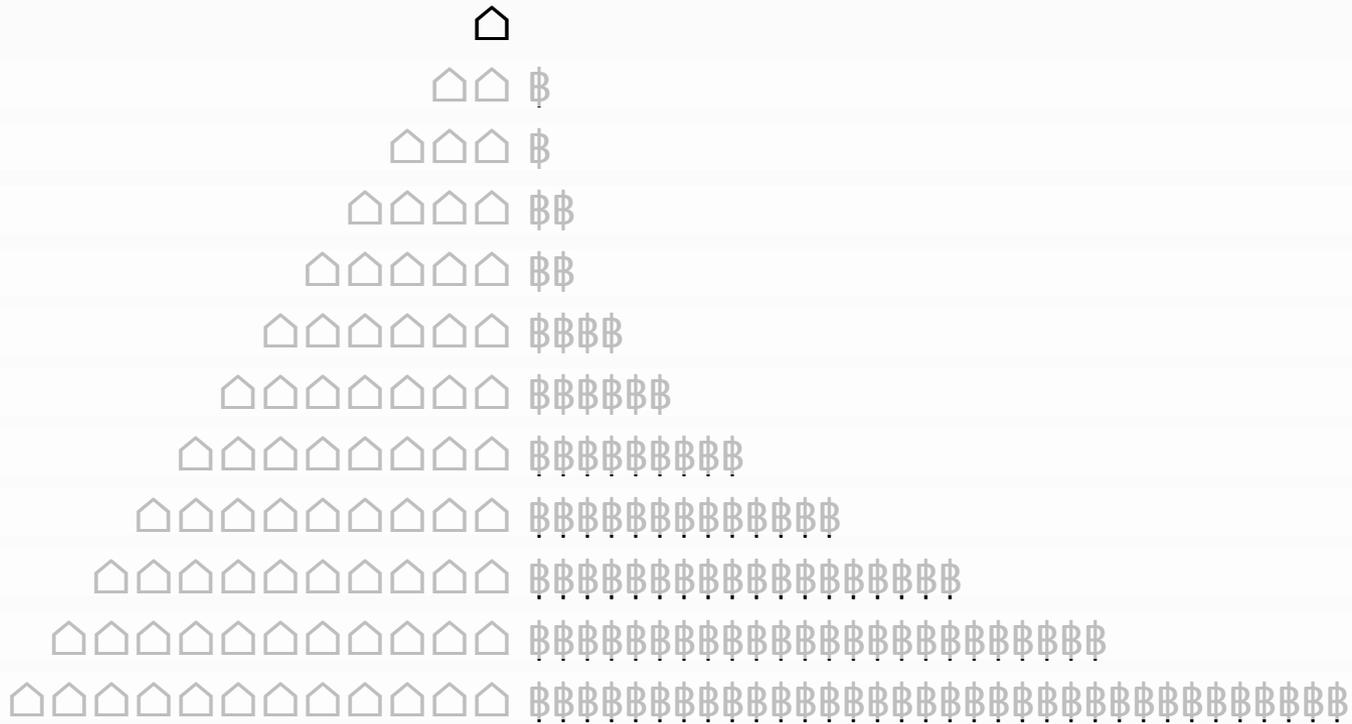
The Gini Coefficient

$$\text{Gini} = 100 \times \frac{A}{A+B}$$

**Gini = 0** means **all incomes are the same**

Gini = 100 means **one household has all the income**

Why Does it Matter?
Consequences of Inequality

- **Growth:** high levels of initial inequality appears to lead to lower subsequent growth in panels that include both high and low-income countries

- **Social cohesion:** inequality appears to be correlated with lower levels of "social trust"

- **Biodiversity:** higher inequality is correlated with a higher proportion of threatened species

- **Emissions:** inequality is correlated with carbon emissions (not necessarily positively)

- **Effort-sharing:** costs and benefits of GHG mitigation are borne differently by people at different income levels

# Mechanisms
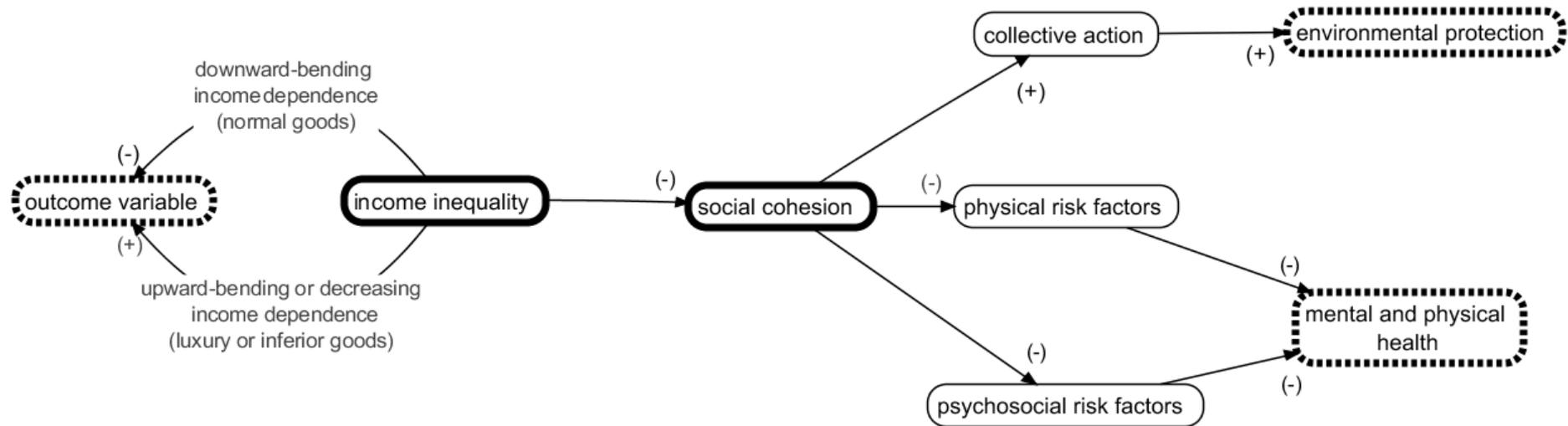
What Influences Inequality?

- Kuznets' hypothesis **is not supported** by the data
  - Kuznets: inequality rises, then falls, with increasing income
  - In fact there is almost no relationship between inequality and income
- The most successful theories include social and political variables
- Markets distribute income, but institutions matter (a lot) for the final allocation

Income Inequality vs. Income

Source: World Bank WDI. Gini data from close to 2005, but taken from 2003-2007.
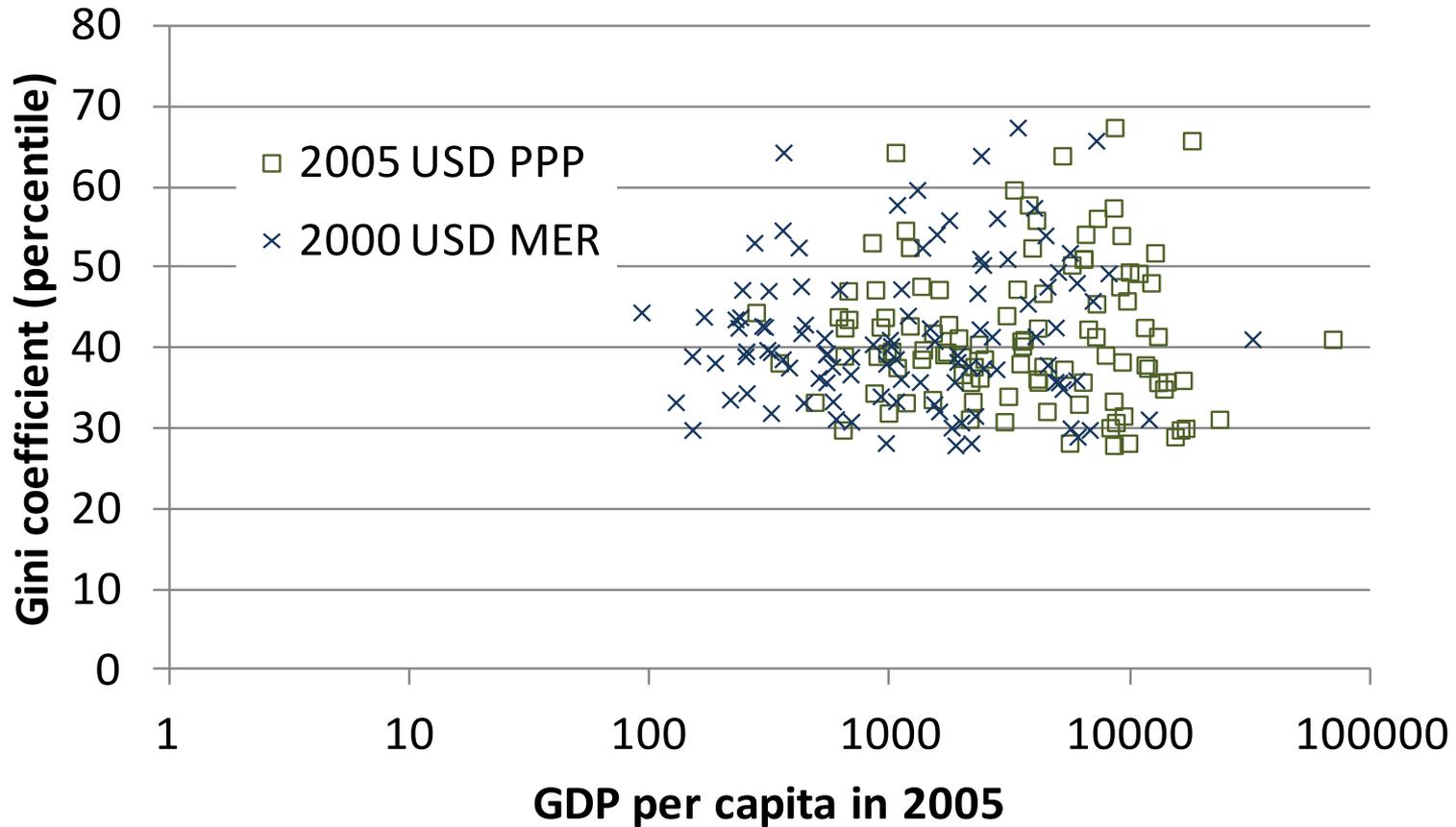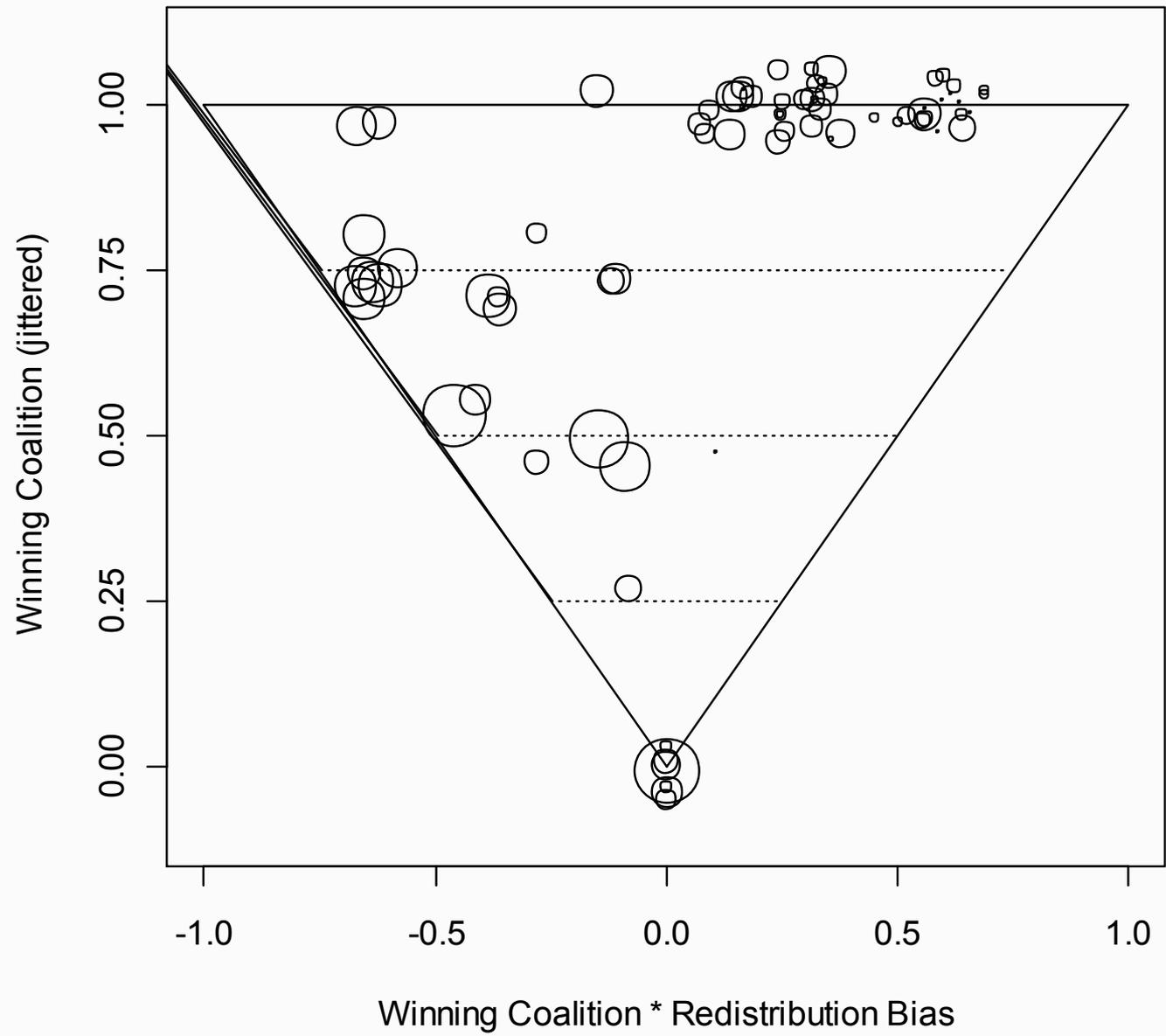
Political Regimes and Income Inequality

- Two theories
  - Chakravorty: income inequality is influenced primarily by state regime, whether extractive, redistributive, or reinvestment oriented

  - Bueno de Mesquita et al.: regimes are more extractive the smaller the size of the "winning coalition", the people who actually determine the choice of leader, compared to the size of the polity

Kemp-Benedict, E., 2011. 'Political Regimes and Income Inequality.' *Economics Letters*, 113(3): 266-268.
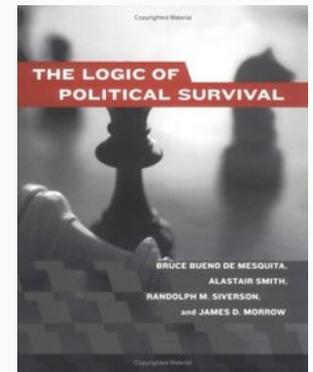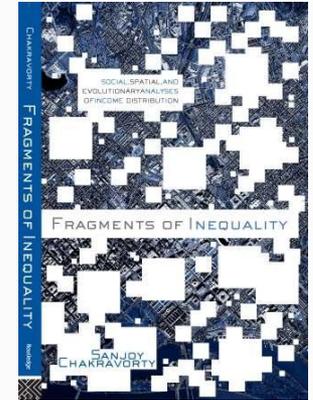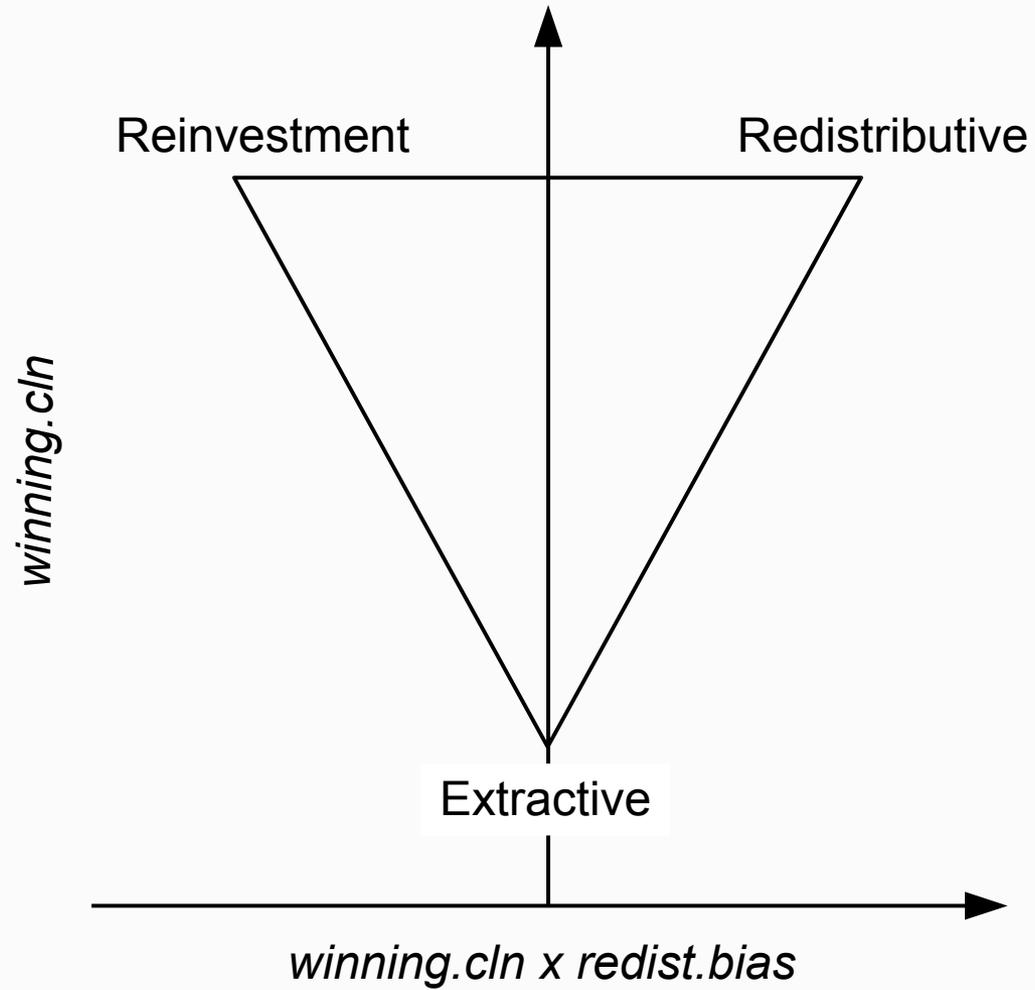
Inequality Data

- Used Gini coefficients from the WIID ver 2.0b
- Wanted measures of income net of taxes and transfers
- Excluded surveys that did not cover all age groups or all of the country
- Preferentially selected:
  - high-quality surveys as reflected in the quality score
  - surveys from the same source
  - In decreasing order of importance, surveys that:
    - reported income rather than expenditure
    - that did not use a gross income measure
    - that covered the entire population (in contrast to wage earners only)
    - that reported for individuals as opposed to households.

Winning Coalition (jittered)

Winning Coalition * Redistribution Bias

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	All variables	Excluding region	Excluding income	Excluding income and region	FGLS*
ME	-8.29** (-2.97)		-8.05** (-2.90)		
EE	-24.18*** (-8.22)		-24.40*** (-8.34)		
AFR	-0.04 (-0.02)		1.66 (0.87)		
SA	-12.96*** (-5.64)		-11.53*** (-5.82)		
EA	-5.61*** (-3.34)		-5.59*** (-3.41)		
OECD	-10.80*** (-5.66)		-10.94*** (-6.61)		
elf	6.42*** (3.54)	12.19*** (6.23)	6.66*** (3.78)	**12.35*** (6.51)**	6.78* (2.32)
(0.25 + winning.cln) ´ redist.bias	-2.95* (-2.16)	-6.25*** (-5.23)	-3.39** (-2.61)	**-8.07***(-8.48)**	-6.34*** (-4.74)
winning.cln	-6.74** (-2.79)	-5.01 (-1.96)	-8.09*** (-3.77)	**-9.74***(-5.64)**	-11.86*** (-6.42)
gini.is.expend	0.46 (0.36)	-0.94 (-0.64)	0.40 (0.31)	**-0.76 (-0.52)**	
gini.is.gross	3.24*** (3.40)	3.54*** (3.34)	3.36*** (3.58)	**4.02 *** (3.88)**	
log(pwt.gdppcch)	-6.28 (-0.55)	9.98 (0.94)			
log²(pwt.gdppcch)	0.31 (0.44)	-0.75 (-1.15)			
Constant	78.73 (1.65)	6.56 (0.15)	48.41*** (23.62)	**39.66*** (23.67)**	45.56*** (23.00)
Observations	307	307	307	**307**	308
R-squared	0.64	0.51	0.64	**0.51**	0.43
Adjusted R-squared	0.63	0.50	0.63	**0.50**	

*Feasible Generalized Least Squares: a two-step method that corrects for endogeneity

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Scenario Model

- Some time scales:
  - Time scale for relatively rapid policy changes regarding orientation toward redistribution or reinvestment (25 years)
  - Time scale for long-term changes in political institutions that influence the size of the winning coalition (75 years)
  - Time scale over which the influence of the historical context of a country over its income distribution gets diluted (100 years)
- Storyline parameters
  - Asymptotic "winning coalition", from 0 to 1 (roughly the same as "autocracy vs. democracy")
  - Asymptotic "redistribution bias", from -1 to 1 (roughly the same as "market-oriented vs. socialist")
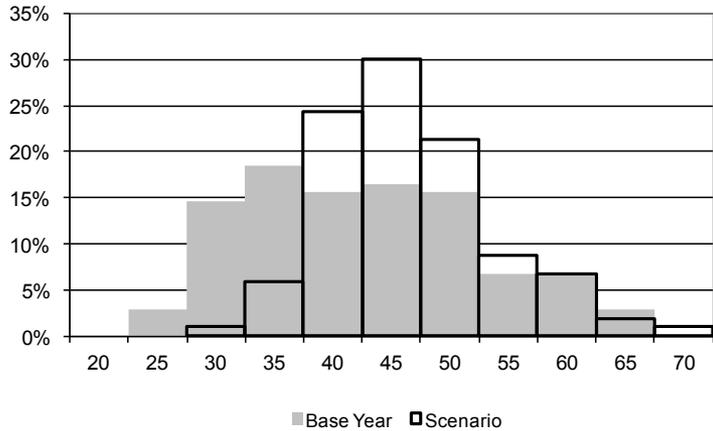
More Explicitly

$$G_i(t) = 39.66 - 8.07\left(0.25 + W_i(t)\right)R_i(t) - 9.74\,W_i(t) + \Delta\,G_i(t)$$

$$R_i(t) = R_i(0) + \left(1 - e^{-\,t/\tau_R}\right)\left(R_{\text{targ}} - R_i(0)\right)$$

$$W_i(t) = W_i(0) + \left(1 - e^{-\,t/\tau_W}\right)\left(W_{\text{targ}} - W_i(0)\right)$$

$$\Delta\,G_i(t) = e^{-\,t/\tau_G}\,\Delta\,G_i(0)$$

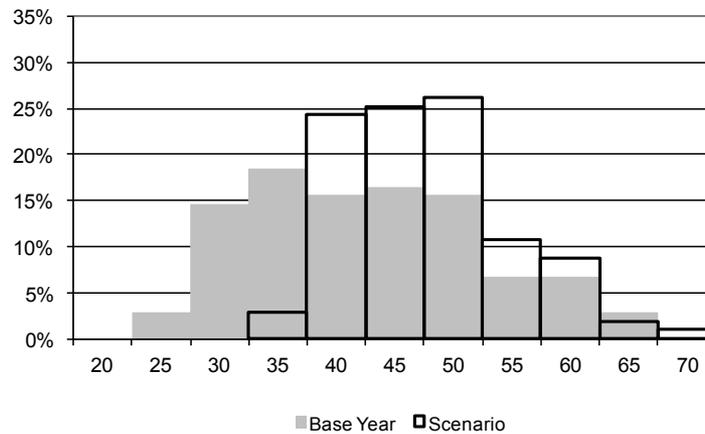# Extreme Regime Types

Reinvestment: R = -1, W = 1
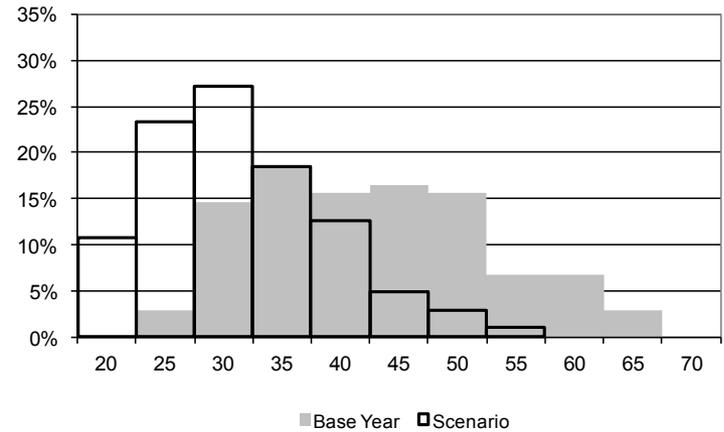
Redistributive: R = 1, W = 1

Extractive: R = -1, W = 0

Conclusion

- Inequalities come in many varieties, and they are not proxies for each other
- Income inequality is correlated with variables of interest for the SSPs
- Income distribution is affected by institutional, social, and political factors
- Used a statistical model that captures about one-half the variation in the data to make a scenario model
- The scenario model links to storylines