Laws of Motion in Capitalism

CMS Stockholm

Stockholm

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Laws of motion

[I]t is the ultimate aim of this work, to lay bare the economic law of motion of modern society

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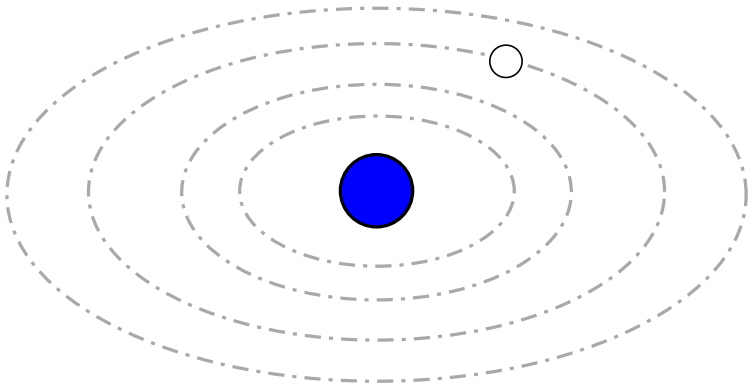

Laws of motion

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Concepts from classical physics in political economy

Signatures of capitalist market economy

1. Equivalence in exchange:

$$\boxed{C \to C}$$

Signatures of capitalist market economy

1. Equivalence in exchange:

$$\boxed{C \rightarrow C}$$

2. Exchange with money:

$$\boxed{C \rightarrow M \rightarrow C}$$

Signatures of capitalist market economy

1. Equivalence in exchange:

$$\boxed{C \rightarrow C}$$

2. Exchange with money:

$$\boxed{C \rightarrow M \rightarrow C}$$

3. Expanding money:

$$\boxed{M \rightarrow C \rightarrow M'}$$

Symmetry and conservation in exchange

$$\mathrm{C} \rightleftharpoons \mathrm{C}$$

Symmetry in exchange

- Example from Volume 1:

$$\text{If} \qquad 1 \text{ coat} \doteq 20 \text{ yards of linen}$$

$$\text{then} \qquad 20 \text{ yards of linen} \doteq 1 \text{ coat}$$

Symmetry in exchange

- Example from Volume 1:

$$\text{If} \qquad 1 \text{ coat} \doteq 20 \text{ yards of linen}$$

$$\text{then} \qquad 20 \text{ yards of linen} \doteq 1 \text{ coat}$$

- The exchange relation is symmetric:

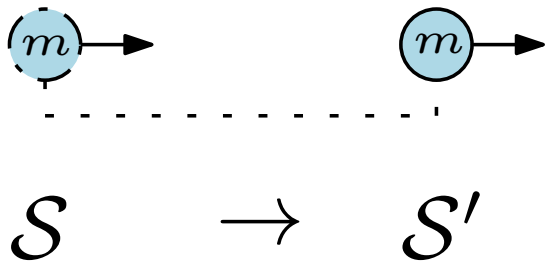
$$\underbrace{C}_{1 \text{ coat}} \rightleftharpoons \underbrace{C}_{20 \text{ yards of linen}}$$

Marx after Noether

Emmy Noether (1882 - 1935)

Symmetry and conservation

If a system has a symmetry property, then it possesses a quantity that is unchanged



Marx after Noether

Emmy Noether (1882 - 1935)

Symmetry and conservation

If a system has a symmetry property, then it possesses a quantity that is unchanged

Marxian hypothesis

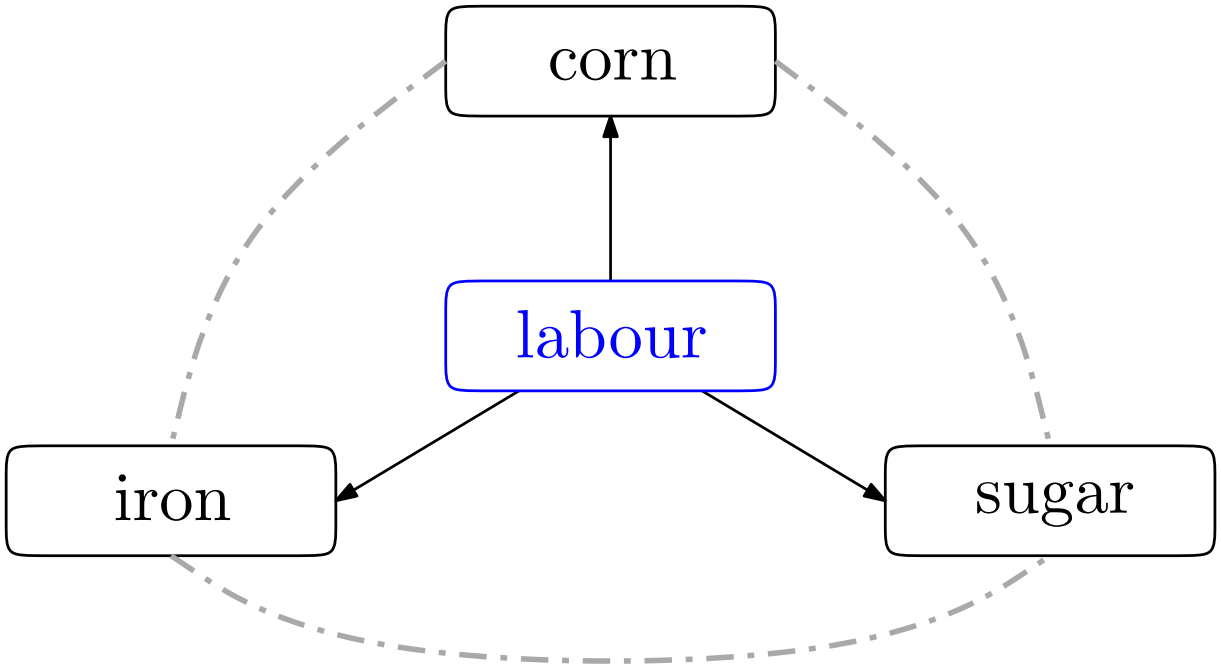
In a system of symmetric exchanges,

$$\mathbf{C} \rightleftharpoons \mathbf{C},$$

the conserved quantity is social labour time

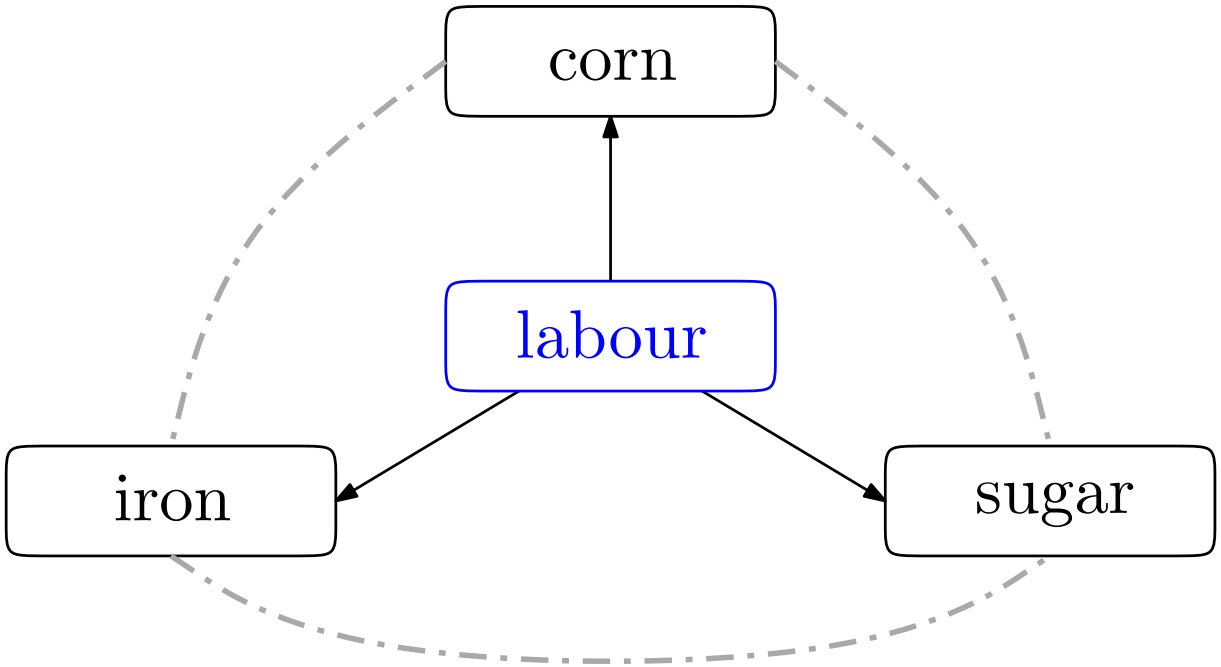
Labour time as the conserved quantity

Social production system



Labour time as the conserved quantity

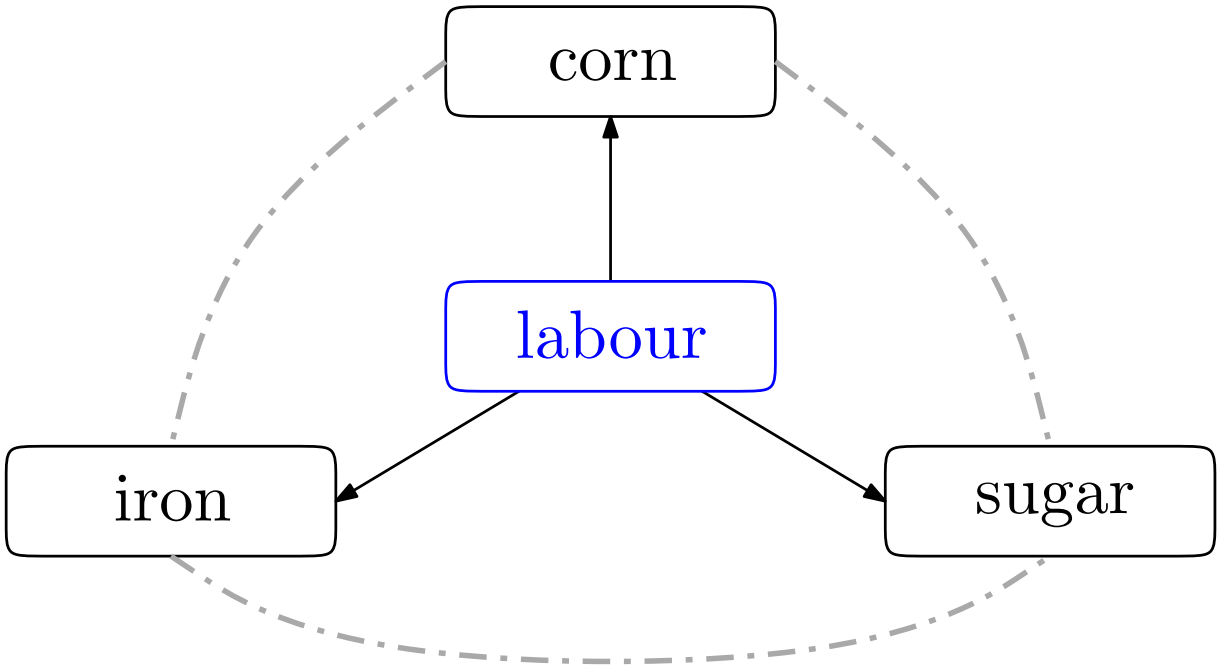
Social production system



Labour is a universal and redeployable resource

Labour time as the conserved quantity

Social production system



Social labour is therefore an abstract quantity

Labour time as the conserved quantity, cont'd

Figure : An object **O** with a mass ...

Labour time as the conserved quantity, cont'd

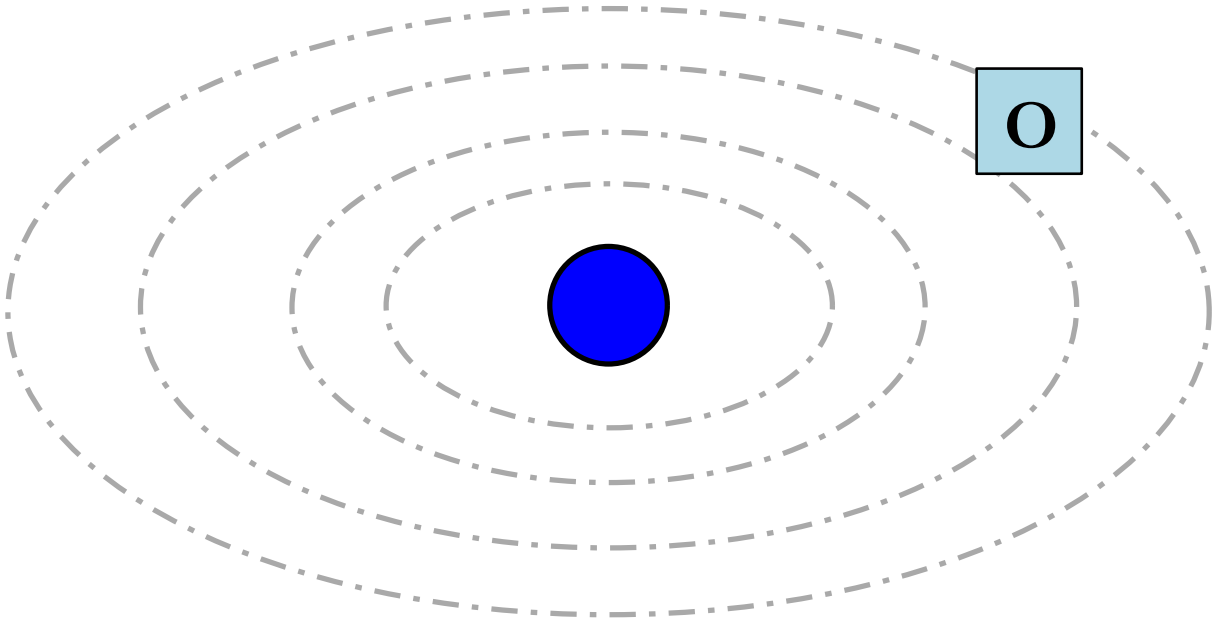


Figure : ... has weight only interaction with gravitational field

Labour time as the conserved quantity, cont'd

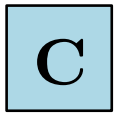


Figure : A commodity **C** with a use value ...

Labour time as the conserved quantity, cont'd

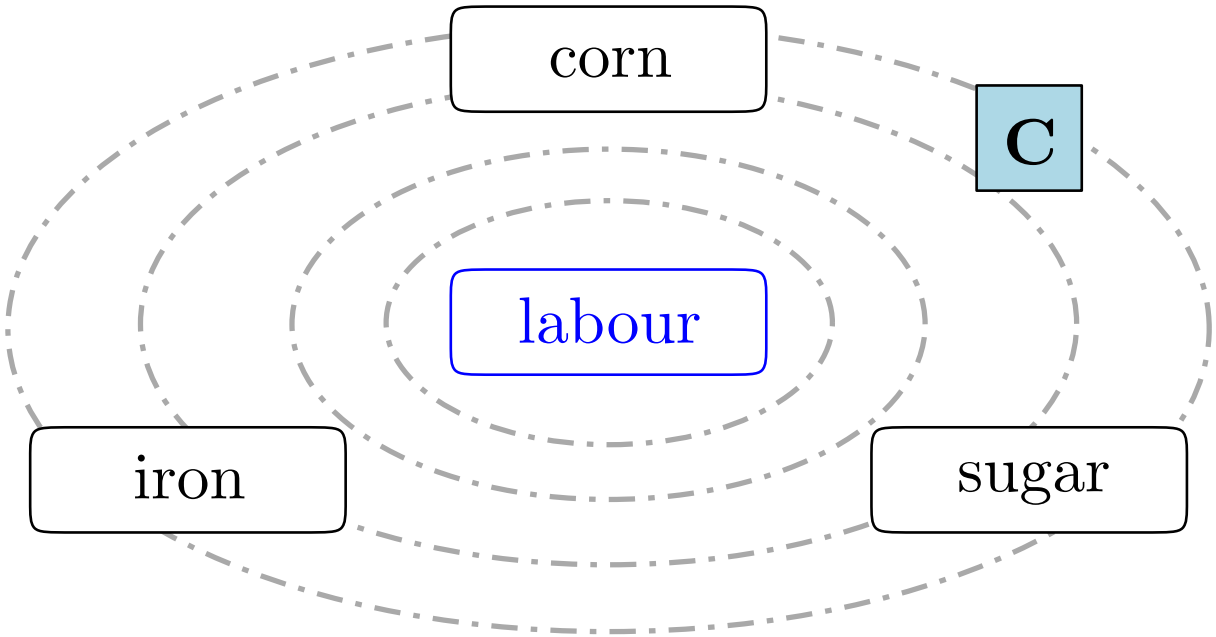


Figure : ... has labour value only interaction with social production field

Labour time as the conserved quantity, cont'd

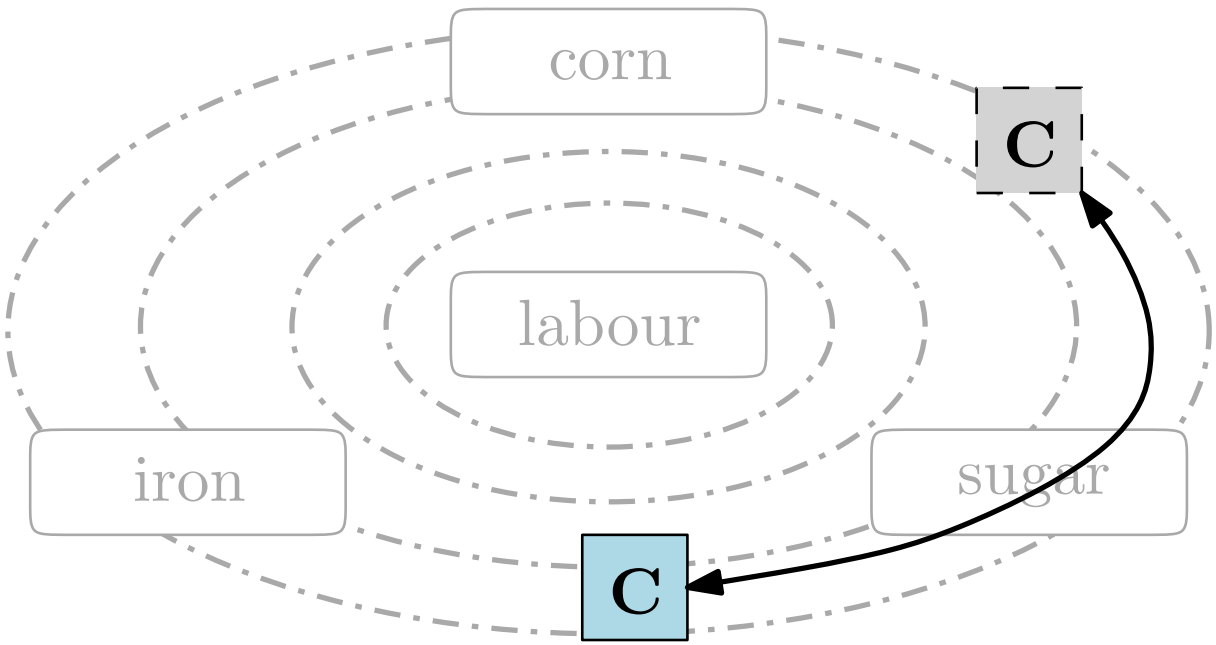


Figure : Labour value is conserved under symmetric exchange

Labour content as conserved quantity, cont'd

Testable law

Market prices of a commodity-type **C** are statistically linked to its labour value

Labour content as conserved quantity, cont'd

Testable law

Market prices of a commodity-type $\mathbf{C}$ are statistically linked to its labour value

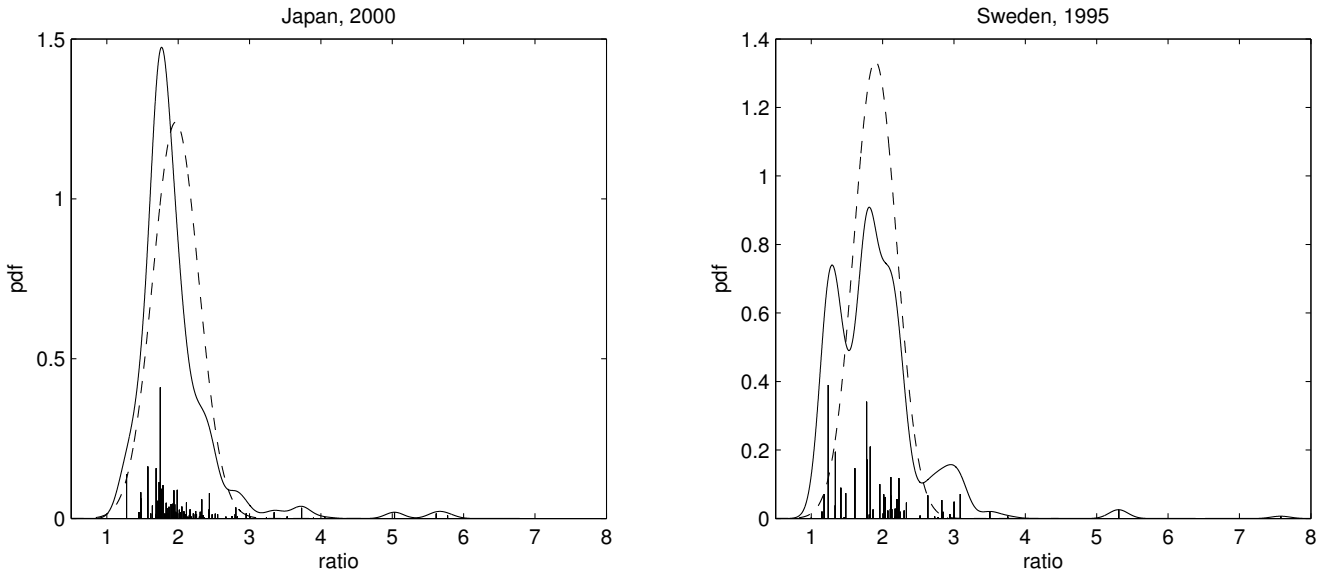


Figure : Proportion of commodities with different ratios $P(\mathbf{C})/\Lambda(\mathbf{C})$

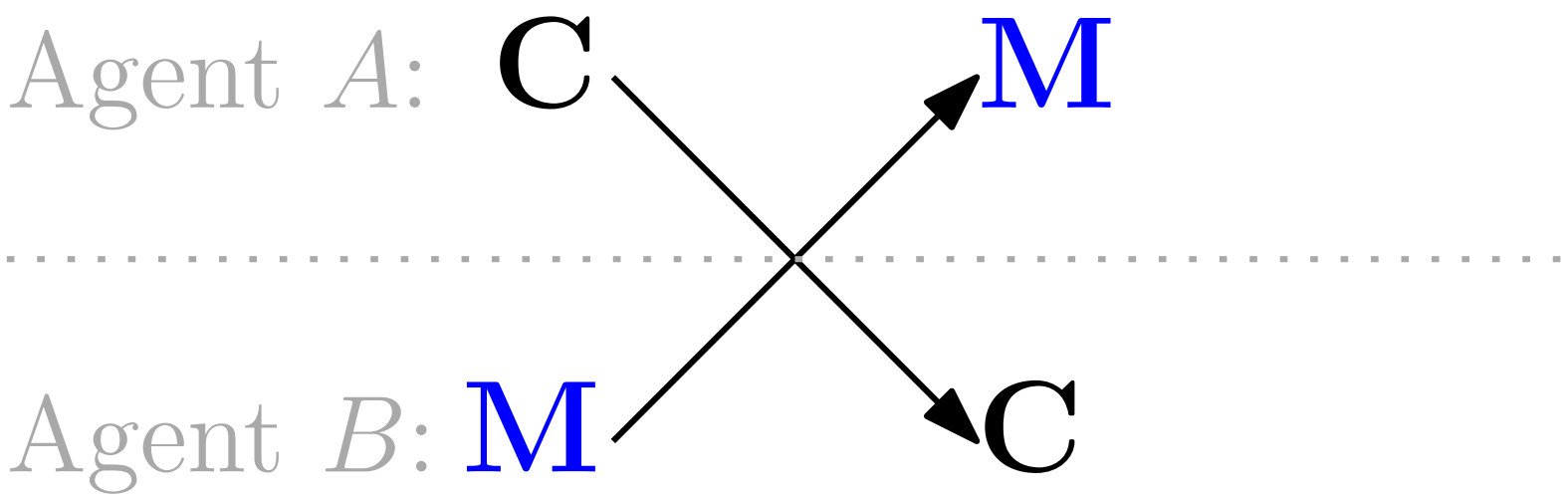
Zachariah, D.: Labour value and equalisation of profit rates: a multi-country study. *Indian Development Review*, vol. 4, June 2006.

Conservation laws of market exchange

$$\mathrm{C} \rightleftharpoons \mathrm{M} \rightleftharpoons \mathrm{C}$$

Colliding agents of market exchange

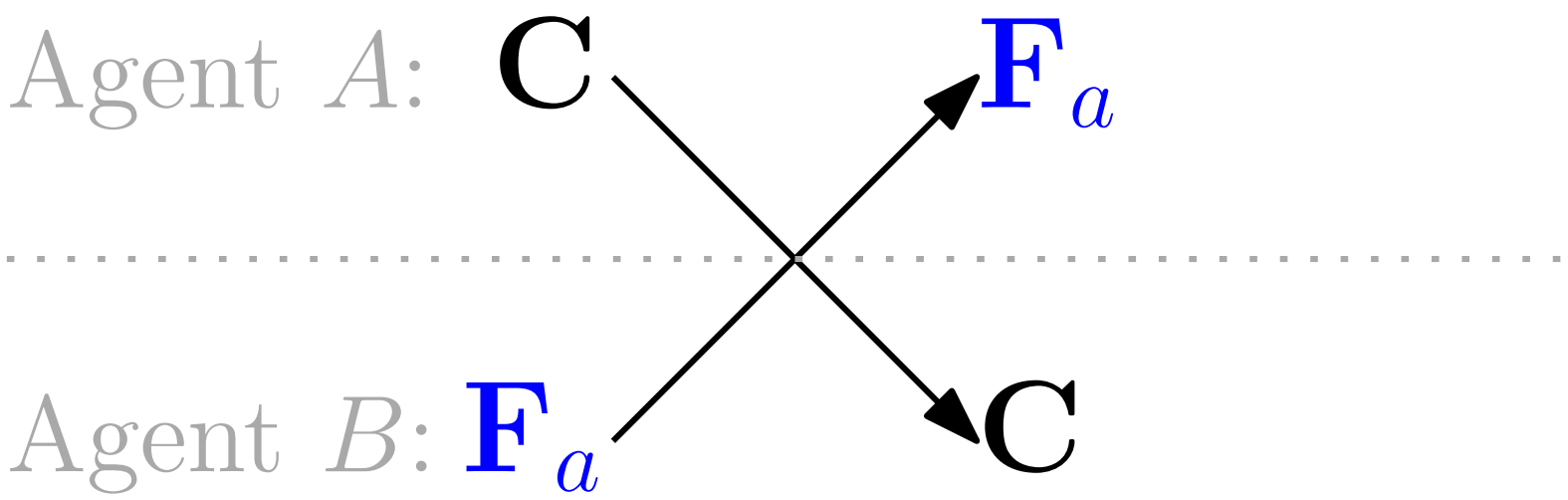
Exchange with money commodity



- Labour value of $\mathbf{C} + \mathbf{M}$ is **conserved**

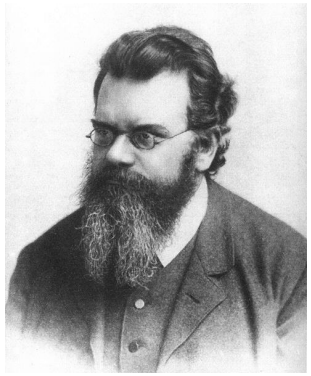
Colliding agents of market exchange

Exchange with financial asset



- Labour value of **C** is **conserved**
- Asset $\mathbf{F}_a$ represents claim on value

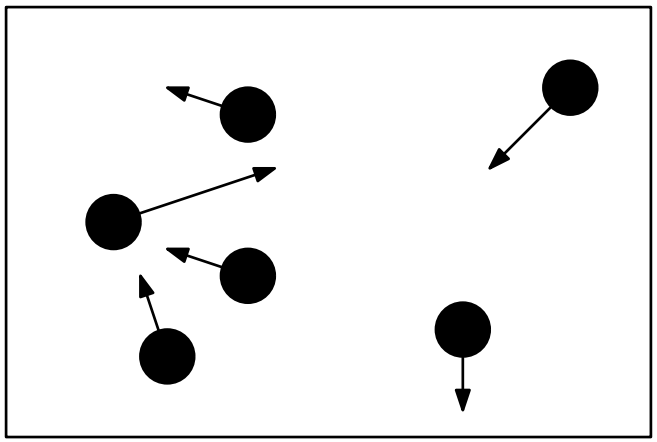
Marx after Boltzmann



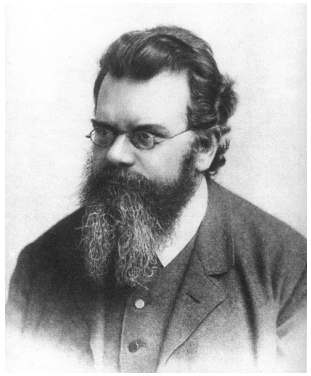
Ludwig Boltzmann (1844 - 1906)

Large systems with energy constraints

Uncoordinated interactions among particles produce stable distribution of energy



Marx after Boltzmann



Ludwig Boltzmann (1844 - 1906)

Large systems with energy constraints

Uncoordinated interactions among particles produce stable distribution of energy

Marxian hypothesis

Uncoordinated market exchange,

$$\mathbf{C} \rightleftharpoons \mathbf{F}_a \rightleftharpoons \mathbf{C},$$

will by itself produce stable distribution of money $\mathbf{F}_a$

Marx after Boltzmann, cont'd

Testable law

The distribution of money across exchanging agents is Boltzmann

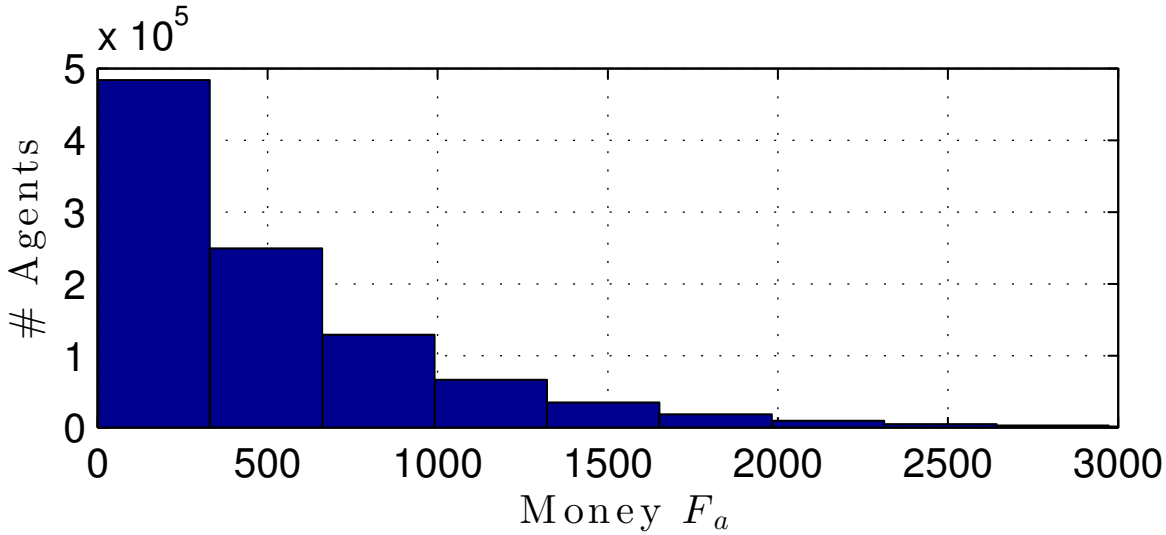


Figure : Proportion of agents with different amounts of money

Marx after Boltzmann, cont'd

Testable law

The distribution of money across exchanging agents is Boltzmann

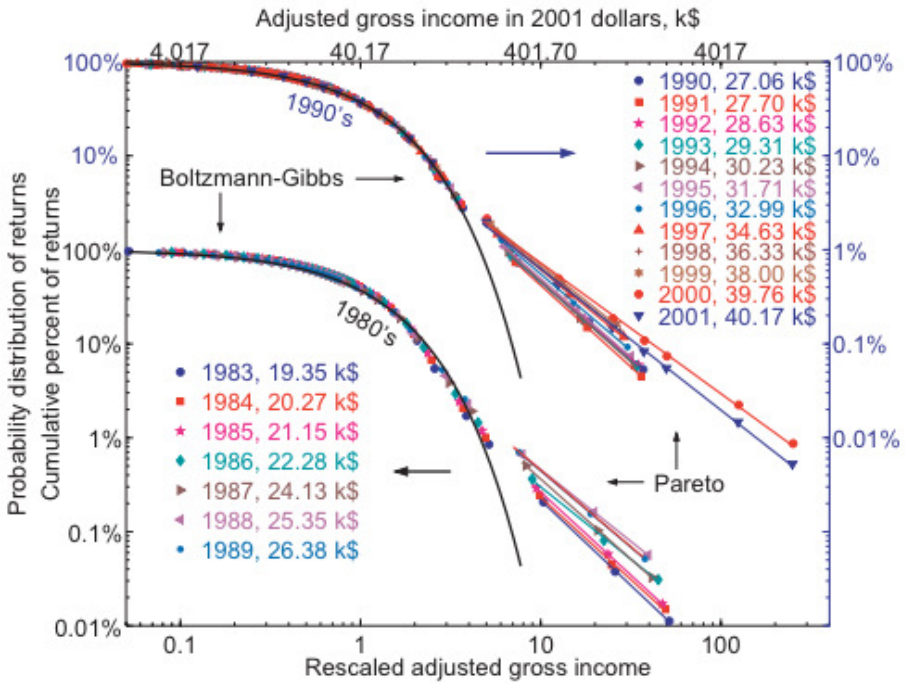
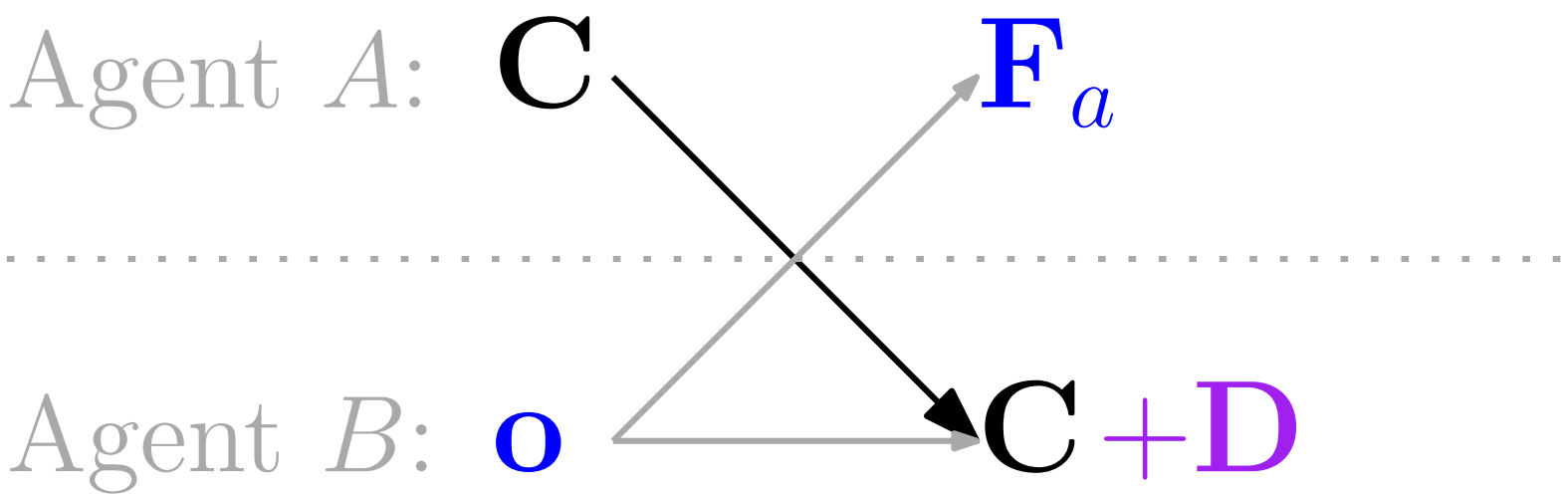


Figure : Distribution of income in USA

Silva, A. C., and Yakovenko, V. M. Temporal evolution of the 'thermal' and 'superthermal' income classes in the USA during 1983-2001. *Europhysics Letters*, v. 69, pp. 304-310, 2005.

Agents of exchange: credit and debt

Exchange using credit and debt



- Labour value of **C** is **conserved**
- Legal obligation **o** that creates **D** and $\mathbf{F}_a$

Agents of exchange: credit and debt

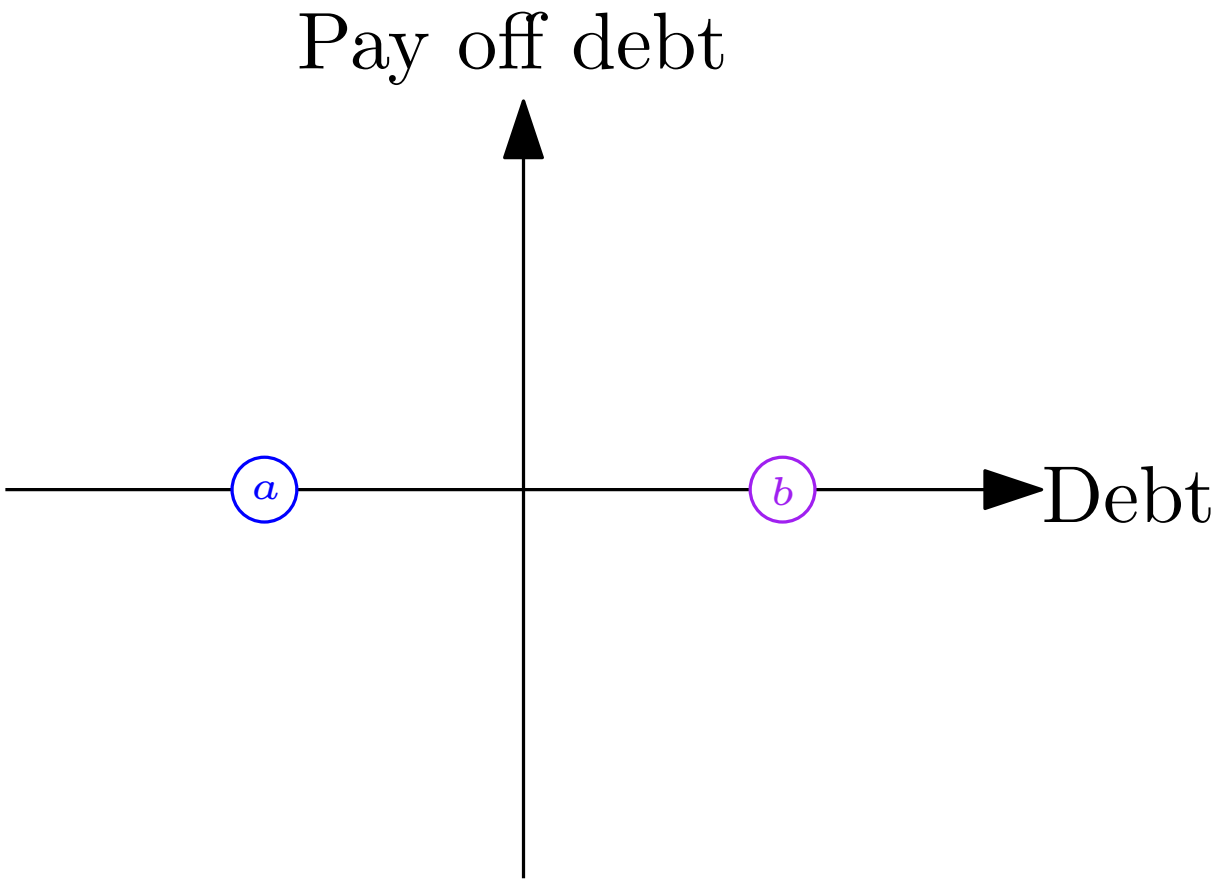


Figure : Two agents with mutual debt obligations

Agents of exchange: credit and debt

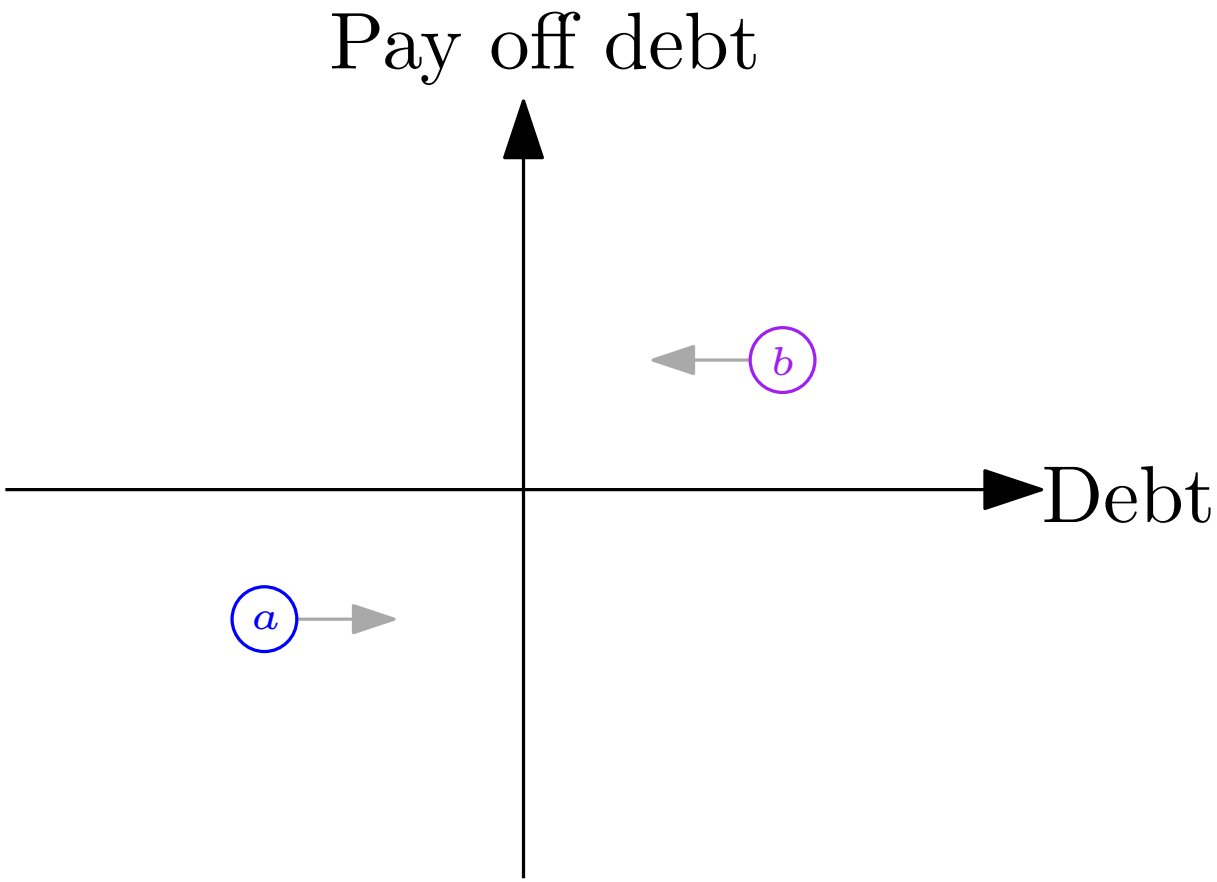


Figure : Repaying debt has symmetric effect on asset

Agents of exchange: credit and debt

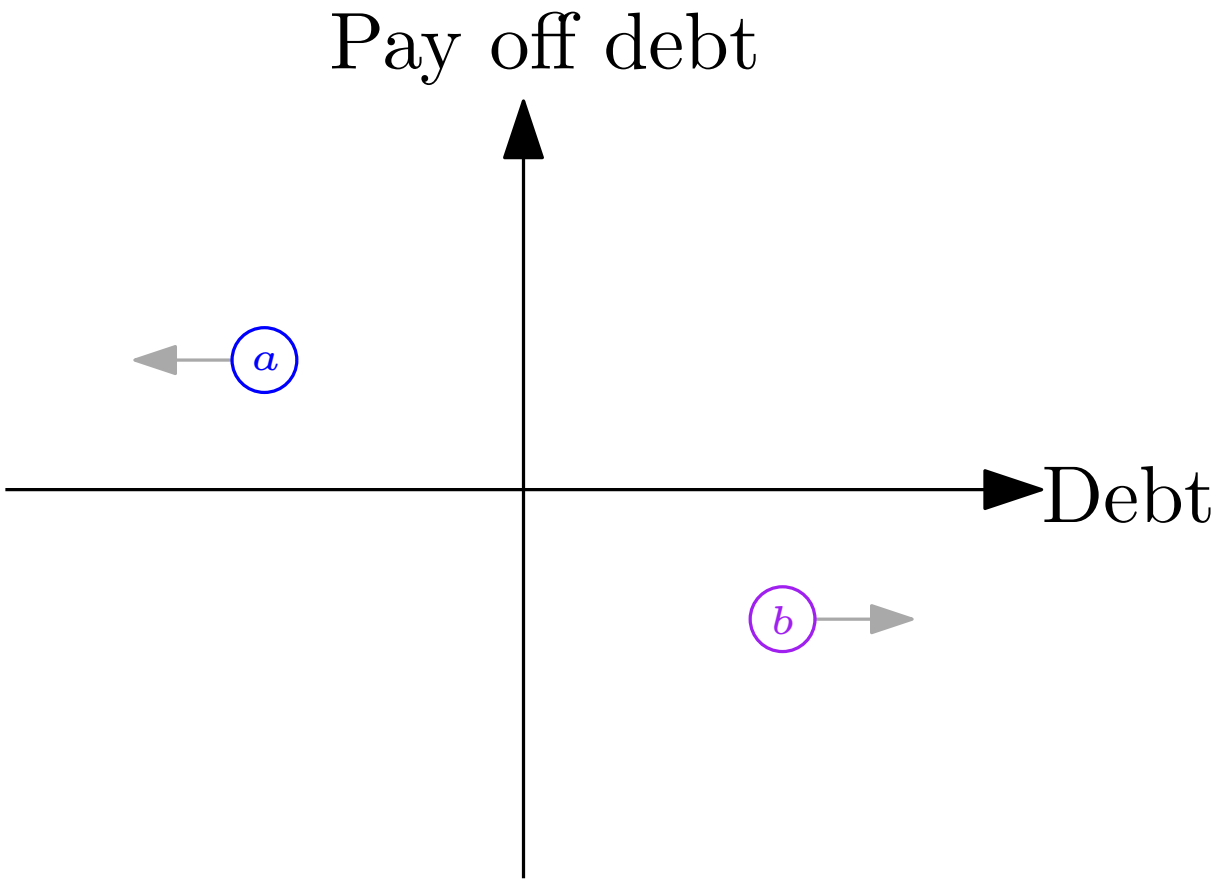


Figure : Increasing debt has symmetric effect on asset

Laws of credit and debt

Testable law

The financial surpluses of all economic sectors sum to 0

Laws of credit and debt

Testable law

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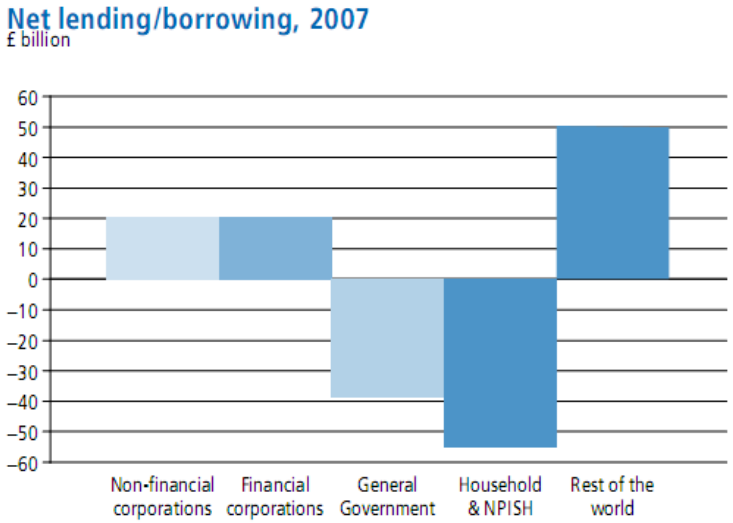

Laws of credit and debt

Testable law

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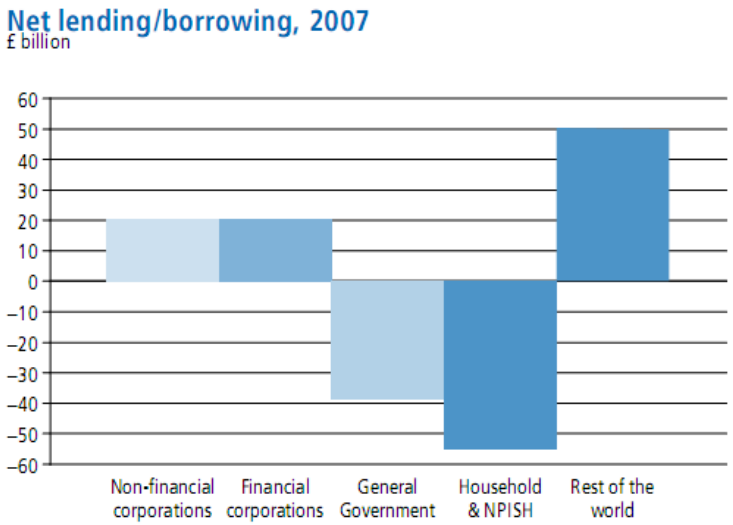


Testable law

In a credit system with interest, firms with different rates of profit will polarize into rentiers and debtors

Non-conservation laws of capital accumulation

$$\mathbf{M} \rightarrow \mathbf{C} \rightarrow \mathbf{M} + \boldsymbol{\Delta}\mathbf{M}$$

Breaking symmetry in production and consumption

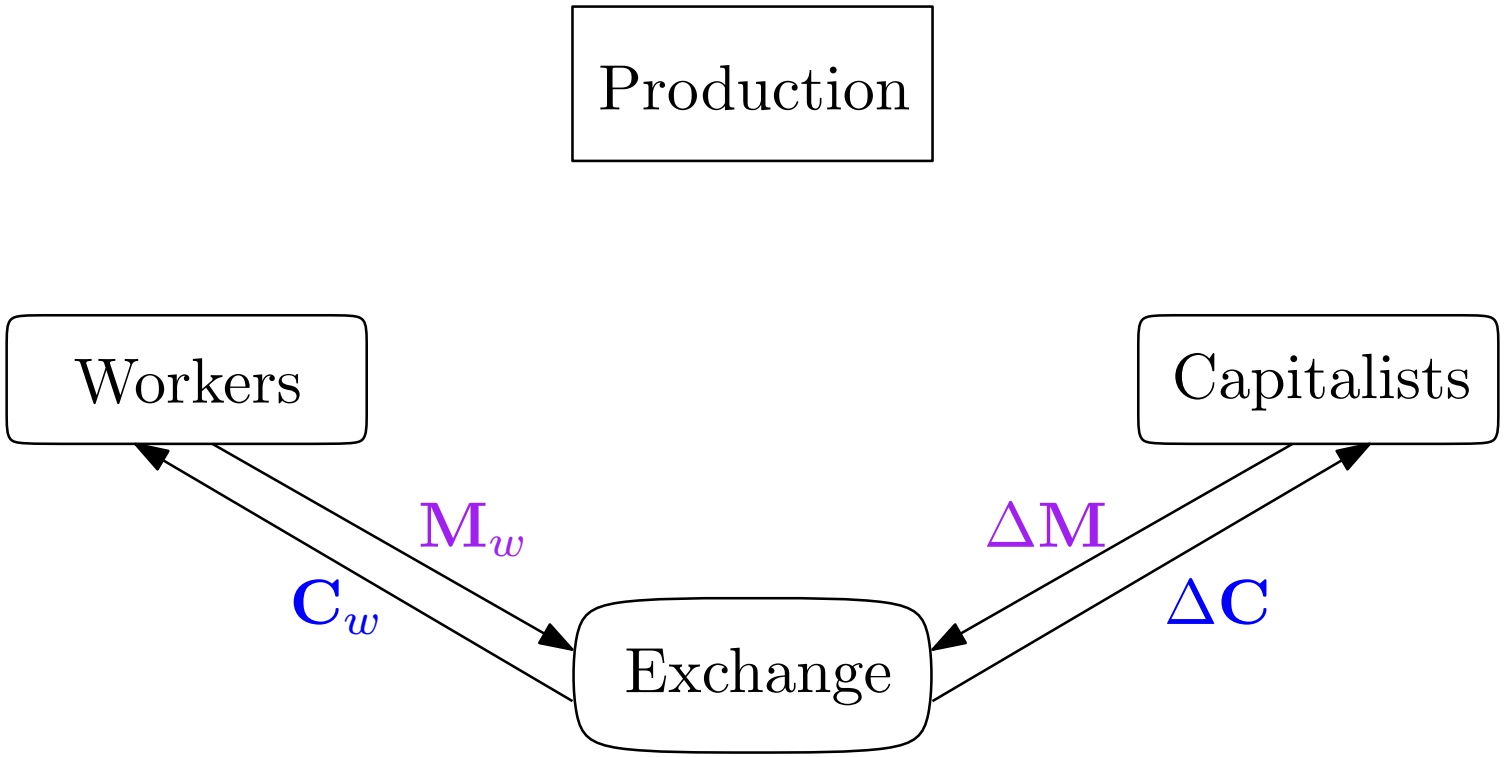


Figure : Symmetry and conservation reigns in market exchange

Breaking symmetry in production and consumption

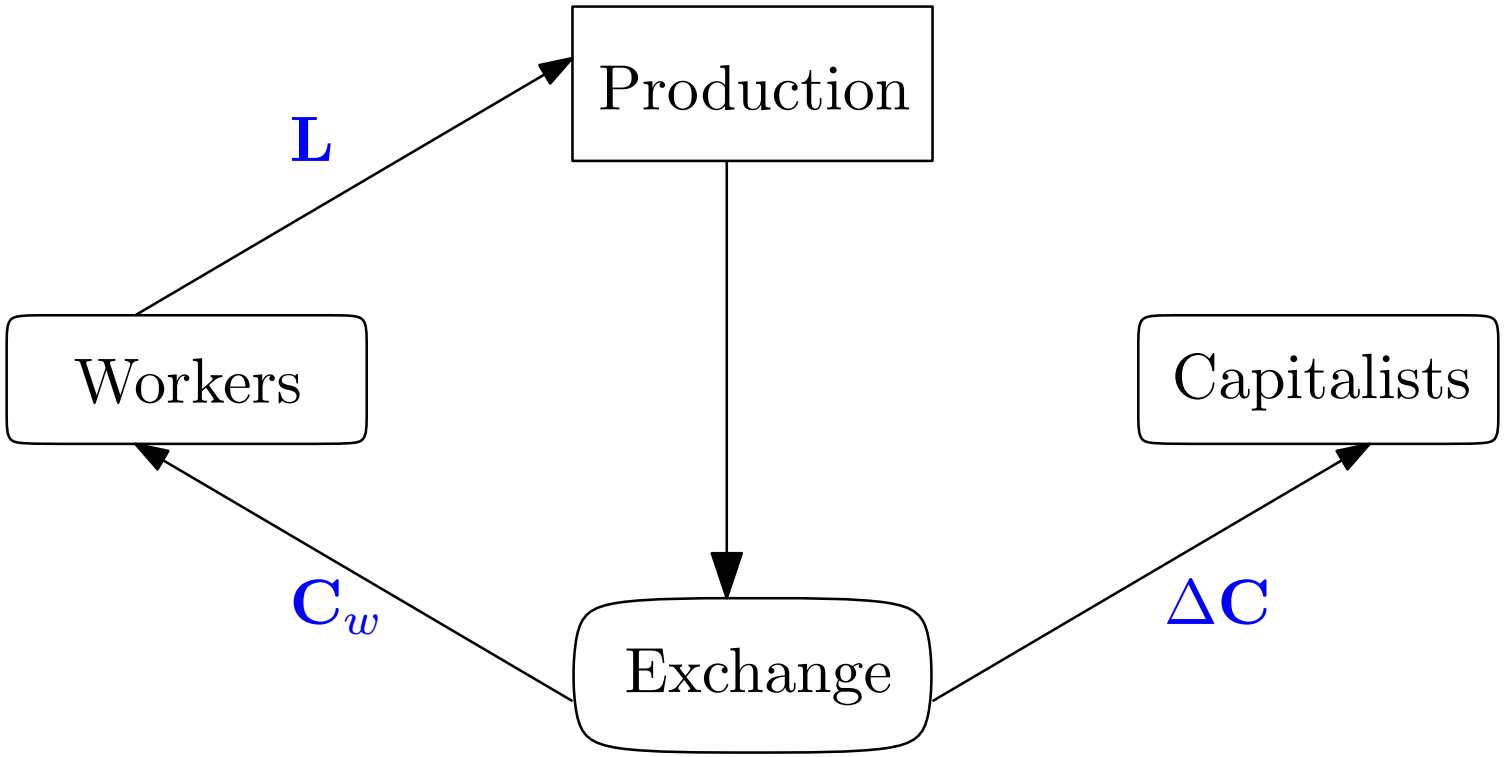


Figure : Surplus labour and product extracted via market mechanism

Breaking symmetry in production and consumption

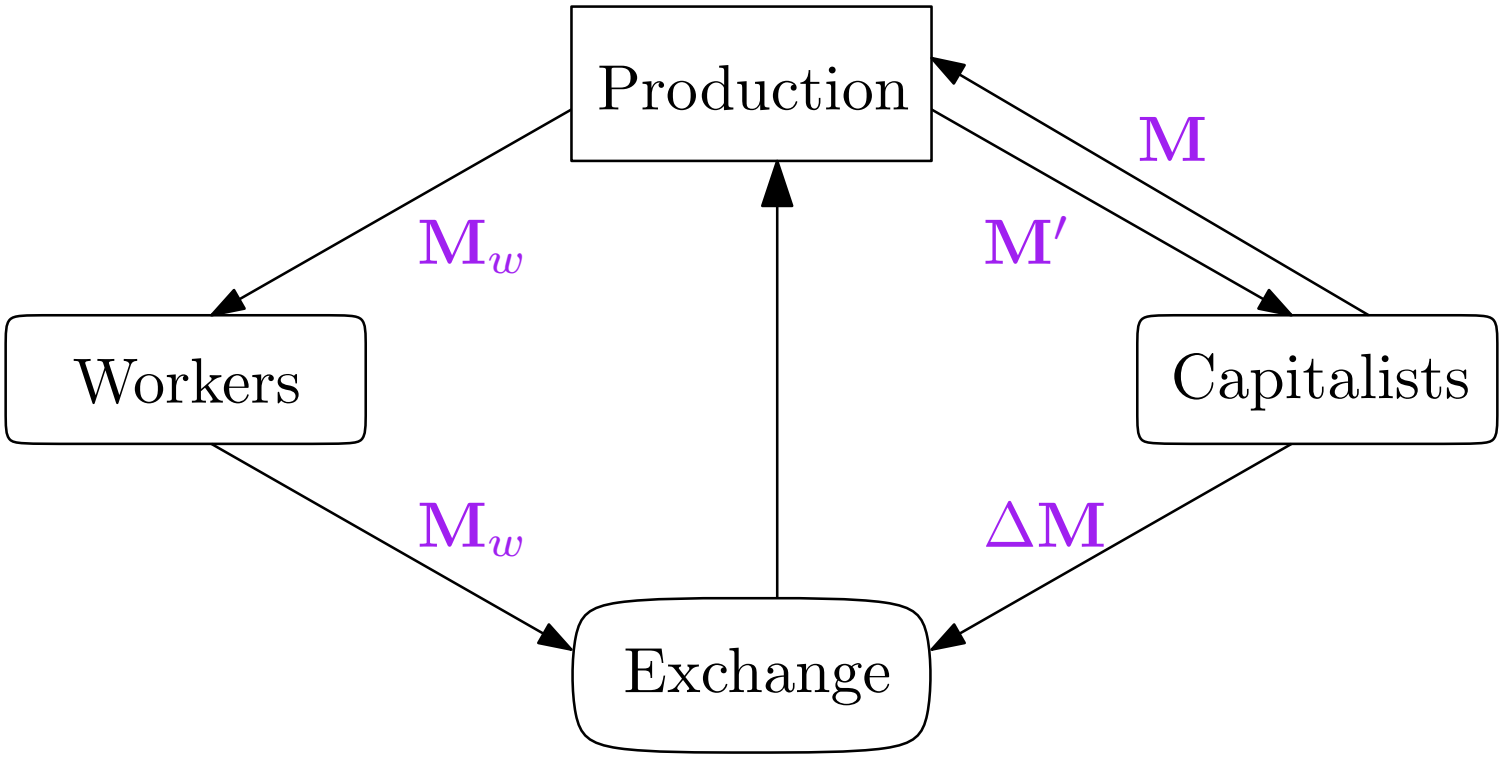
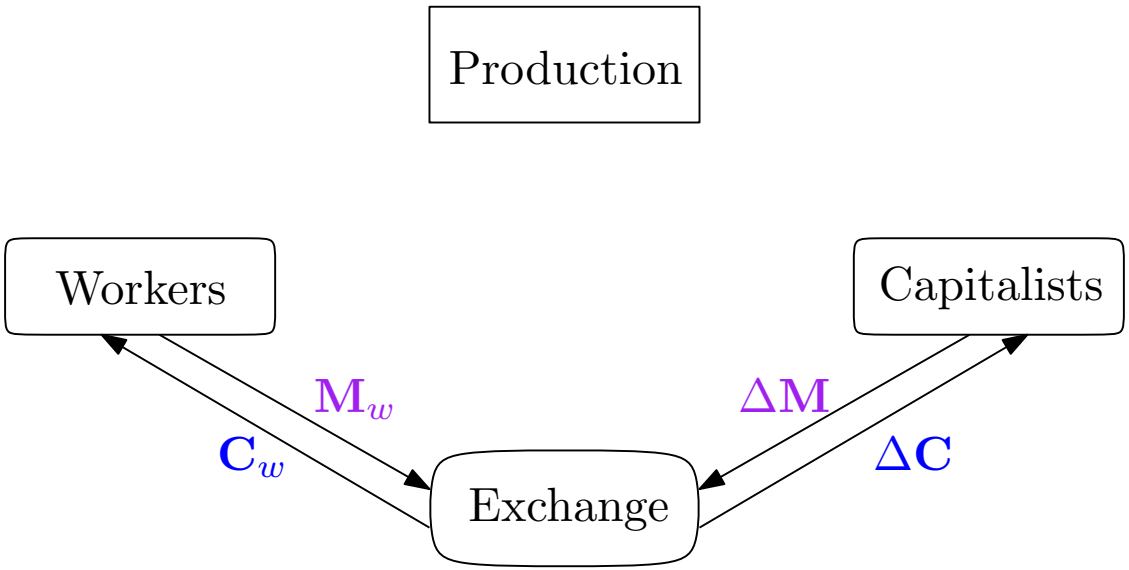


Figure : Profit income is a symbolic claim on surplus product

Breaking symmetry in production and consumption



Testable law

Real profit income arises through the extraction of surplus labour

Testable law

Aggregate profit income is determined by capitalist expenditure

General signature of capital

The general signature of capital

$$\mathbf{M} \rightarrow \qquad \mathbf{C} \qquad \rightarrow \mathbf{M}'$$

General signature of capital

hides its material basis

$$\mathbf{M} \rightarrow \Big[\mathbf{C} \Rightarrow \mathbf{C} + \Delta\mathbf{C} \Big] \rightarrow \mathbf{M}'$$

$$\uparrow$$

$$\mathbf{L}$$

Exponential growth through reinvestment

Exponential growth of claims on value

$$\mathbf{M} \to \mathbf{C} \to \mathbf{M}' \to \mathbf{C} \to \mathbf{M}'' \to \mathbf{C} \to \mathbf{M}''' \to \cdots$$

Exponential growth through reinvestment

Exponential growth of claims on value

$$\mathbf{M} \rightarrow \mathbf{C} \rightarrow \mathbf{M}' \rightarrow \mathbf{C} \rightarrow \mathbf{M}'' \rightarrow \mathbf{C} \rightarrow \mathbf{M}''' \rightarrow \cdots$$

must be backed by material expansion of

$$\mathbf{M} \rightarrow \left[\mathbf{C} \Rightarrow \mathbf{C} + \Delta\mathbf{C} \right] \rightarrow \mathbf{M}'$$

$$\uparrow$$

$$\mathbf{L}$$

Constraints on average profitability

Testable law

Average profit rate is determined by investment level and exponential growth of labour and productivity

Constraints on average profitability

Testable law

Average profit rate is determined by investment level and exponential growth of labour and productivity

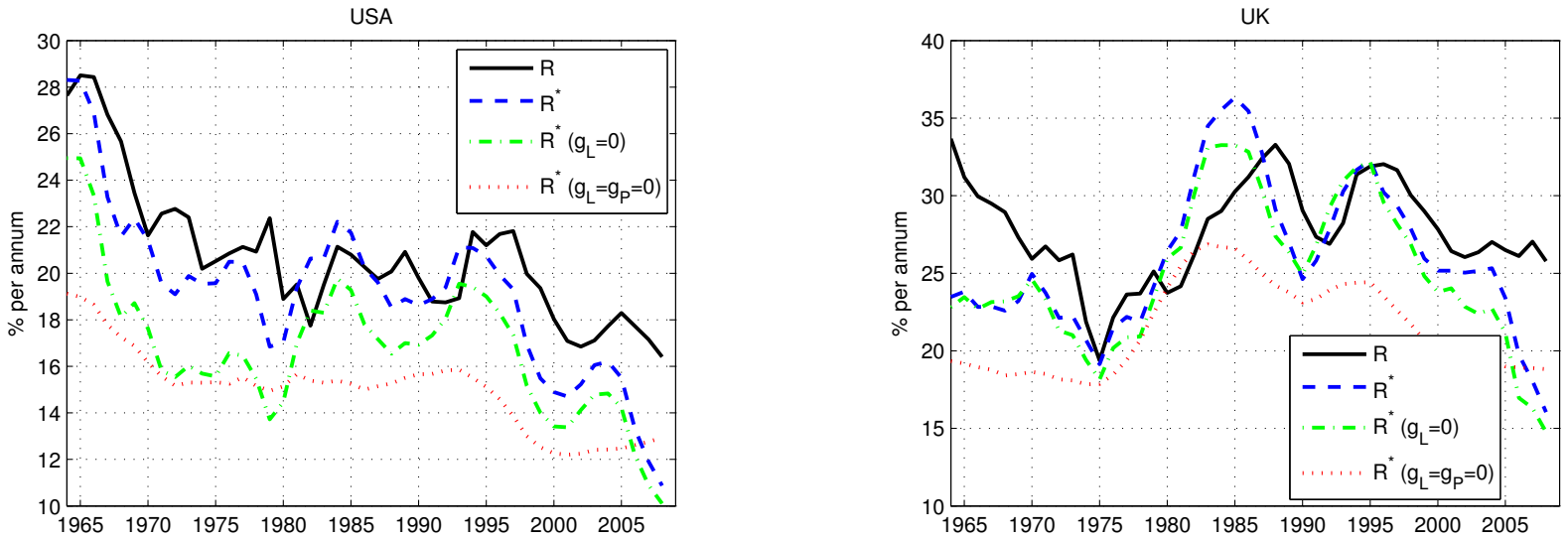


Figure : Trajectory of average profit rates in US and UK

Zachariah, D.: Determinants of the average profit rate and the trajectory of capitalist economies. *Bulletin of Political Economy*, Vol.3, No.1, 2009

Summary

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By applying concepts from classical physics, the signatures

$$C \to C \qquad C \to M \to C \qquad M \to C \to M',$$

can generate fruitful hypotheses and testable laws of capitalist market economies

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For more details:

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Thank you for listening!