



A low-carbon transition in a wage-led growth regime

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ISEE 2016: Transforming the Economy: Sustaining Food, Water, Energy and Justice

June 26-29, 2016

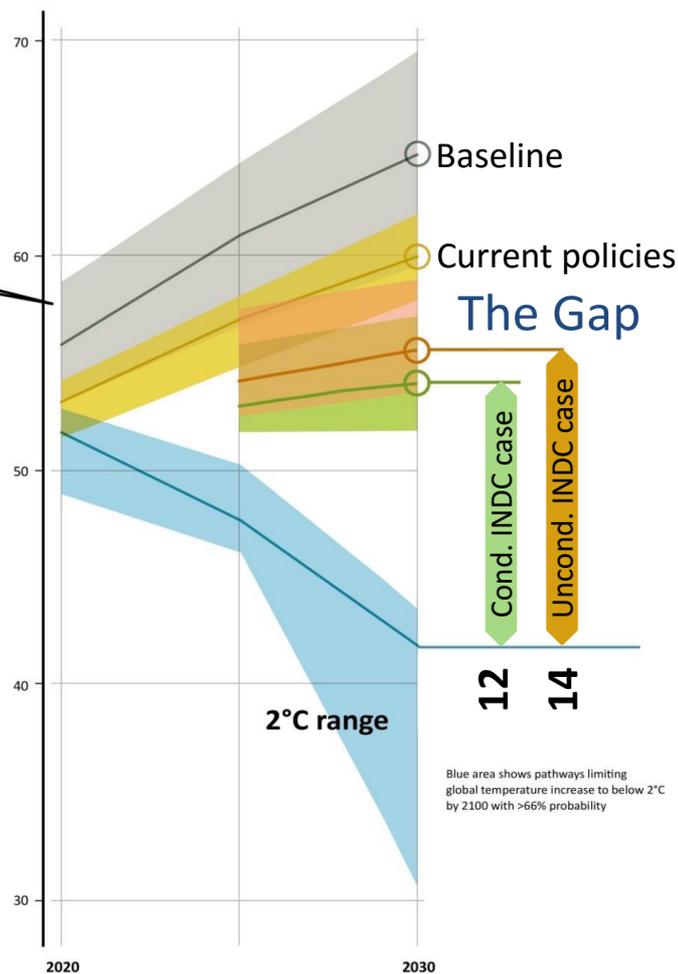
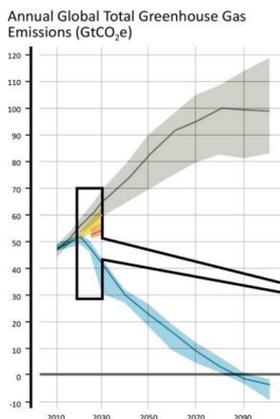
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The low-carbon economy

- Very low greenhouse gas (GHG) emissions
- Made possible by
 - Renewable and low-carbon energy sources;
 - *Sustainable production*: energy and material-efficient transport, storage, manufacturing and other intermediate processes;
 - *Sustainable consumption*: low embodied material use for satisfying needs; non material-intensive satisfiers for non-material needs

How low?

INDC contributions and the emissions gap



Unconditional INDC case

Gap= 14 GtCO₂e

Conditional INDC case

Gap= 12 GtCO₂e

The INDCs present a real increase in the ambition level compared to a projection of current policies.

The emissions gap in both 2025 and 2030 will be very significant and ambitions will need to be enhanced urgently.

Note: At COP21 an aspirational goal of 1.5°C above pre-industrial levels was adopted.

The importance of capital

- Capital stocks have “baked-in” technology
 - Coal-fired power plants
 - Blast furnaces
 - Jet turbines
 - A preponderance of roads over rail
- They can also last a very long time*
 - 5-15 years: consumer durables
 - 15-40 years: Factories, power plants, road, rail, power distribution...
 - 40+: land use and urban form

Plus ça change...

“...if there is a significant probability of having to maintain atmospheric greenhouse gas concentrations below about double those of the preindustrial era, then **the economic risks associated with deferring abatement justify starting to limit CO₂ emissions from energy systems immediately.**” *Ha-Duong et al. 1997*

“Substantially postponing the emission reductions, compared to the ranges indicated in IPCC’s recent assessment for 2020 as required for meeting the long-term 2°C target, increases the risk of exceeding this target. **The costs of a delay strategy are lower in the short term, but leads to higher costs in the longer term.**” *den Elzen et al. 2010*

“**Substantial emissions reductions over the next few decades can** reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, **reduce the costs and challenges of mitigation in the longer term** and contribute to climate-resilient pathways for sustainable development.” *IPCC AR5 2014*

...but not entirely *la même chose*

- Rapidly dropping costs of some renewables
- Expansion of wind power in the US Midwest
- Greater integration of renewables in electricity grids
- Expanding use of electric vehicles
- Shifts away from coal in some countries
- Major initiatives with strong support (e.g., *Energiewende* in Germany)

In this presentation

- Motivate a pen-and-paper post-Keynesian model for studying a low-carbon transition
- Use it to make the following points:
 - The presence of green investment is necessary but not sufficient for a low-carbon transition
 - For a transition to occur, investors must be “bullish” on the green economy
 - When economies are wage-led*, a low-carbon transition is likely to be stimulating
 - High-income countries are likely to do better than low-income countries in a push toward a low-carbon economy

SOME CONCEPTS

Socio-technological regimes

- Incumbent technologies are supported by infrastructure; standard components; trained workforce; research grants; regulations; lobbyists; familiarity; industry networks;...
- Invention proceeds mainly along well-defined paths, but;
- Some invention occurs in niches, pointing to possibilities and providing seeds for the future;
- Normally, a niche expands because: a) it is initially protected; b) it can support a clearly more profitable regime after the transition

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Why does it depend?

- Energy
 - Intermittent, distributed renewables need a new grid and operating regime: UHVDC, 'smart' components, short-time dispatching/bid
 - Biomass-based fuels require different processing and components
- Chemicals
 - Biomass-based chemicals offer different 'platform' chemicals
 - Synthetics are likely to have different properties
- Building materials
 - New building shells require new skills to work
 - Composites are often called for, and they require new skills
 - Carbon-sequestering cements may have different properties
 - But... steel stays the same, except for production methods

Uncertainty

- Will we succeed in meeting climate goals?
- What technologies will prevail?
- What current capital can be adapted? What needs to be scrapped?
- Will government policy be politically sustainable?
- Will countries act together, or separately?
- What jobs will be available, and what skills will be wanted?

Uncertainty

- Will we succeed in meeting climate goals?
- What technologies will prevail?

This is not a question of probabilities
The future is *fundamentally* uncertain

?

- Will countries act together, or separately?
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MODEL FEATURES

Green & brown capital regimes

- Binary classification: “green” and “brown”
- Irreversible, “putty-clay” investment
- Distinguished by their GHG emissions intensities
- Propose:
 - Green capital is less productive than brown capital in a brown capital-dominated regime (carbon lock-in*)
 - Green capital is more productive than brown capital in a green capital-dominated regime (carbon lock-out)
 - As green capital penetrates into the economy, its productivity increases, while that of brown capital decreases

Inputs and outputs

Main assumptions

- Leontief production function with surplus labor (standard post-Keynesian)
- Capital productivity in different regimes (new)
- Perpetual inventory dynamics

Can now calculate

- The volume of investment
- Allocation between green and brown

VOLUME OF INVESTMENT

Side note: Regimes

Three 'regimes' in
this model

Socio-technological

- Brown capital-dominated
- Green capital-dominated

Distributional

- Fixed-markup
- Target-return

Growth

- Wage-led
- Profit-led

Profit rate

- The profit rate is the product of the profit share and the capital productivity
- When capital productivity falls:
 - If the profit share (and wage share) are fixed, then the profit rate falls
 - If the profit rate is fixed, then the profit share rises and the wage share falls

Distributional regimes: A stylized history of the 'North'

Era	Unions	Profit share	Profit rate	Events and trends
1960s	Comparatively strong	Stable	Historically stable	
1970s	Weakening	Stable	Falling	Oil crisis 'Petrodollars' Southern investment
1980s	Very weak	Rising	Rising	Southern debt crisis Gov't attacks on unions
1990s	Very weak	Rising	Stable	'Shareholder value era' Financialisation

Distributional regimes

fixed-markup

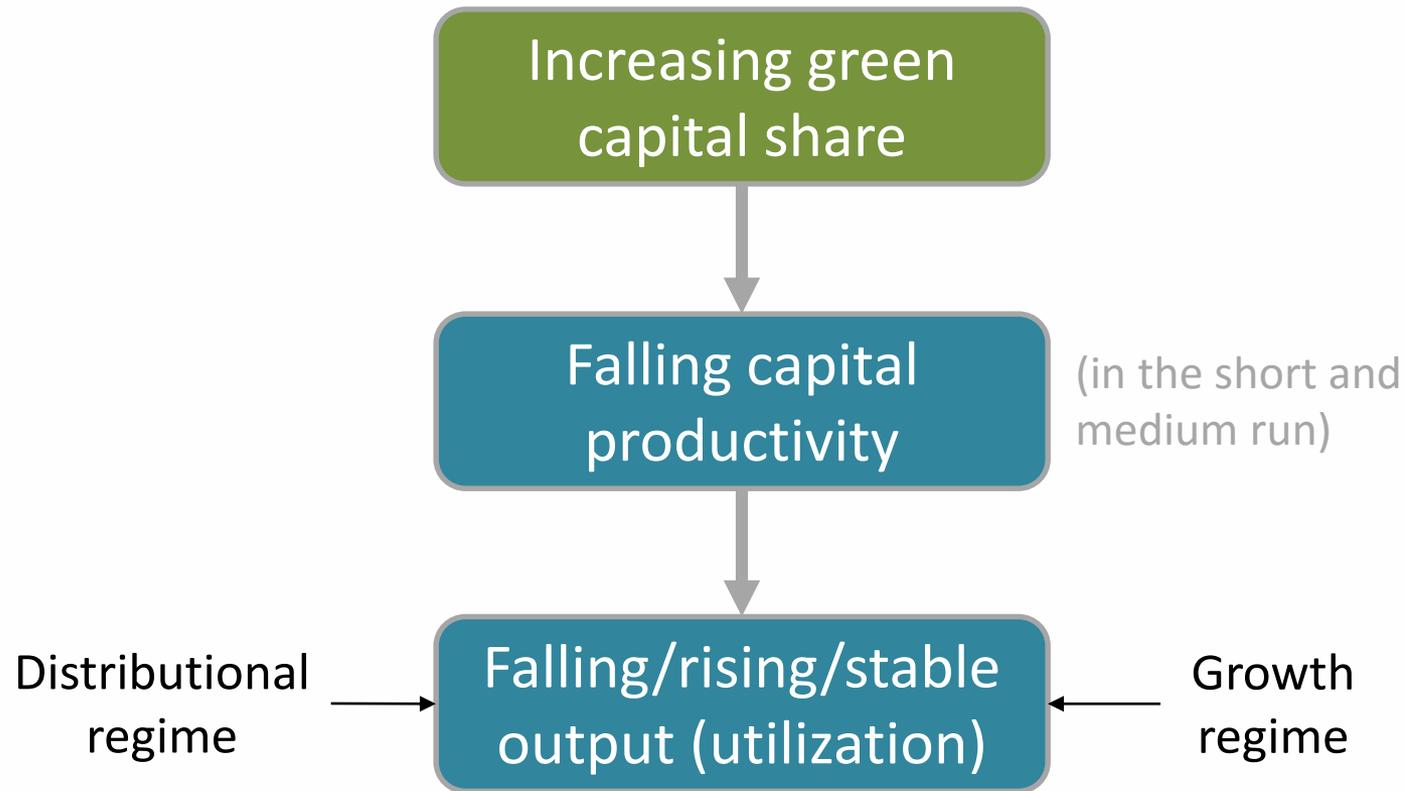
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target-return

Growth regimes

- Regime types
 - Wage-led: a rising wage share is stimulating
 - Profit-led: a rising profit share is stimulating
- Who is wage-led?*
- The world as a whole appears to be wage-led
- High-income countries and large mid-income countries tend to be wage-led
- Small countries and developing countries tend to be profit-led

Causal chain



Impacts on different economies

	Large	Small
Middle-high income	Many sources of saving Wage-led	Many sources of saving Profit-led
Low-middle income	Saving from profits Wage-led	Saving from profits Profit-led

The best prospects are for large, high-income countries
Small, open developing countries are likely to fare poorly

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Rising risk premia can make all negative

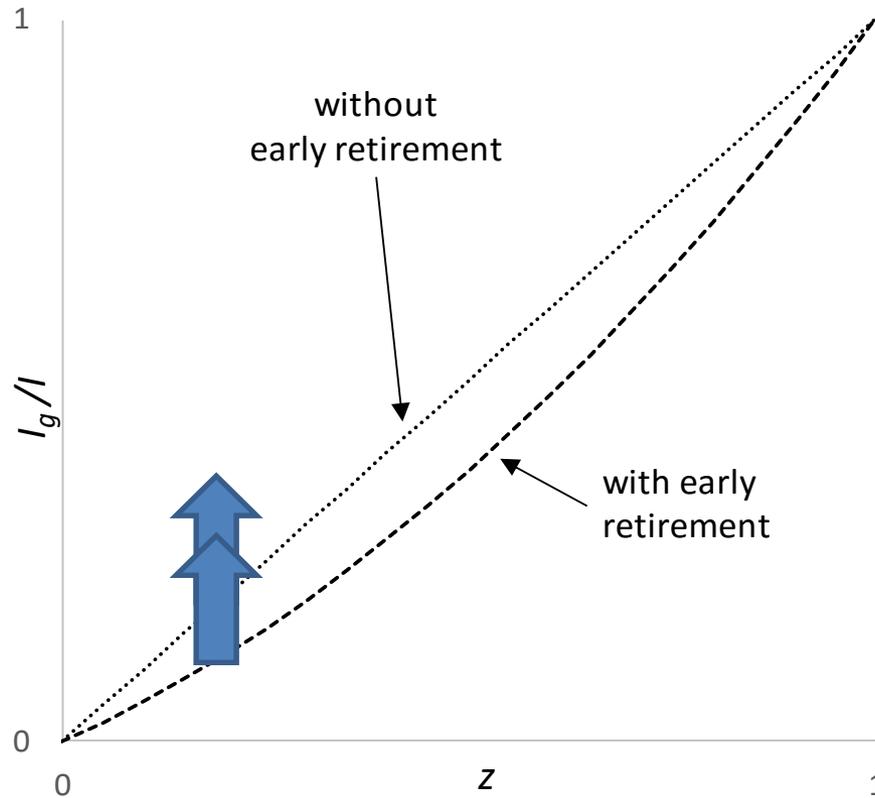
INVESTMENT ALLOCATION

A “neutral” portfolio

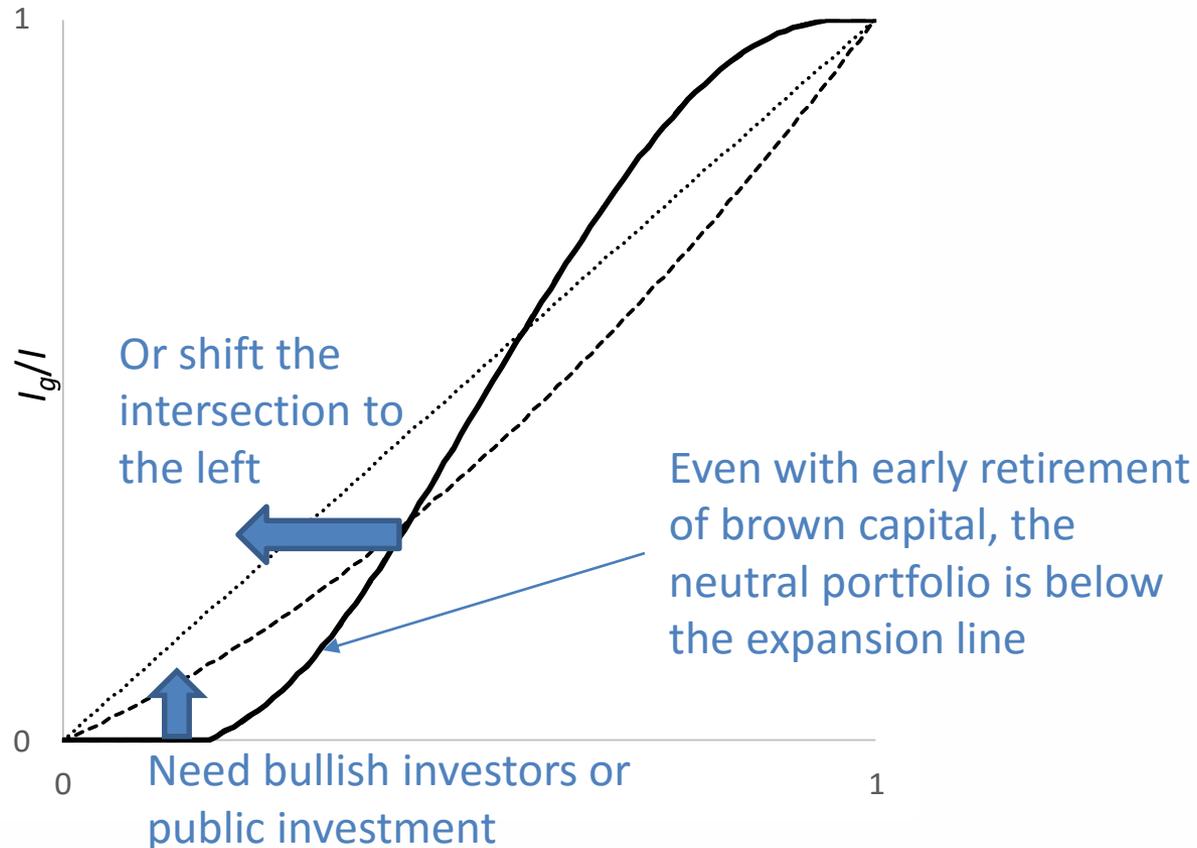
- Brown capital is more productive
- But it may rapidly lose value (stranded assets)
- A cautious investor might choose a portfolio that is neutral to a change in the amount of green capital in the capital stock

Model → Productivity difference depresses investment below level needed to expand

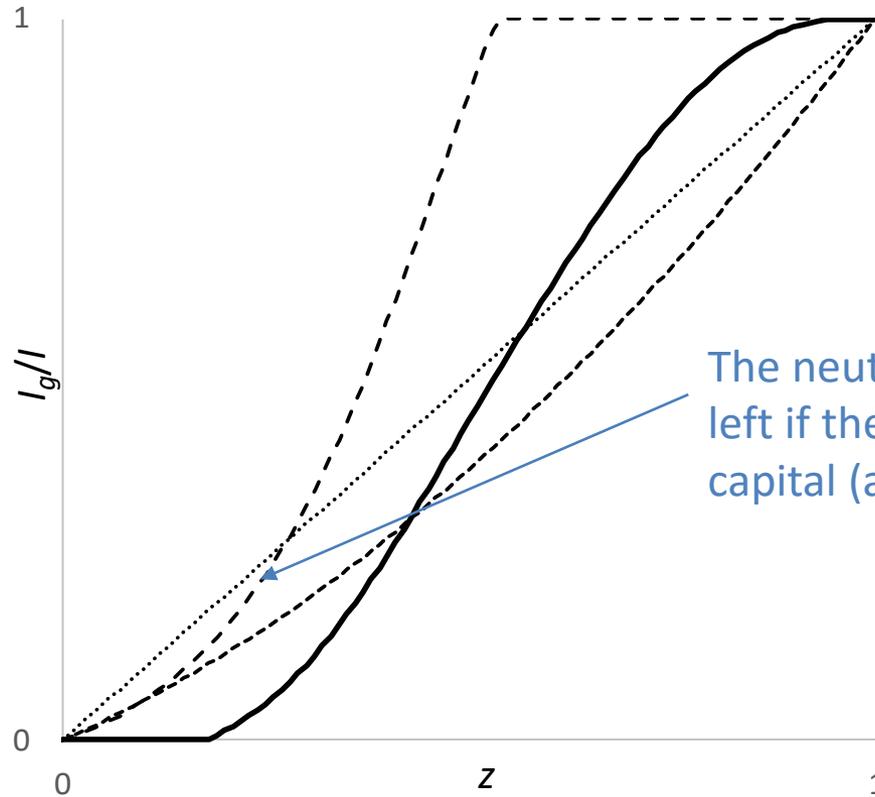
The expansion line



Neutral portfolio

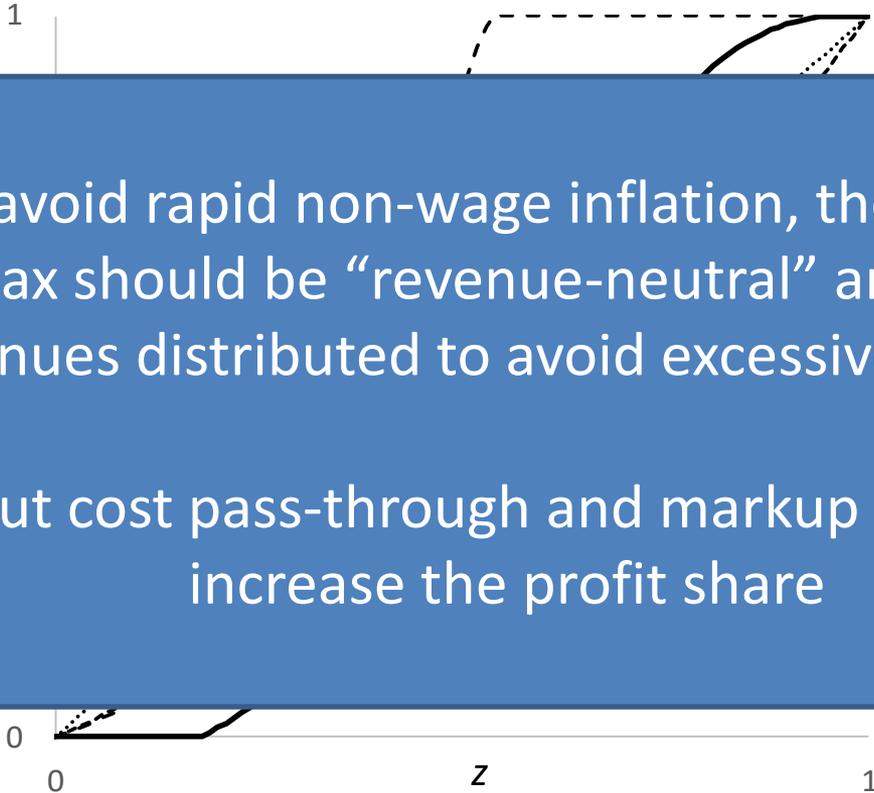


Carbon tax



The neutral portfolio shifts to the left if the costs of operating brown capital (and prices) are higher

Carbon tax



To avoid rapid non-wage inflation, the carbon tax should be “revenue-neutral” and the revenues distributed to avoid excessive burdens

But cost pass-through and markup pricing increase the profit share

ts to the
ng brown
gher

IMPLICATIONS AND FINAL WORDS

Within individual countries

- Construct a credible, explicable, and maintainable portfolio of incentives (“policy wedges”?) to provide a stable and encouraging environment for investment
 - Systemic change is needed, so a carbon price alone is unlikely to succeed
 - Investment in shared infrastructure that “crowds in” private investment is key to systemic change
 - Support technological “niche” development
- Maintain public optimism
 - Pay attention to uneven distribution of gains and losses in the transition
 - Deliver consistent messages and seek to build a reputation for competence and reliability

Between countries

- For the world as a whole, prospects are good, and protecting real wages enhances the effect
- But:
 - High-income countries are likely to do better
 - Small, open developing countries might suffer
- Policy implications:
 - Avoid one-size-fits-all: address the specific context within individual countries
 - Provide financial assistance to developing countries, but through grants where possible to minimize the risk of future unsustainable debt

post-Keynesian Kaleckian models

- Good for pen-and-paper analysis
- A “workhorse” model with many expositions and extensions in the literature
- An alternative to neoclassical models with:
 - Different types of income recipients (wage-earners/salary-earners/dividend recipients/firms)
 - Underutilization of resources (unemployment)
 - Non-optimizing behavior (negotiated, norm-based)
- A useful approach for ecological macroeconomics