"Environmentalism without class struggle is just gardening"

An Ecological Interpretation of the Ricardian Growth Model

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Chico Mendes

Figure: Chico Mendes (born 1944) was a Brazilian rubber tapper, trade union leader and environmentalist. He fought to preserve the Amazon rainforest, and advocated for the human rights of Brazilian peasants and Indigenous peoples. He was assassinated by a rancher on 22 December 1988.

Outline of the Argument

- The actual limits to economic growth are not due to thermodynamics (Georgescu-Roegen), demographics (Malthus), strict biophysical limits (Daly), ... but the **social relations underpinning them: political economy**
- **The need to bring class analysis to ecological economics** (Malm)
- Discussing how the struggles of the poor are also ecological struggles for energy, food, and water, Martínez-Alier already emphasized three decades ago the centrality of social movements for environmental justice, inequality, and class conflict in shaping climate politics.

De-growth is inevitable, says political economy

- The paper pursues an ecological understanding of the earliest model of growth (under limited natural resources) in the history of political economy, developed in 1824 by David Ricardo.
- **Carrying Capacity** For David Ricardo, the economic system will eventually reach a steady state *spontaneously* (contra Herman Daly) due to the profit squeeze of increasing natural rents.
- The "principal problem in political economy" is the complex interaction between growth and income distribution in the form of wages, profits, and rent, respectively among workers, capitalists, and landlords (i.e. the private owners of the limited natural resources available).

The Tendency of the Profit Rate to Fall

"The idea that the process of capitalist accumulation ultimately terminates in a stationary state is deeply rooted in the classical tradition of political economy. Ricardo, in particular, visualized the process of accumulation that is almost inexorably driven toward its end because the capitalists gradually lose command over the investible surplus as their profit dwindles due to increasing pressure of rent on **limited natural resources like land***." (Bhaduri and Harris 1987)*

Marx's Tendencies and Counter-Tendencies

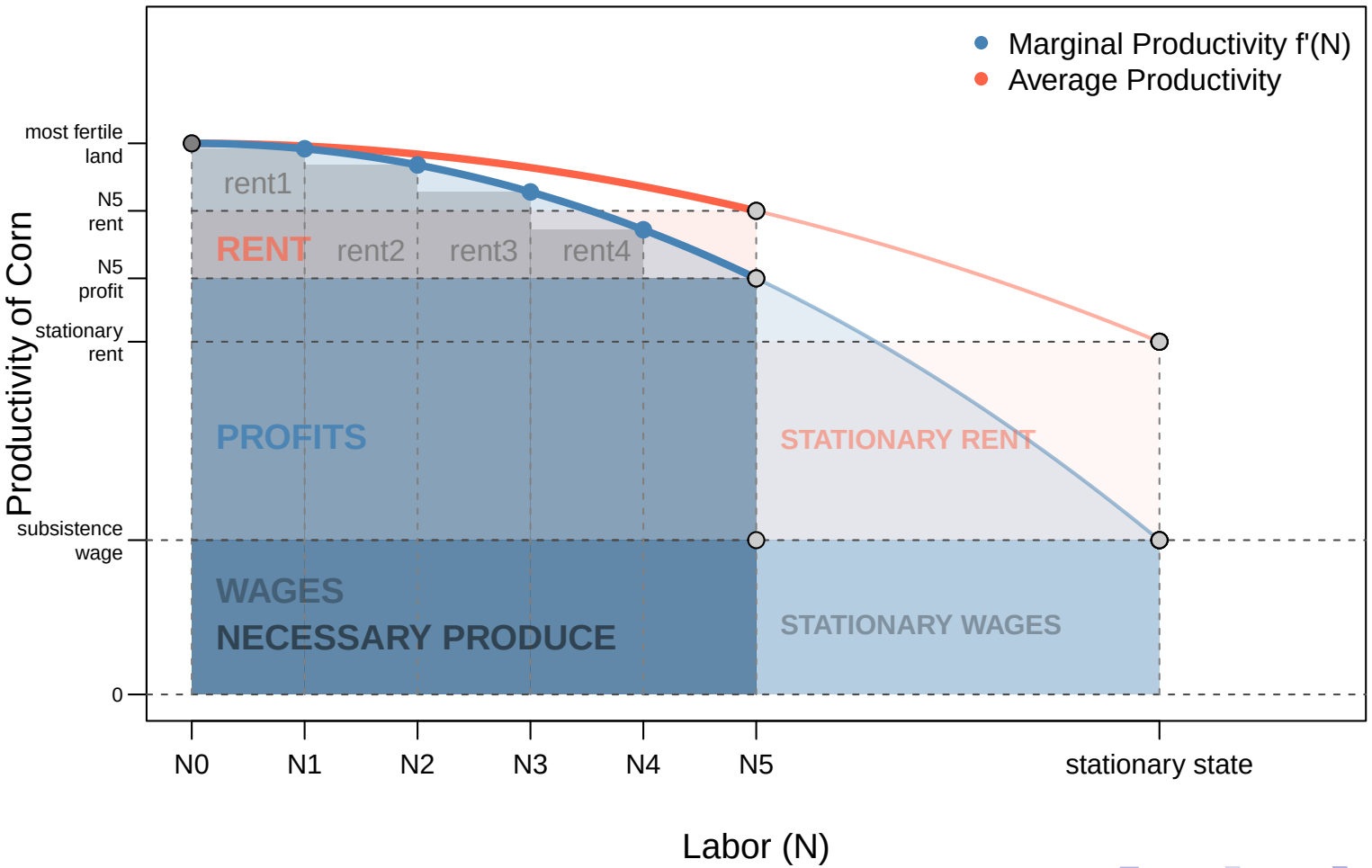
- **Tendencies Leading to the Decline of the Rate of Profit**
  - Rising Capital-to-Labour Ratio
  - Increasing Labour Productivity
  - Competition and Market Saturation
- **Counter-Tendencies that Offset the Decline**
  - Increasing Exploitation of Labor
  - Reduction in Wages or Depression of Wages Below Subsistence
  - Cheapening of Machinery
  - Expansion of Foreign Trade
  - Financial Speculation
  - Technological Innovations

Kondratieff's long waves in history

long wave phase	begin	end	historical period
upswing	1780-1790	1810-1817	French revo. - Napoleonic wars
downswing	1810-1817	1844-1851	Napoleonic wars - 1848 revos
upswing	1844-1851	1870-75	Liberal revos - German unification
downswing	1870-1875	1890-1896	Long Depression, Africa Scramble
upswing	1890-1896	1914-1920	Liberal Belle Époque - WW1
downswing	1914-1928/29	1939-1950	Fascism, Great Depression
upswing	1939-1950	1968-1974	WW2 - Wirtschaftwunder
downswing	1968-1974	1984-1991	Great Stagflation - collapse USSR
upswing	1984-1991	2008-2010?	Great Moderation, neoliberalism
downswing	2008-2010?	2030-2040?	Arab Spring, neofascism

Table: Kondratieff's long waves (Korotayev 2010)

Visual Depiction of the Ricardian Model (Pasinetti 1977)



Classes of Income and their Shares of Output

Class	**Income**	**Share**
Output	$Y = aN - 0.5bN^2$	$\iota = 1$
Rents	$R = 0.5bN^2$	$\rho = \frac{bN}{2a-bN}$
Wages	$W = wN$	$\omega = \frac{2w}{2a-bN}$
Profits	$P = (a-w)N - bN^2$	$\pi = \frac{2a-2w-2bN}{2a-bN}$

Table: **Classes of Income and their Shares of Output**

Logistic Growth

Discrete dynamic equation of motion

$$N_{t+1} = \frac{a}{w}N_t - \frac{b}{w}N_t^2 = \frac{a}{w}N_t\left(1 - \frac{b}{a}N_t\right) \tag{1}$$

Two-parameter

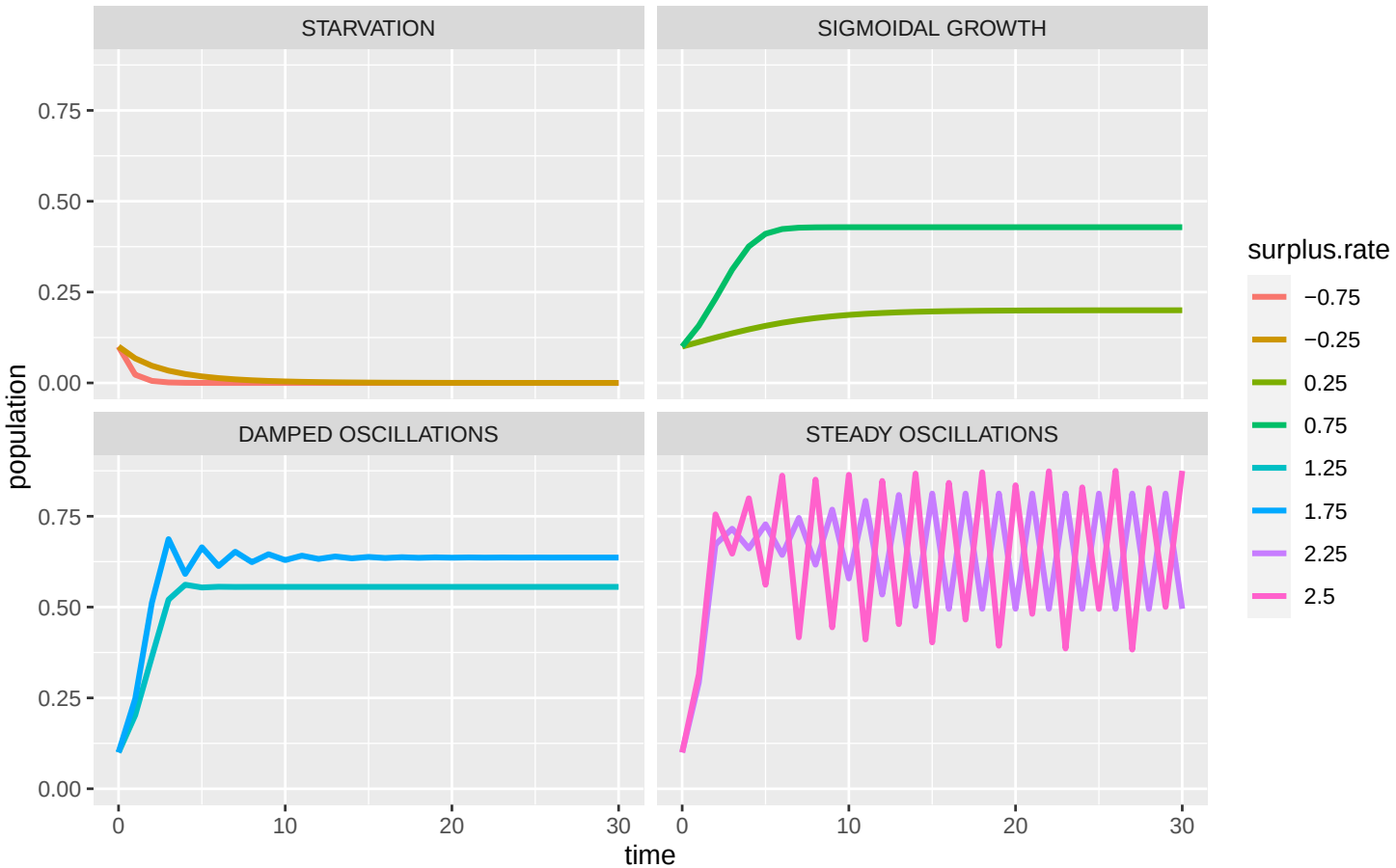
$$X_{t+1} = rX_t\left(\frac{K - X_t}{K}\right) \tag{2}$$

One-parameter

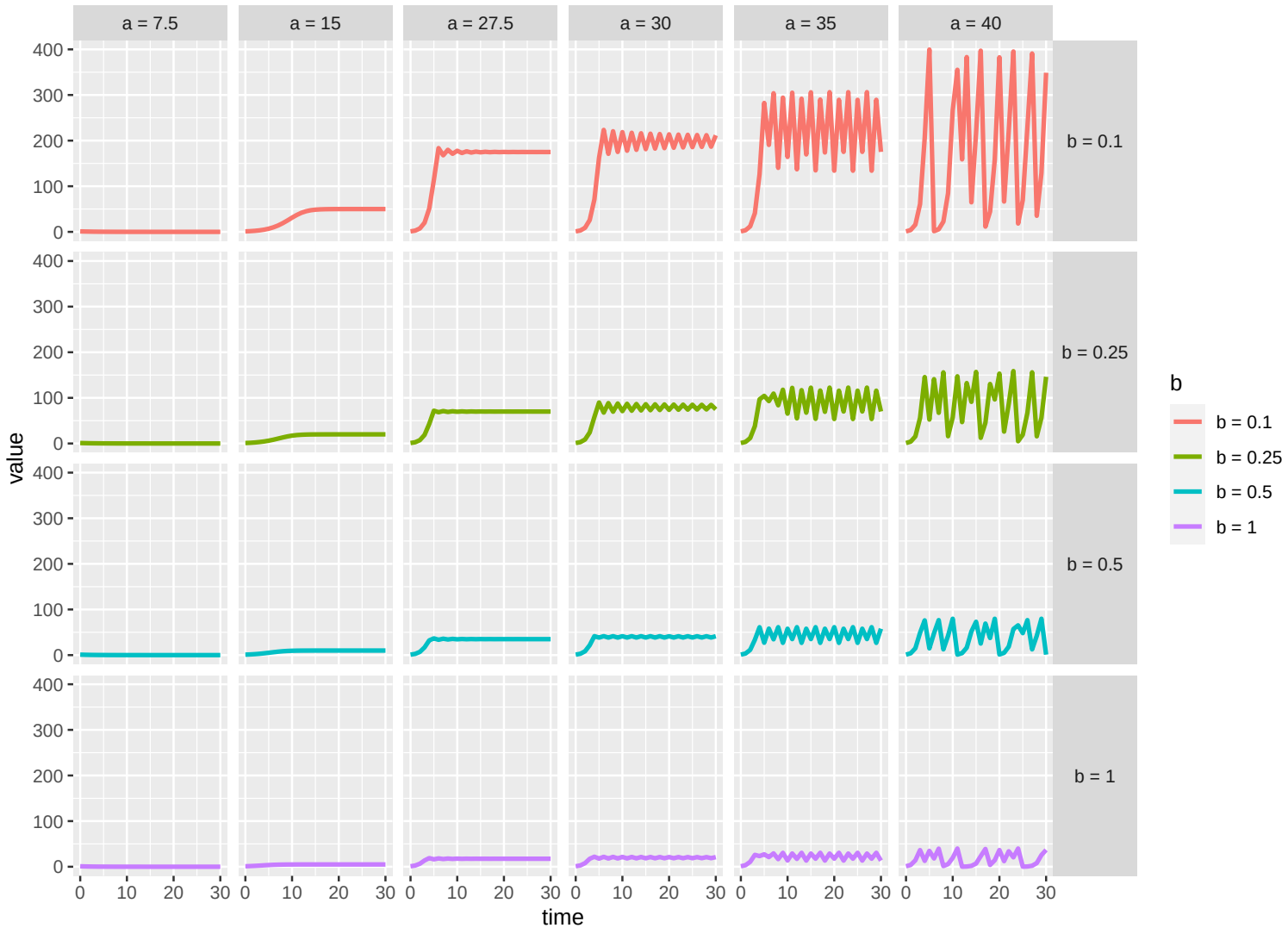
$$x_{t+1} = rx_t(1 - x_t), \qquad x \equiv X/K \tag{3}$$

where $K \equiv \frac{a}{w}$ is the carrying capacity of the environment (Daly).

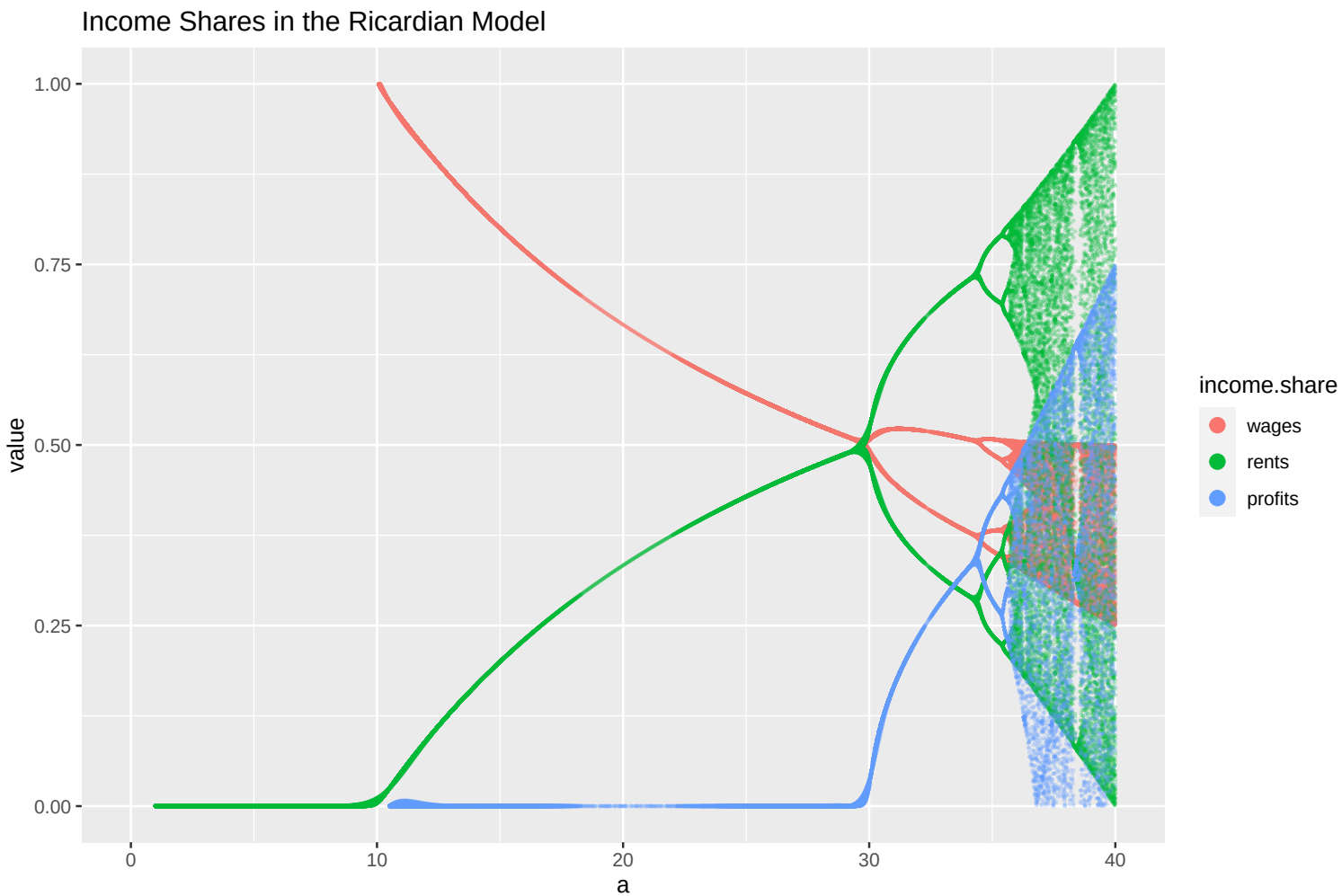
One-Parameter Scenarios



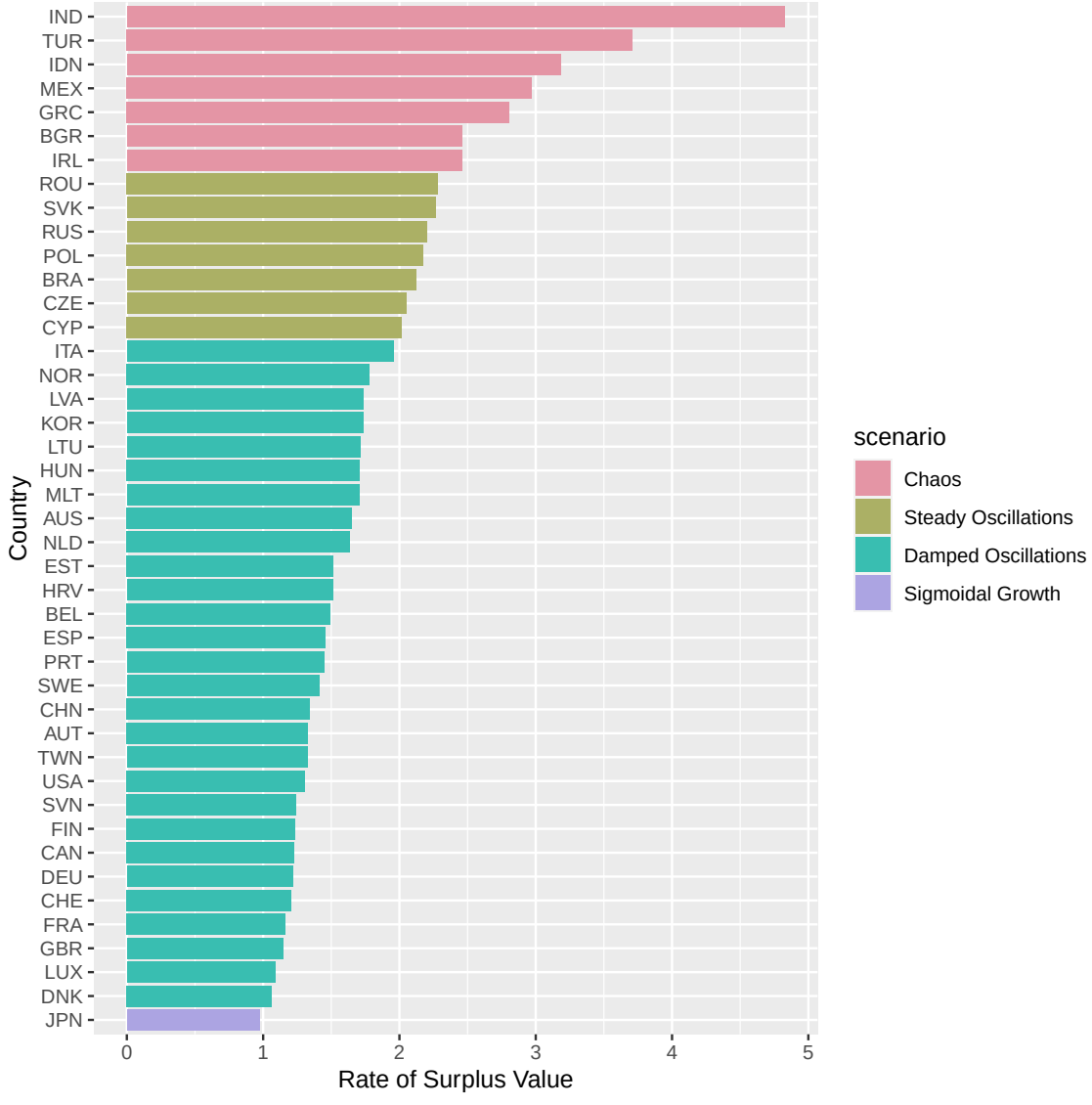
Two-Parameter Scenarios



Bifurcation Diagram: Chaotic Windows

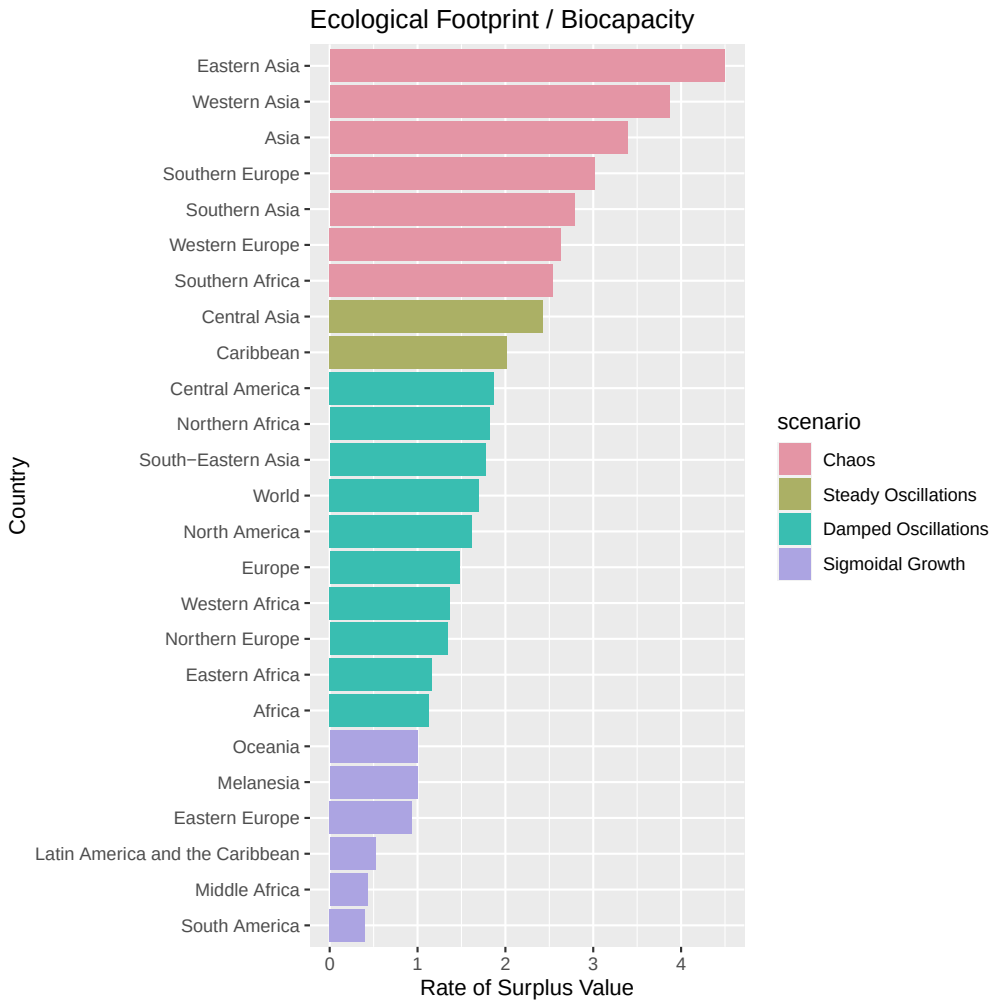


Labour (Rotta and Kumar 2023)



Energy Sources (EORA)

Ecological Footprint (Global Footprint Network)



Thank you!

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