

HOW'D *THAT* HAPPEN?

BIOPHYSICAL PERSPECTIVES IN ECONOMIC HISTORY

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At root asking:

How'd that happen

Plan of attack

- Range of styles
- Layers of biophysical economics
- How things stack up

The works

- **Friends of nature**

- Pomeranz: *The great divergence*
- Pomeranz (ed.): *The environment and world history*
- Bowlus: “Ecological crisis in fourteenth century Europe”
 - in *Historical ecology*

- **Hybrids**

- Landes: *The unbound Prometheus*
- McCusker & Menard: *The economy of British America*
- Jones: *European miracle*

- **It's the people, stupid**

- North: *Growth of the United States 1790-1860*
- North & Thomas: *The rise of the West*
- Critics of Pomeranz (e.g., Jones)

4 layers of biophysical perspective



- Evolutionary view
- Finance
- Resources and technology
- Economy as physical process
- Geography

Economy as a physical process



- Core idea of biophysical economics:

The economy is fundamentally a physical process

Other aspects are derived from that

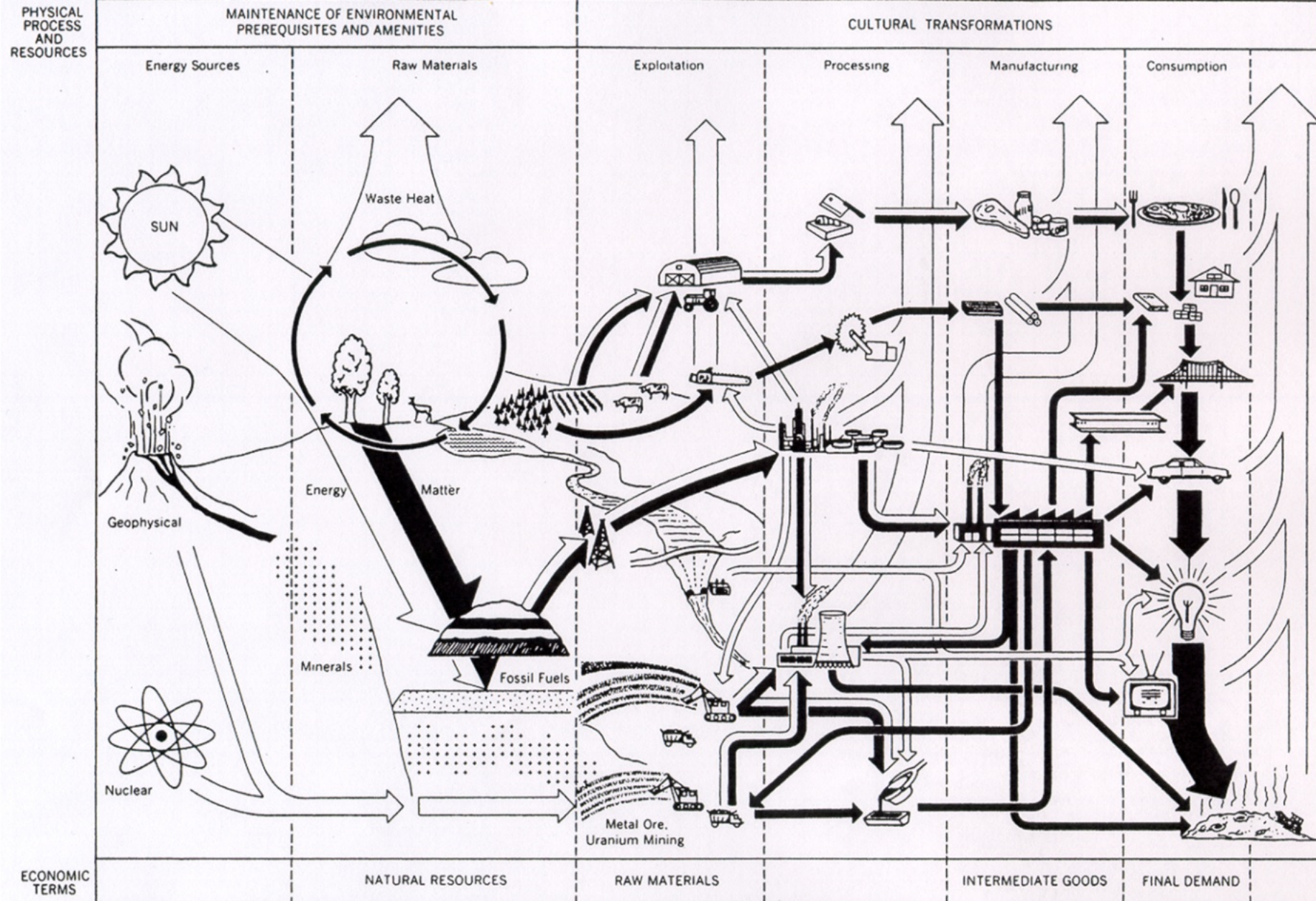
Prosperity comes from using resources

Evolutionary perspective

Finance

Resources and technology

Economy as physical process

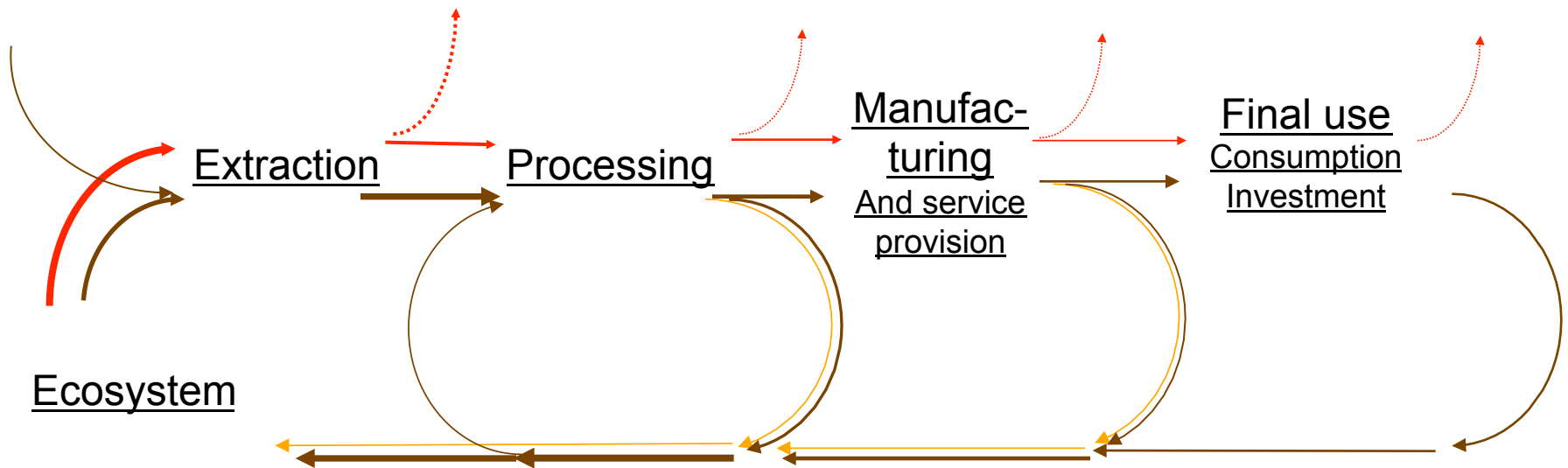


From Charles A.S. Hall, "Biophysical economics: definitions and applications"

Simplified energy and matter flow



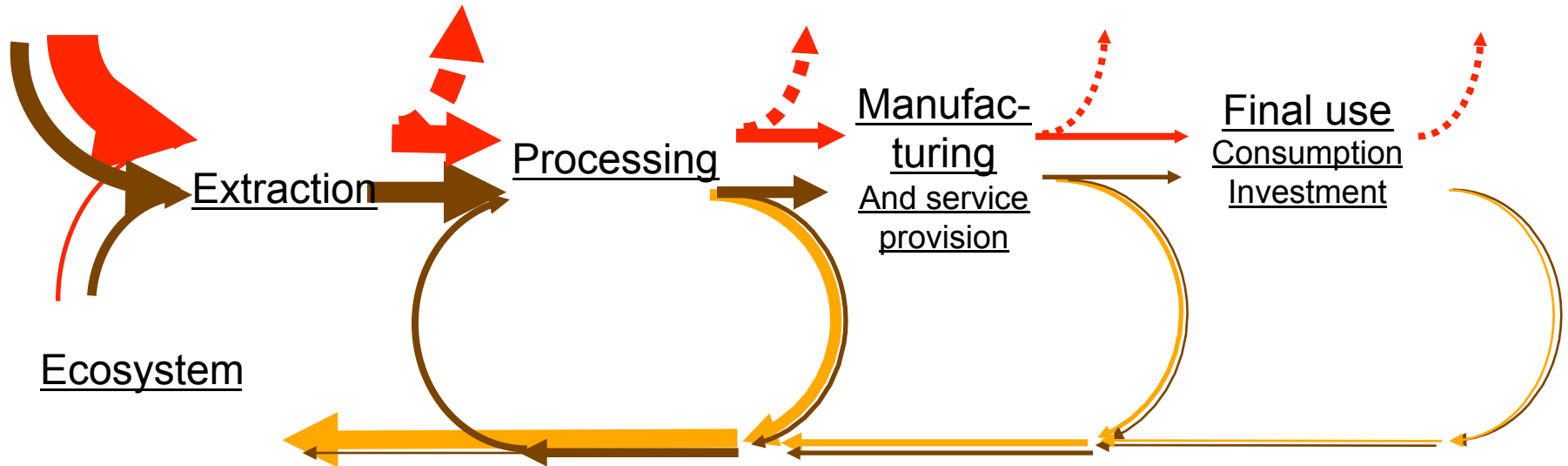
Non-renewables



Simplified energy and matter flow



Non-renewables



Economy as a physical process

- 14th-century collapse
 - Bowlus: exhaustion of forests
 - North-Thomas: wrong institutions for eliciting needed action
- Netherlands
 - Bowlus: dependent on grain imports in Middle ages
 - North-Thomas: transcended resource constraints by becoming entrepôt
- China vs. the West
 - Pomeranz: colonial exploitation, then coal
 - Jones: Balderdash! It's institutions
- Landes
 - Ind. Rev. in UK unthinkable without coal

Evolutionary perspective

Finance

Resources and technology

Economy as physical process

Resources and technology

- Innovation is changed relationship to resources, or thermodynamic gradients
 - Improved ability to find them
 - Increased capture
 - Modified ways of using them

Evolutionary perspective

Finance

Resources and technology

Economy as physical process

Resources and technology



- North-Thomas growth description:
 - Increase in *per capita* quantity of one or more factors of production
 - [i.e., improved ability at finding, and/or increased capture of gradients]
 - Increase in efficiency of one or more factors of production
 - [i.e., modified ways of using gradients]
- Landes
 - Technological change requires sufficient expected gain to overcome inertia
 - [Abundant resources boost the expected gain] Evolutionary perspective
 - Recognizes application of new resources as important aspect of technology Finance

Resources and technology

Economy as physical process

Finance



- Economy is a complex system
 - Many individual, interacting components
 - System behavior not predictable from behavior of the components
- In nature, chemical and physical signals to organize complex systems

Evolutionary perspective

Finance

Resources and technology

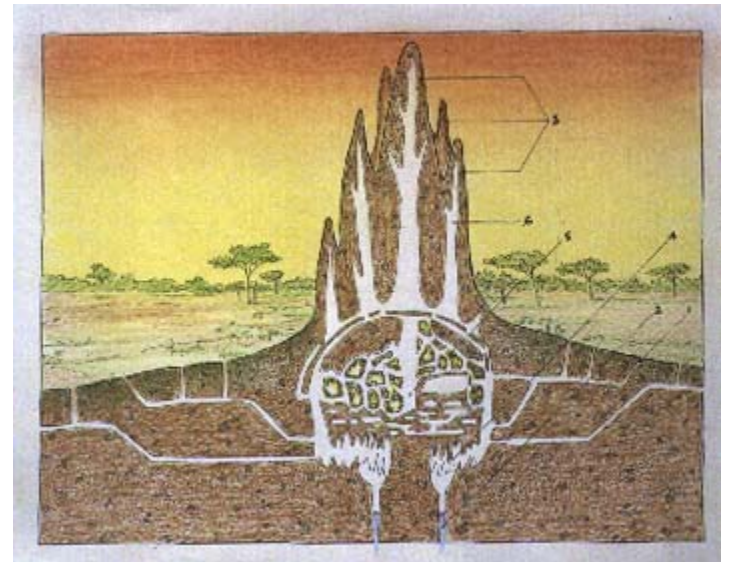
Economy as physical process

Decentralized coordination

Nobody's "in charge" in a termite mound
They build large structures that embody complex engineering principles



<http://blog.100-mile-house.org/?p=77>

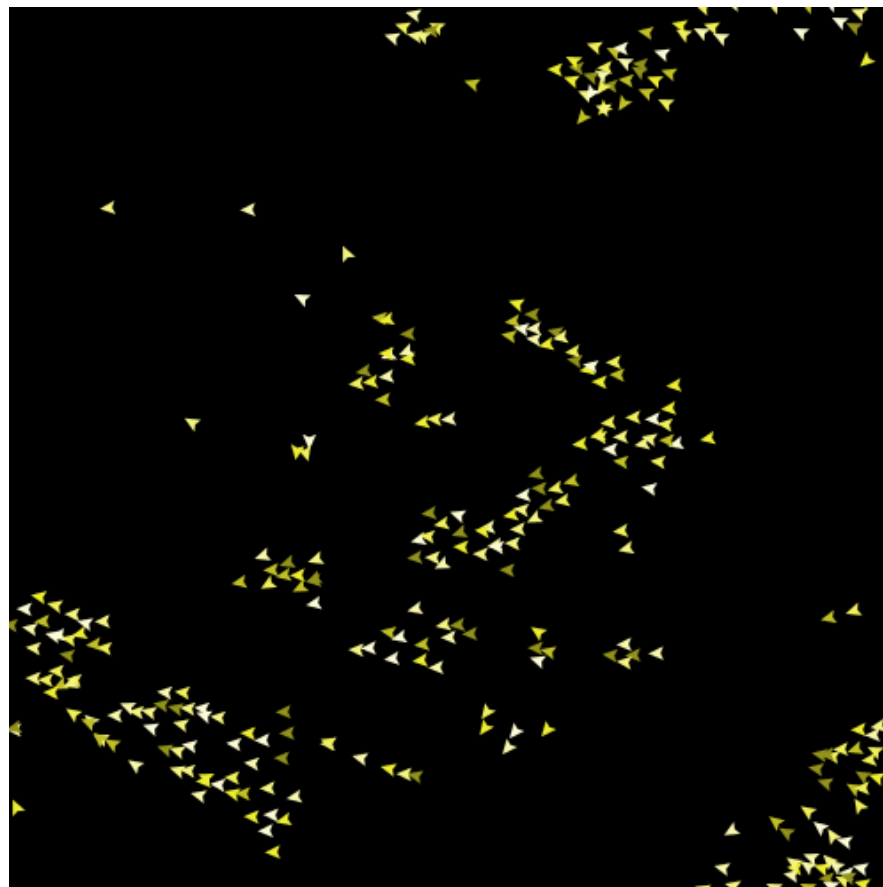
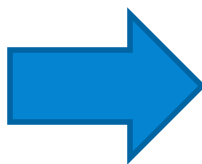
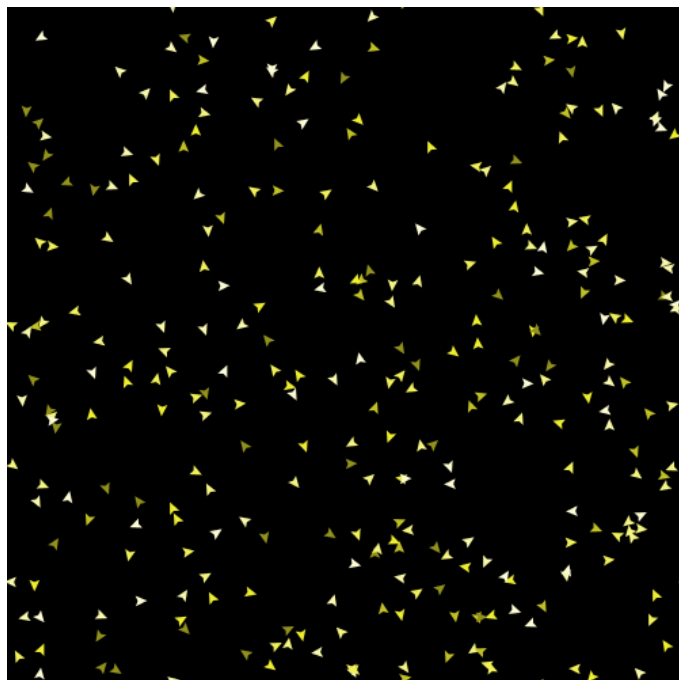


<http://inhabitat.com/building-modelled-on-termites-eastgate-centre-in-zimbabwe/>

Complex system

- A system of many components, where the system displays properties that are not obvious from the properties of the individual components
 - 4 rules
 1. If you're a bit too far from others turn toward them
 2. If you're too close, turn away
 3. If you're "in the zone," turn to be with them
 4. You have limited effective visions

Flocking behavior



Finance



- Economy is a complex system
 - Many individual, interacting components
 - System behavior not predictable from behavior of the components
- In nature, chemical and physical signals to organize complex systems
- In human economies, signaling through institutions
 - Modern economies: money, finance, markets

Evolutionary perspective

Finance

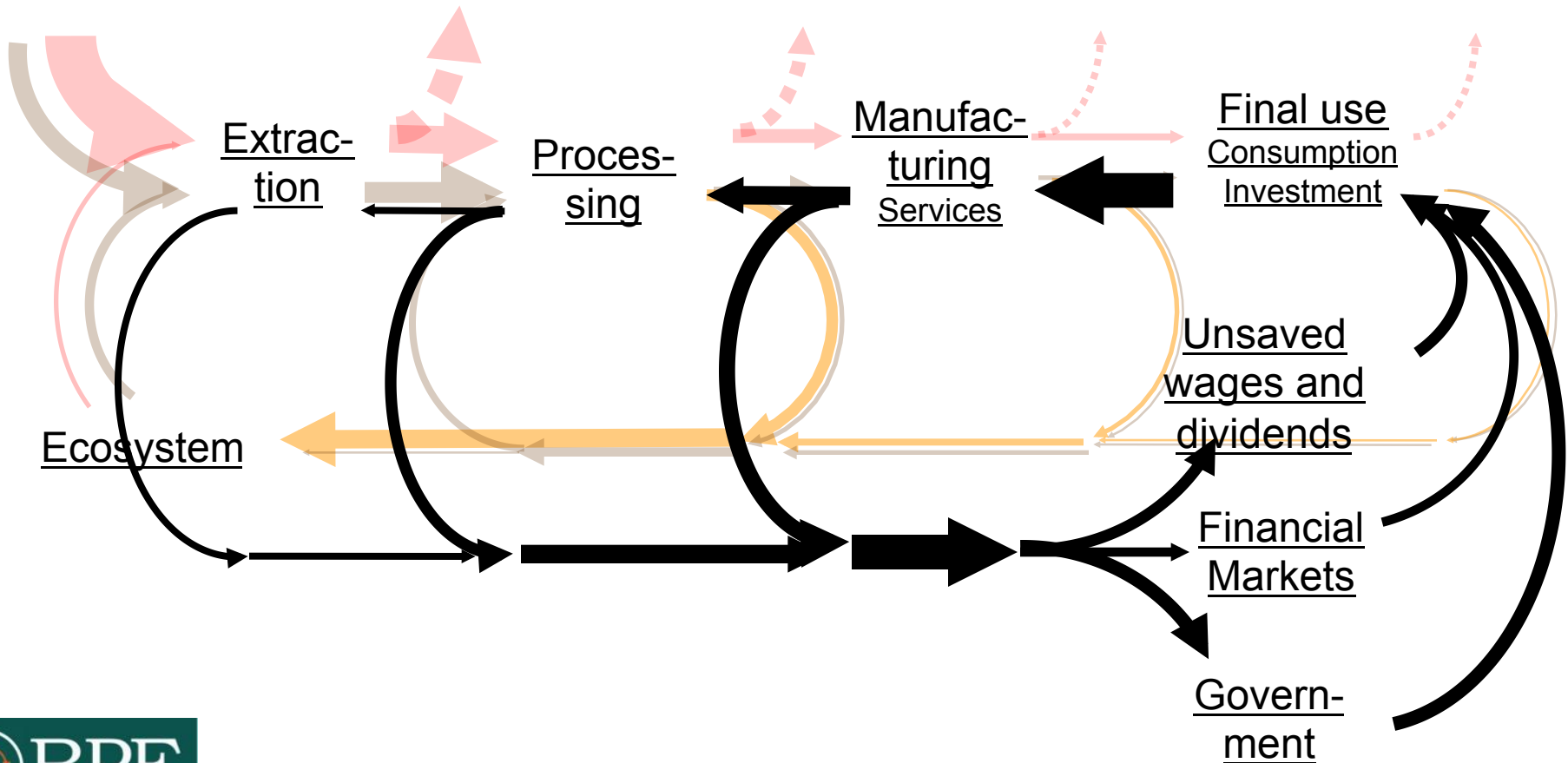
Resources and technology

Economy as physical process

Circular flow of expenditure

Purchasing power

Non-renewables



Finance

- Institutionalists understand the coordinating role
 - Good finance → Better job marshaling your physical assets
- But causality the other way?
- North-Thomas: There are costs to changing and developing institutions
 - Large expected gains → Higher odds of institutional advance
 - Abundant *potential* resources → Strong incentive for improvement

Evolutionary perspective

Finance

Resources and technology

Economy as physical process



HARTWICK
est. 1797

Evolutionary view

- Economy as complex adaptive system (CAS)
- Good explanations make evolutionary sense
 - Each step is progress on its own
 - Don't happen "so that" some later step can happen
 - Only survive if useful in their time
 - Though they may turn out to be crucial to some later development

Economics is the ecology of our species

Evolutionary perspective

Finance

Resources and technology

Economy as physical process

Evolutionary view

- Pomeranz
 - China's mines were in arid region
 - No motive for developing steam technology that would be crucial later
- Landes
 - Early steam engines <1% efficient, but viable at mines
 - Free fuel
 - Allowed the technology to evolve further
- North
 - Social overhead to serve cotton trade later supported growth in Northeast

Evolutionary perspective

Finance

Resources and technology

Economy as physical process

How'd *that* happen?

- Natural resources *are* the source of prosperity
- But institutions shape the “when,” “where,” and “how”
 - And evolving ability to use resources shapes institutions

Economic history is crystallized development theory

Existing histories can illustrate biophysical forces at work in development

Thanks

- Kent Klitgaard, *Wells College*
- Larry Malone, *Hartwick College*
- Sean Kelley, *Hartwick College*



The Dance of the Hippo

The universe doesn't hate you -- at least, not more than it hates most people

Monday, August 27, 2012

Libertarian-Gold smackdown



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