Was Marx Right?

Development and Exploitation in 43 Countries, 2000-2014

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Objective

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To assess **Marx's hypotheses** about economic development on a **world scale**

How?

Estimate Marxist variables from the **World Input-Output Database** (WIOD)

Create a **new panel dataset** for **43 countries** in the **2000-2014** period

Estimate **productive** and **unproductive activities** for each country

Compare Marxist variables at the **global level**, **between countries** and **within countries**

Compare results across **different productive-unproductive classifications**

Develop an estimation methodology and create a **software in R** that automates every step

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Marx's hypotheses

Marx

Axioms

In the capitalist mode of production, economic activities can be classified into two categories:

Productive activities (PA) = produce goods and services **for profit** and **create value**

Unproductive activities (UA) = draw their incomes from the pool of value added that PA create

Only productive human labor creates value in the capitalist mode of production

The labor time directly and indirectly required to reproduce (not produce) a commodity determines its value

Competition induces companies to adopt capital-intensive labor-saving technology

Marx

Hypotheses about the long run

OCC = $\frac{\text{constant capital}}{\text{productive labor}}$ ratio tends to rise (because of labor-saving capital-intensive technology)

Exploitation rate of productive labor tends to rise (to increase profits)

OCC tends to rise faster than the rate of exploitation of productive labor

Average profit rate tends to fall as countries develop (because r = e/OCC)

Empirical evidence from 43 countries, 2000-2014

Marx was right on a global scale, but subject to important modifications

Methodology

Methodology

World Input-Output Database (WIOD):

WIOD = WIOT + SEA for **56 sectors** in **43 countries** from **2000 to 2014**

WIOT = multi-country input-output matrices

= 2,474 rows by 2,687 columns for each year

SEA = country-level data on capital stock, wages, and employment

Convert the entire WIOD to Marxist variables in US dollars

Estimate productive and unproductive activity from WIOT and SEA

Consolidate the transformed data into a **panel dataset** with nearly 400 variables

Estimate Marxist variables for countries and for the world economy

R software with 7,000 lines of code to automate all steps (R code will be posted on GitHub soon)

Methodology

From the global input-output matrices (WIOT) we compute:

$$ValueAdded\ {}^{WIOT}_{PA,i,t} = TotalValue\ {}^{WIOT}_{PA,i,t} - Inputs\ from\ PA\ {}^{WIOT}_{PA,i,t}$$

$$NetIncome\ {}^{WIOT}_{UA,i,t} = GrossIncome\ {}^{WIOT}_{UA,i,t} - Inputs\ from\ UA\ {}^{WIOT}_{UA,i,t}$$

Two robustness tests:

First robustness test: different classifications of productive and unproductive activity

Second robustness test: compute variables with and without adjustment for self-employment

Empirical results

Results

Marx was right at the world level, but subject to important modifications

Evidence at the global level

World profit rate declined because the OCC rose faster than the rise in the rate of surplus value

Wage share of productive labor was roughly constant from 2000 to 2014

Value added and capital stock in productive activity relocated rapidly towards China

In 2014, China already had the greatest capital stock in productive activity in the world, and was second in value creation

Productive activity rose in countries that gained weight in the global economy (China)

Unproductive activity rose in countries that lost weight in the global economy (United States, Western Europe, and Japan)

Output, capital stock, and employment of productive activity grew faster than unproductive activity at the world level from 2000 to 2014

Results

Evidence between and within countries

Rich countries have lower OCC and lower rates of surplus value

Why? Because labor compensation is much higher in rich countries

Citizenship-based inequality between countries dominates class-based inequality within countries

Rich countries have lower profit rates

Why? Because of the rise in the capital stock tied up in unproductive activity

Rich countries have greater output, capital stock, and employment in unproductive activity

Despite the growth of unproductive activity within most countries, the impressive growth of productive activity in China made productive activity grow faster than unproductive activity at the global level

Profit rates declined at the aggregate global level, between countries, and within countries

Results

Robustness of the empirical findings

Capitalism has become a global production system

Results derive from global input-output data, covering 56 sectors in each of the 43 countries

Global input-output data show:

- global value chains
- value flows between sectors within the same country
- value flows between sectors across different countries

Results are robust across different classifications of productive and unproductive activities

Only the levels of the variables change across classifications, not their trends

Results are robust to the adjustment for self-employment (larger in poor countries)

Thank you

Slides available at

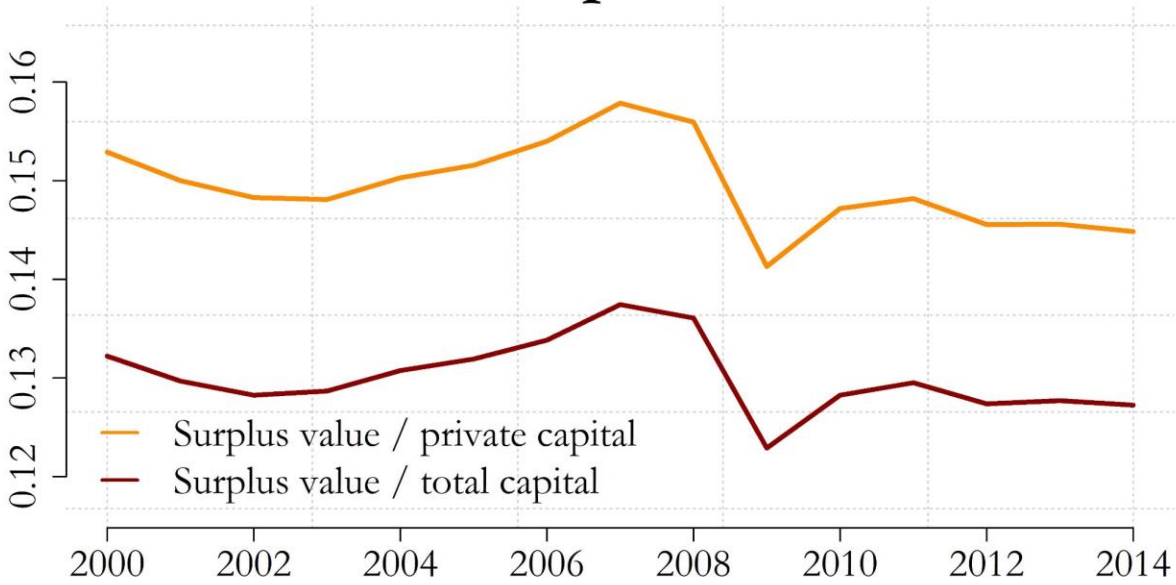
tomasrotta.wordpress.com

Appendix

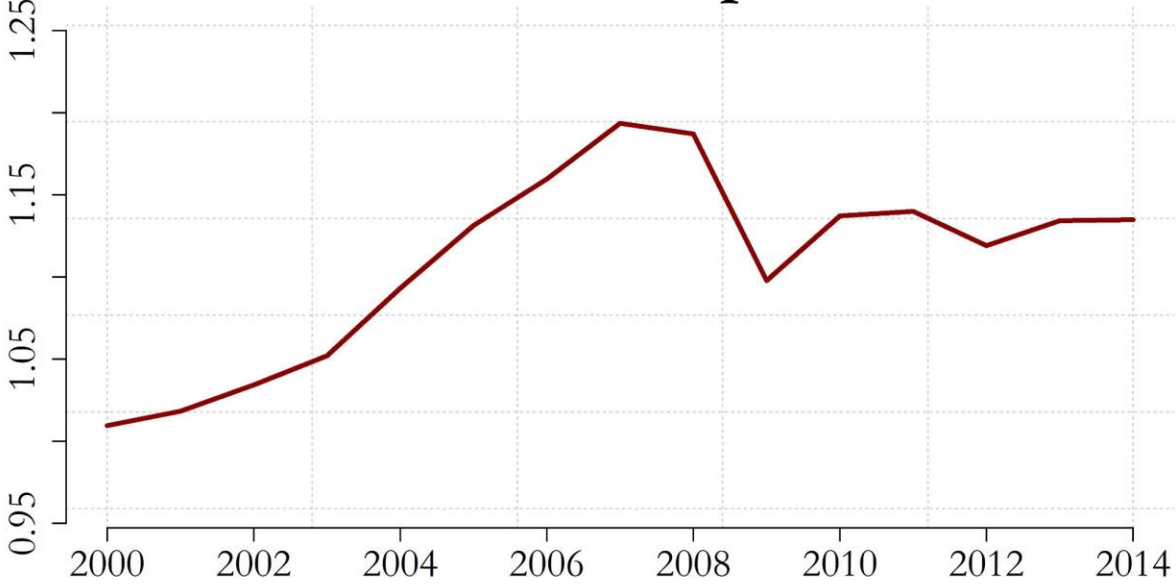
Table 1: List of countries in the World Input-Output Database (WIOD)

AUS	Australia	**ITA**	Italy
AUT	Austria	**JPN**	Japan
BEL	Belgium	**KOR**	South Korea
BGR	Bulgaria	**LTU**	Lithuania
BRA	Brazil	**LUX**	Luxembourg
CAN	Canada	**LVA**	Latvia
CHE	Switzerland	**MEX**	Mexico
CHN	China	**MLT**	Malta
CYP	Cyprus	**NLD**	Netherlands
CZE	Czech Republic	**NOR**	Norway
DEU	Germany	**POL**	Poland
DNK	Denmark	**PRT**	Portugal
ESP	Spain	**ROU**	Romania
EST	Estonia	**RUS**	Russia
FIN	Finland	**SVK**	Slovakia
FRA	France	**SVN**	Slovenia
GBR	UK	**SWE**	Sweden
GRC	Greece	**TUR**	Turkey
HRV	Croatia	**TWN**	Taiwan
HUN	Hungary	**USA**	USA
IDN	Indonesia	**ROW**	Rest of the world combined
IND	India		
IRL	Ireland		

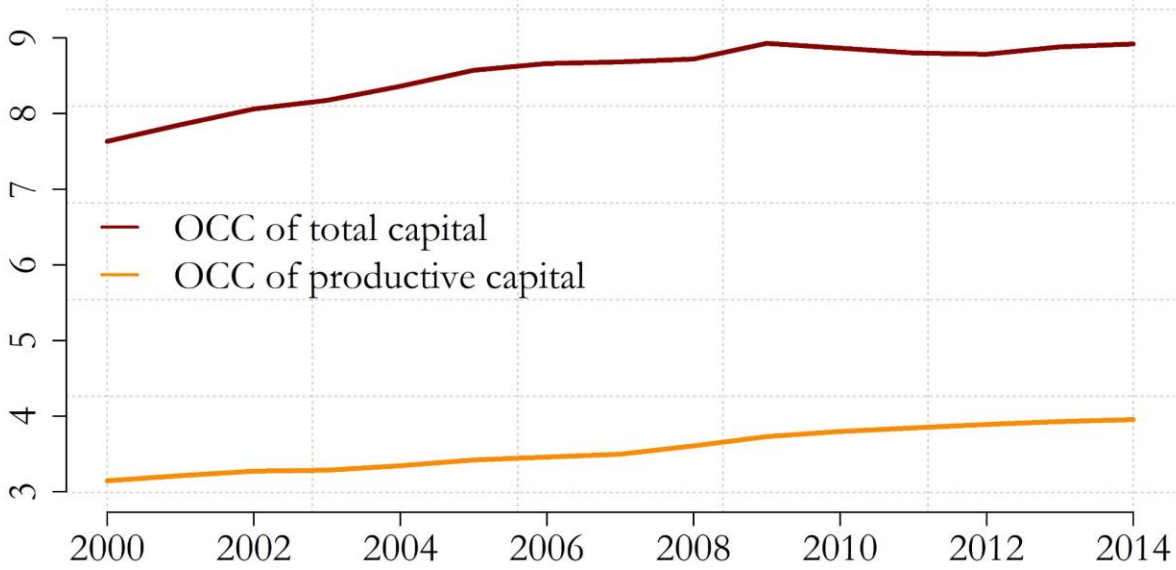
Global profit rate



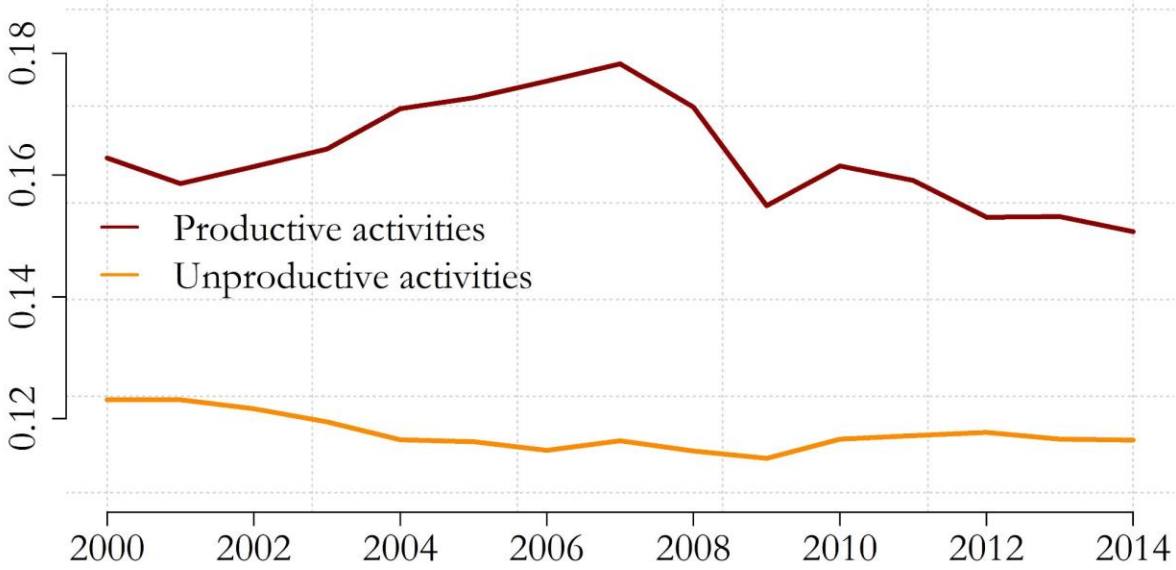
Global rate of surplus value

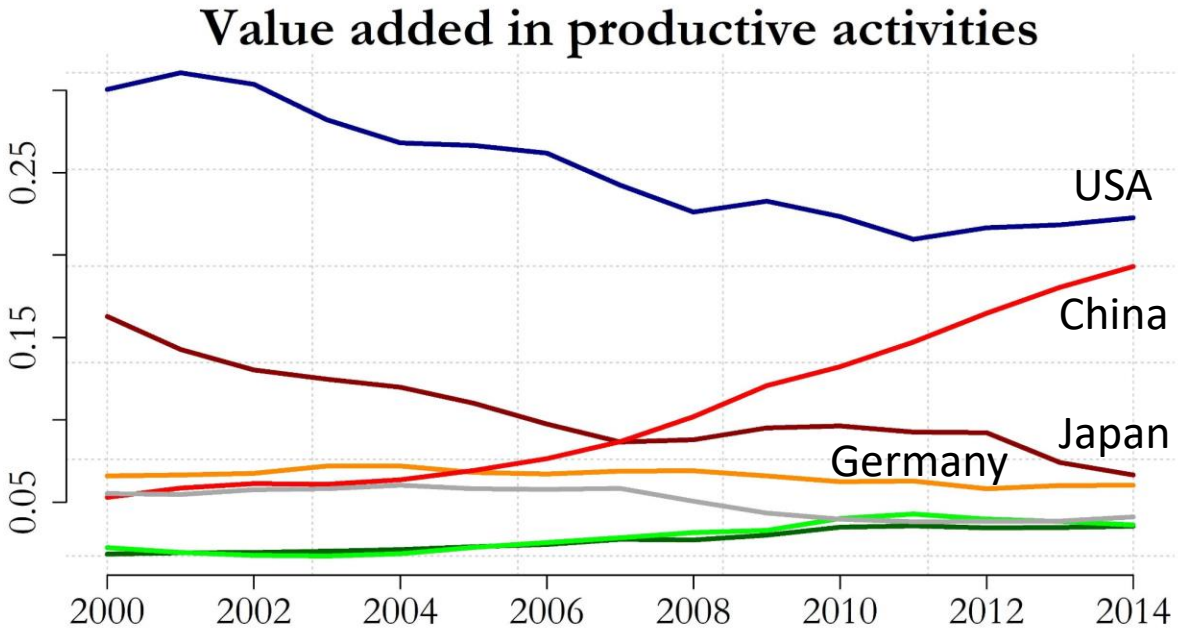


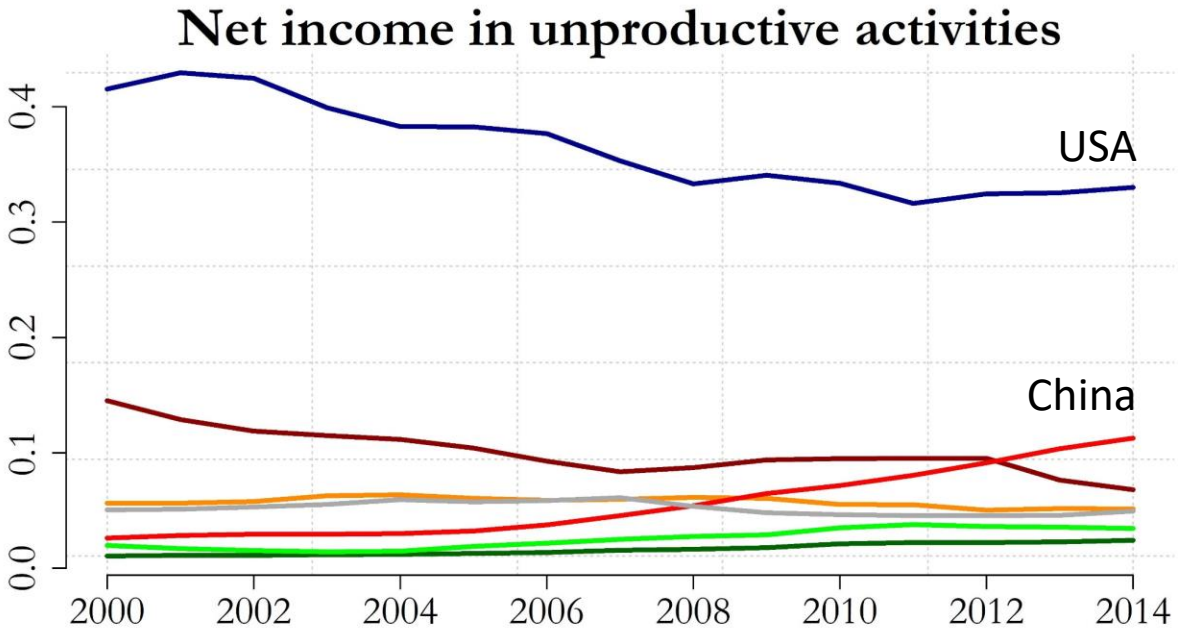
Global organic composition of capital

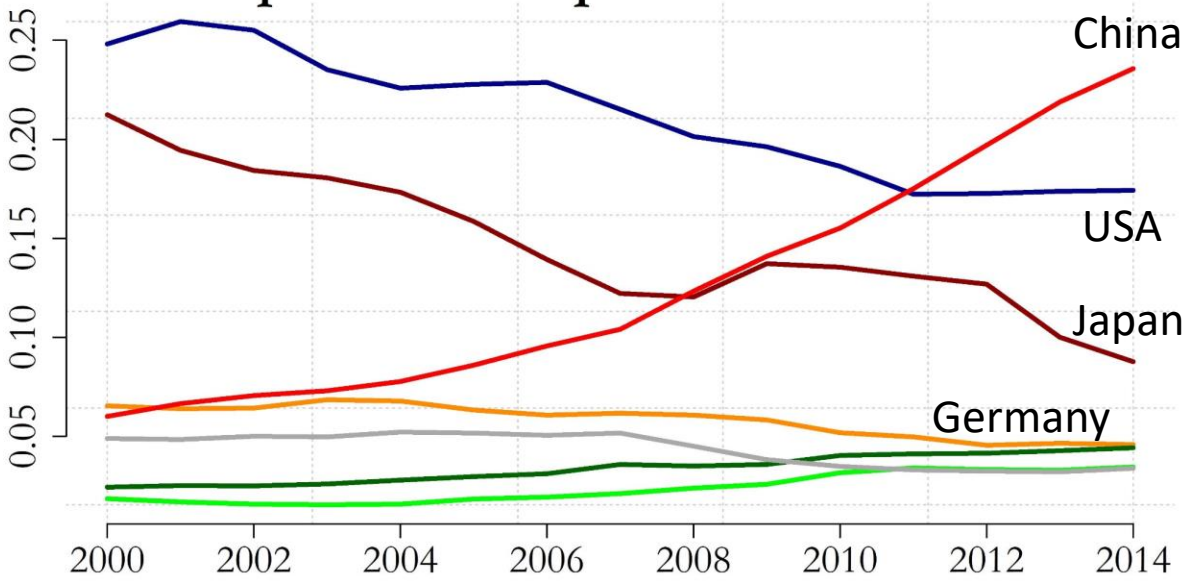


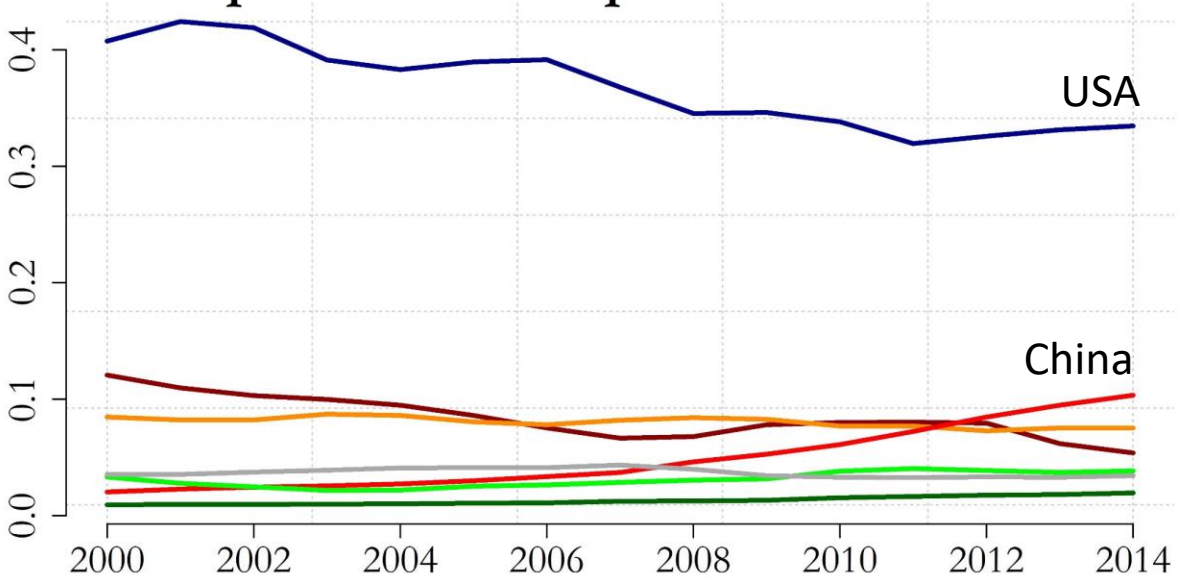
Global net profit over capital stock




Value added in productive activities
0.25
0.15
0.05
USA
China
Japan
Germany
2000
2002
2004
2006
2008
2010
2012
2014


Net income in unproductive activities
0.4
0.3
0.2
0.1
0.0
USA
China
2000
2002
2004
2006
2008
2010
2012
2014


Capital stock in productive activities
0.25
0.20
0.15
0.10
0.05
China
USA
Japan
Germany
2000
2002
2004
2006
2008
2010
2012
2014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0.4
0.3
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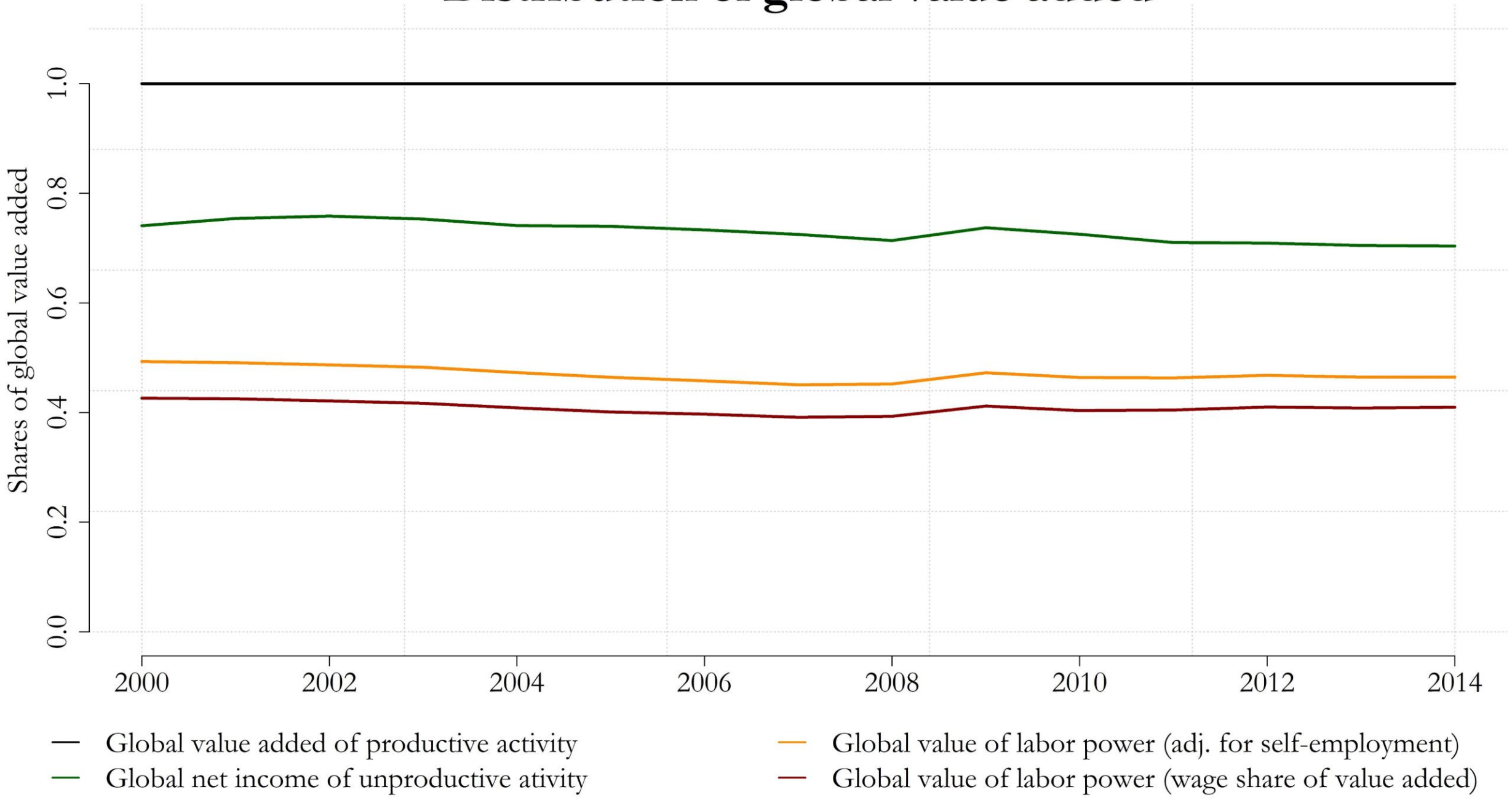
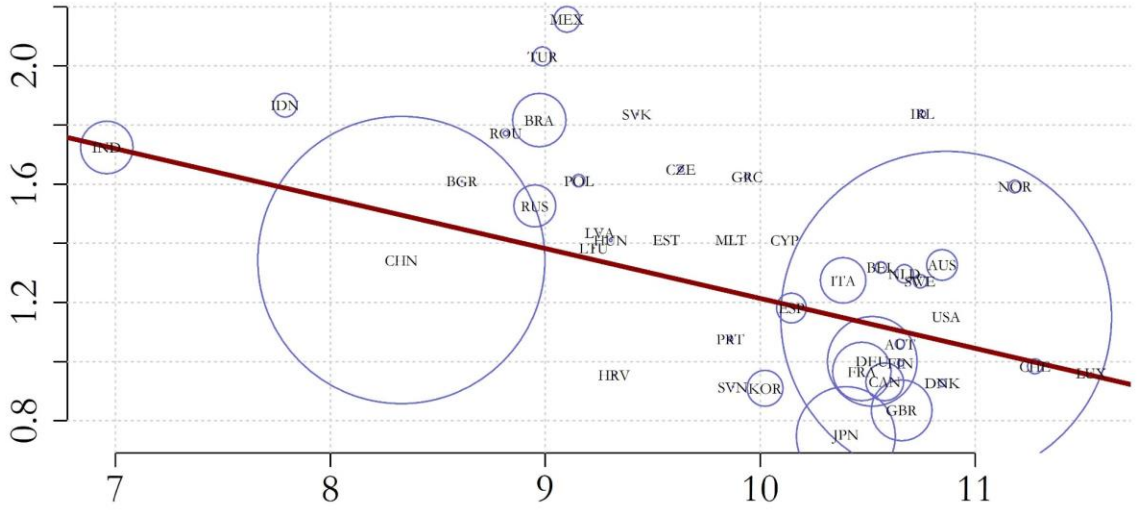
0.1
0.0
USA
China
2000
2002
2004
2006
2008
2010
2012
2014


USA
Japan
Germany
UK
China
India
Brazil

Distribution of global value added

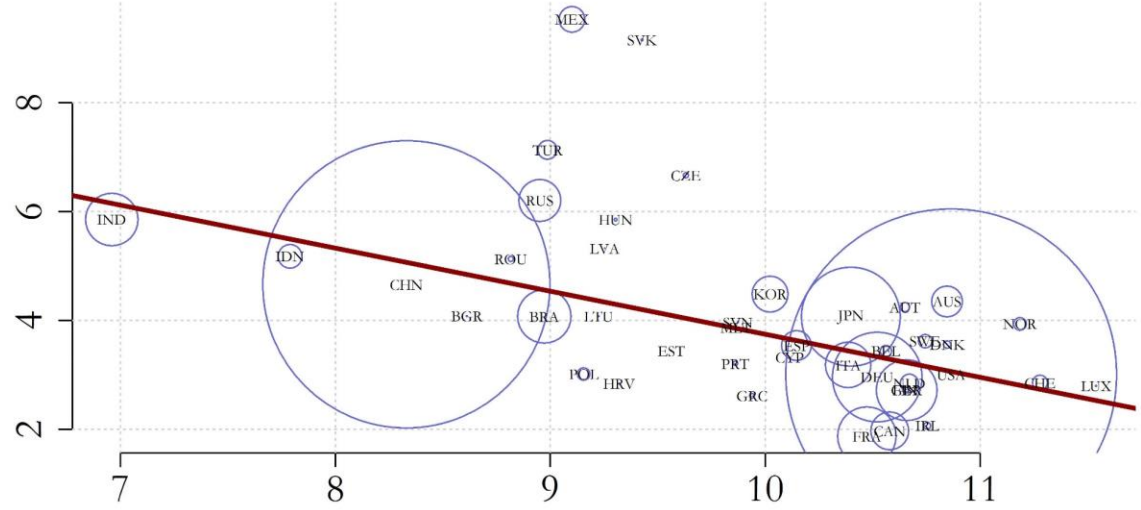


Rate of surplus value



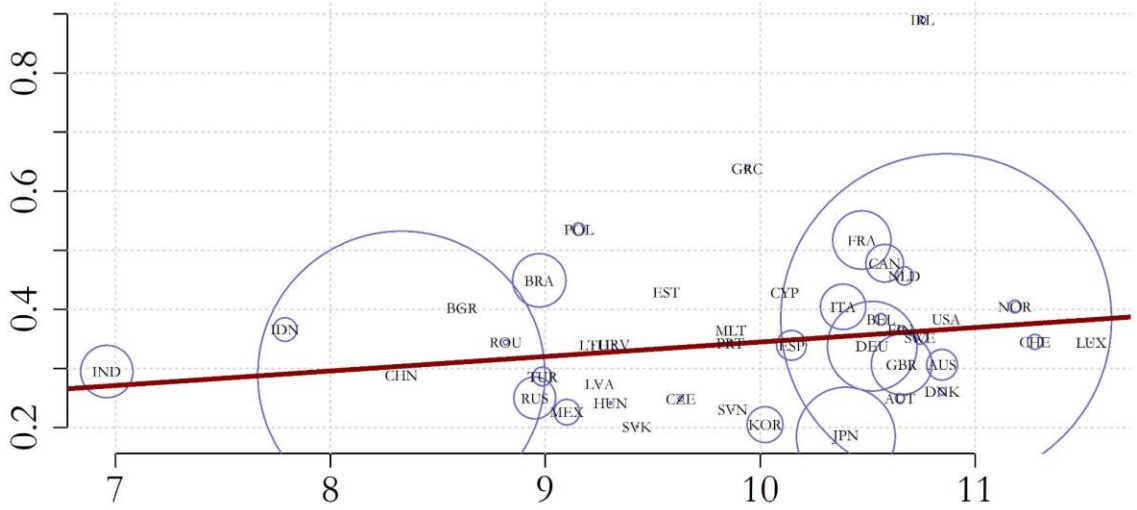
Real GDP per capita in 2015 US dollars in logs

Organic composition of productive capital



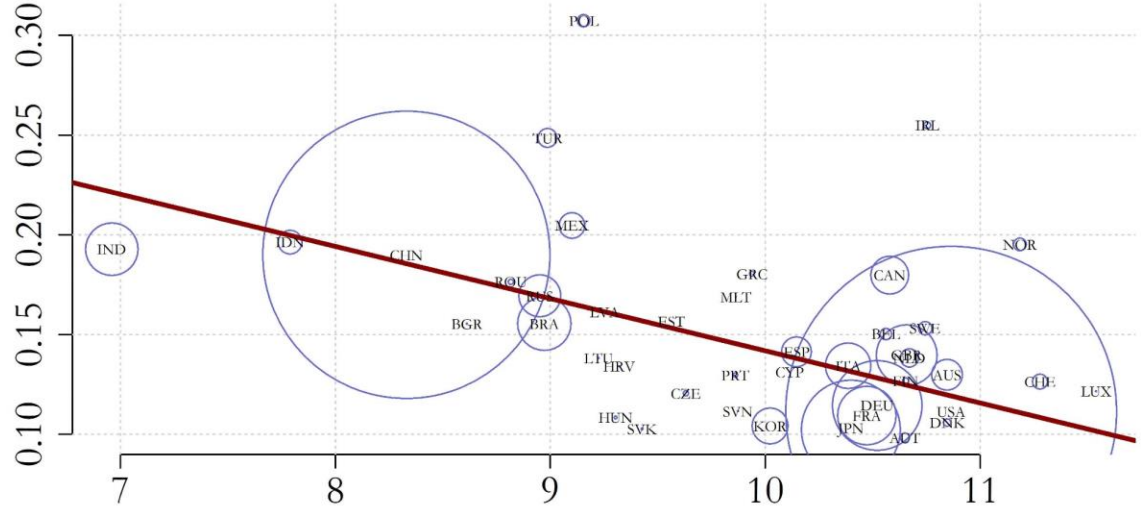
Real GDP per capita in 2015 US dollars in logs

Profit rate on productive capital



Real GDP per capita in 2015 US dollars in logs

Profit rate on total capital



Real GDP per capita in 2015 US dollars in logs

Table 2: Weighted global averages regressed on linear time trend

Dependent variable	**Global time trend**
Rate of surplus value	0.008721***
Organic composition of productive capital	0.062268***
Organic composition of total capital	0.084159***
Organic composition of unproductive capital	0.021891*
Rate of profit on total capital (surplus value/total capital stock)	-0.000253
Rate of profit on productive capital (surplus value/productive capital stock)	-0.002885***
Net profit rate: productive activities (using conventional value added)	-0.000882*
Net profit rate: unproductive activities (using conventional value added)	-0.000424***
Net income of unproductive activity over the value added of productive activity	-0.003722***
Capital stock: unproductive to productive ratio	-0.0177***
Persons engaged: unproductive to productive ratio	0.005371***
Number of employees: unproductive to productive ratio	-0.000902**
Employee compensation: unproductive to productive ratio	-0.003563***
Employee plus self-employed compensation: unproductive to productive ratio	-0.002375***

Note: Significance levels are 10%(*), 5%(**), 1%(***). OLS estimates. Independent variables: intercept and linear time trend. Dependent variable in levels. Regressions include global aggregates for the 43 countries listed in **Table 1** over the 2000-2014 period. Persons engaged are employees plus self-employed workers. Variables adjusted for self-employment in productive and unproductive activities.

Table 3: Between- and within-country components of Marxist variables regressed on log of real GDP per capita, weighted by country shares of global value added

Dependent variable	Panel fixed effects: between countries	Panel fixed effects: within countries
Rate of surplus value	-0.194***	-0.143***
Organic composition of productive capital	-0.884***	0.459***
Organic composition of total capital	0.28	0.85***
Organic composition of unproductive capital	1.164***	0.391***
Rate of profit on total capital (surplus value/total capital stock)	-0.027***	-0.04***
Rate of profit on productive capital (surplus value/productive capital stock)	0.024	-0.064***
Net profit rate: productive activities (using conventional value added)	-0.003	-0.064***
Net profit rate: unproductive activities (using conventional value added)	-0.043	-0.01
Net income of unproductive activity over the value added of productive activity	0.168***	0.044***
Capital stock: unproductive to productive ratio	0.561***	-0.009
Persons engaged: unproductive to productive ratio	0.186***	0.101***
Number of employees: unproductive to productive ratio	0.178***	0.041***
Employee compensation: unproductive to productive ratio	0.158***	0.072***
Employee plus self-employed compensation: unproductive to productive ratio	0.133***	0.078***

Note: Significance levels are 10%(*), 5%(**), 1%(***). Fixed effects include individual effects. Independent variable: log of real GDP per capita in 2015 US dollars. Dependent variable in levels. Regressions include the 42 countries listed in **Table 1** over the 2000-2014 period, excluding Taiwan due to lack of data on real GDP per capita. Persons engaged are employees plus self-employed workers. Variables adjusted for self-employment in productive and unproductive activities. 'Between' and 'within' panel estimators weighted by country shares of global value added.

Thank you

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