The Great Divergence revisited: industrialization, inequality and political conflict in the unified growth model

Dmitry Veselov, Alexander Yarkin

National Research University Higher School of Economics

EEA Conference. Geneve. August 21-26, 2015

Motivation

- Different timing of growth take-offs leads to the Great Divergence in income per capita across countries.
- In many countries industrialization intensifies the social tensions between different social classes. (landowners, emerging class of capitalists and workers)
- What explains the huge cross-country differences in the pace of industrialization and moments of transition from stagnation to growth?
- What explains differences in the intensity of political and social conflict between supporters and opponents of modern sector development?

The Great Divergence: illustration

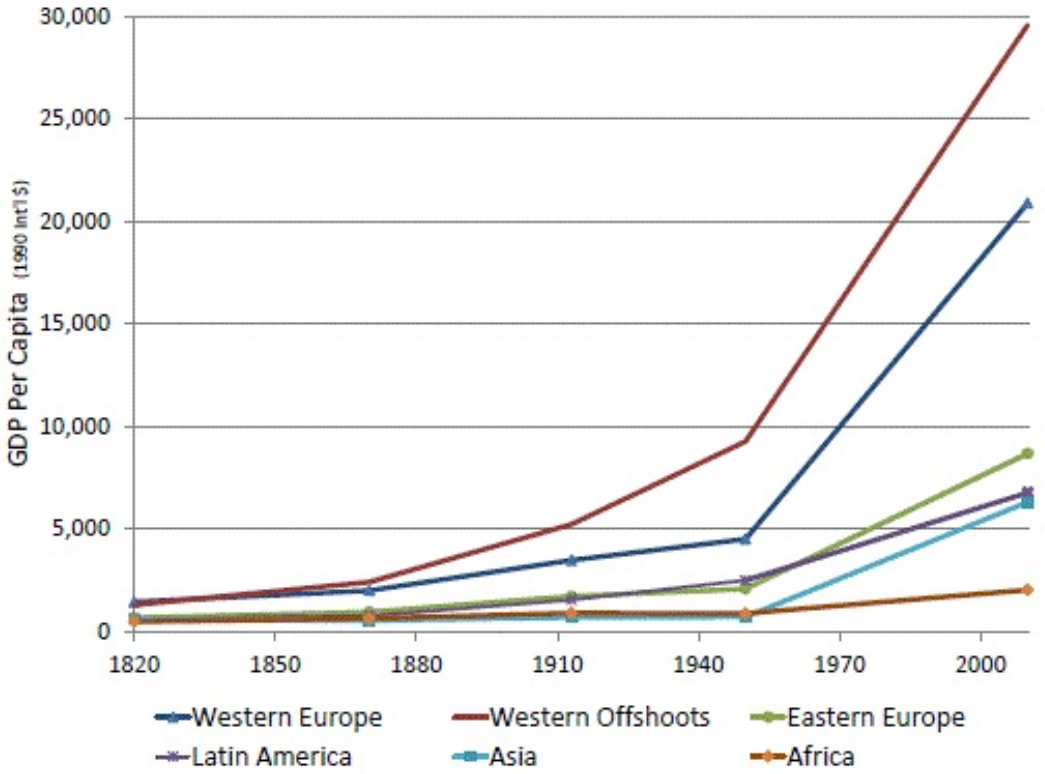

Рис.: Madisson database // O.Galor. Lecture 1. Growth and comparative development: an Overview

The importance of inequality in wealth (land, capital)

The inequality in wealth distribution affects outcomes and intensity of political conflict.

- It affects agents preferences over institutional set-up
- It shapes the incentives and abilities of agents to participate in political conflict
- It determines the degree of collective action problem inside competing groups

Changes in the structure of wealth (France, 1700-2000)

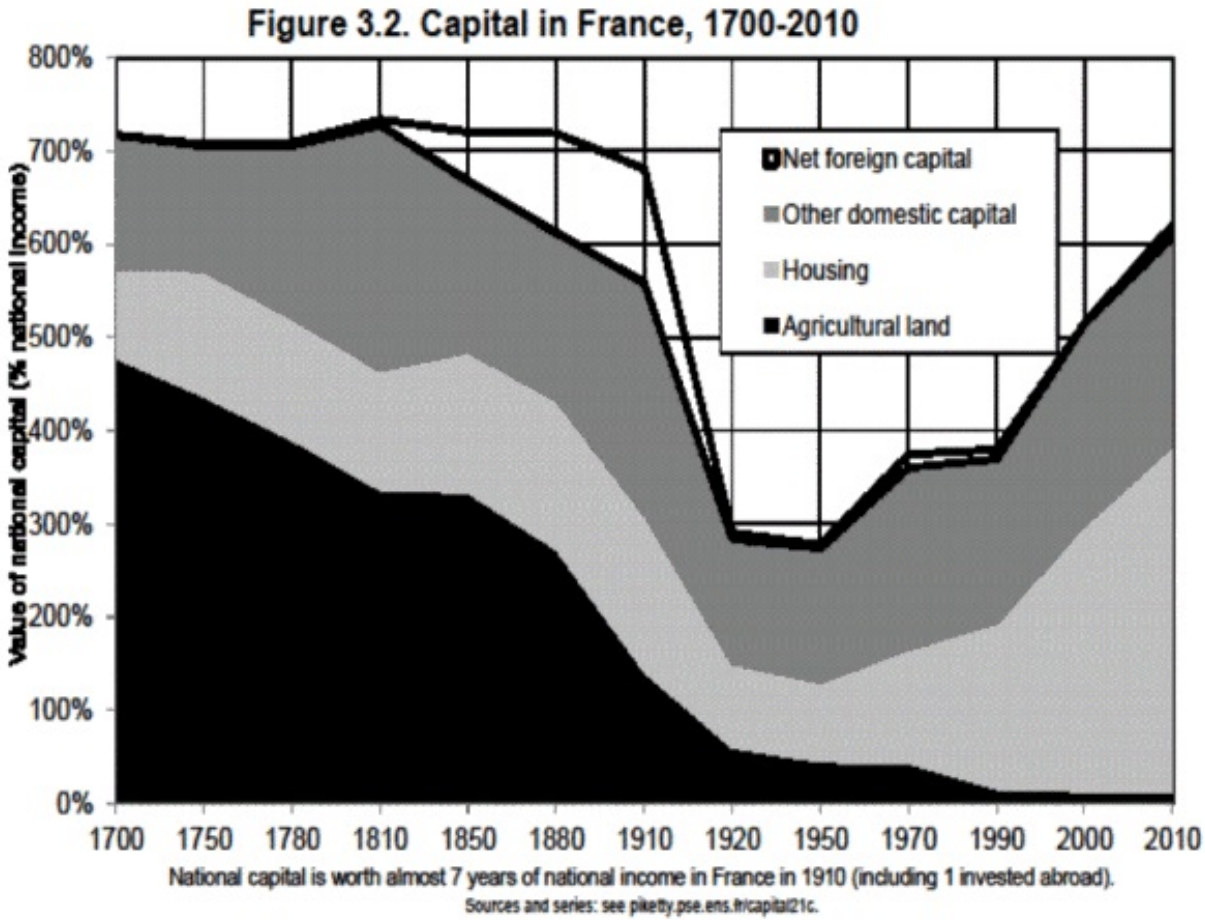

Рис.: T. Piketty. Le capital au XXI siécle. pp.27.

Contribution

1. A two-sector neoclassical growth model of transition from stagnation to growth with asymmetric public policy contest
2. The outcome of the public policy contest determines the pace of industrialization and growth.
3. Wealth distribution within and between the opposing groups affects the agents' incentives and abilities to invest in political conflict

Wealth inequality $\rightarrow$ outcome of political conflict $\rightarrow$ industrialization $\rightarrow$ Great Divergence

Related literature

- The models of transition from stagnation to growth
  - Galor,Weil (2000), Galor, Moav (2002), Hanssen, Prescott (2002), Jones (2002), Strulik, Weisdorf (2008)
- The models of the political economy of industrialization
  - Galor et al. (2009), Bertocchi (2006), Boschini (2006)
- The models of public policy asymmetric contests
  - Epstein and Nitzan (2006), Baik (2008), Nitzan and Ueda (2014)

Production side

- The economy consists of two sectors, traditional (Tr) and modern (M). The production functions are Cobb-Douglas in both sectors

$$Y_{T,t} = A_{T,t} T^{\alpha} L_{T,t}^{1-\alpha}, \tag{1}$$

$$Y_{M,t} = A_{M,t} K_t^{\alpha} L_{M,t}^{1-\alpha}, \tag{2}$$

  - $L_{T,t}, L_{M,t}$ - is the employment in the traditional and in the modern sector,
  - $A_{M,t}, A_{T,t}$ - the level of technology in Tr and M sectors and
  - T_t, K_t - the size of the land and physical capital.
- Labor are perfectly mobile across sectors
- Goods in Tr and M sectors are perfect substitutes

$$Y_t = Y_{M,t} + Y_{T,t} \tag{3}$$

Agents' types

- We consider an OLG model with bequests where each generation lives for two periods
- The size of the population is constant.
- Agents are divided into two classes: landowners and landless citizens (capitalists)
- The amount of land is distributed within the group of elite with a known distribution function.
- Land is a non-tradable good; inside one family it is inherited from one generation to another without any changes in size,so

$$T_{i,t} = T_i = const. \tag{4}$$

- The individual's level of capital is formed from the bequest of the previous generations, $k^i_{t+1} = b^i_t$

Technological progress

- Two type of policies:
  - reform policy (R).
  - status-quo policy (S).

$$A_{M,t} = \begin{cases} \gamma A_{M,t-1}, \textit{if } R \\ A_{M,t-1}, \textit{if } S \end{cases}, \tag{5}$$

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$$A_{M,t} = \begin{cases} \gamma A_{M,t-1}, \textit{if } R \\ A_{M,t-1}, \textit{if } S \end{cases}, \tag{5}$$

- The expected growth rate of technological progress is

$$g_t = p_{R,t}(\gamma - 1) \tag{6}$$

where $p_{R,t}$ - the probability that the reform policy will be implemented (determined in the political conflict).

- There exists a spillover from the modern-sector productivity to the productivity in the traditional sector, such that $A_{T,t} = A_{M,t-1}$

Timing of the model

1. Generation is born and receives capital and land bequests, which are used in production processes and generate incomes in the second period of their life.
2. At the second period agents may invest part of their pre-conflict incomes in political struggle in order to increase the probability of the desired policy outcome
3. After the policy is determined, agents receive their post-conflict incomes, where factor prices are affected by the conflict outcome
4. Finally, agents optimally allocate their post-conflict income between consumption and bequest to their offspring, and the game repeats

Agents' preferences

Agents maximize the following utility function

$$\mathbb{E}\,U(c^i_{t+1}, b^i_{t+1}, e^i_{t+1}) = (1-\beta)ln(c^i_{t+1,1}) + \beta\,\mathbb{E}[ln((c^i_{t+1,2}) + ln(b^i_{t+1})] \quad (7)$$

where $c^i_{t+1,1}$ stands for pre-conflict consumption, $c^i_{t+1,2}$ stands for post-conflict consumption, b^i_{t+1} for bequest. Two budjet constraints

$$c^i_{t+1,1} + e^i_{t+1} \leq I^i_{t+1,1} \quad (8)$$

$$c^i_{t+1,2} + b^i_{t+1} \leq I^i_{t+1,2} \quad (9)$$

where e^i_{t+1} for the input in contest

Incomes' formation

- Factor markets are competitive, factor prices are equal to marginal productivity of factors.
- Each factor (labor, capital, land) use two times and generate pre-contest and post contest incomes
- In the status-quo case incomes does not change, in the reform case incomes change due to the change in the factor prices.

$$I^i_{t+1} = w_{t+1} + k^i_{t+1} R_{t+1} + T^i \rho_{t+1}, \tag{10}$$

where $w_{t+1}, R_{t+1}, \rho_{t+1}$ are factor prices. Capital equals to the bequest from the previous generation, $k^i_{t+1} = b^i_t$.

Political contest

- Agents non-cooperatively choose the amount of efforts to put in contest
- The probability that the reform policy will be implemented is determined by the simple Tullock contest success function.

$$p_R = (\sum e_R^i)/(\sum e_R^i + \sum e_S^j) = E_R/E, \tag{11}$$

where

- e_R^i and e_S^j are efforts of supporters and opponents of the reform policy correspondingly.
- E_R, E_S are the sum of efforts of groups R and S,
- E is the total sum of efforts of all agents

Agents' political preferences

Proposition 1

- There exists a subset (possibly empty) of landowners with sufficiently high k_t^i and low T^i, such that they support the reform policy

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Agents' political preferences

Proposition 1

- There exists a subset (possibly empty) of landowners with sufficiently high k_t^i and low T^i, such that they support the reform policy
- The larger is k_t^i, the stronger is support for industrialization, the larger is T^i, the weaker is support for industrialization
- There exists a threshold level of aggregate capital $\overline{K}$ such that for all $K_t > \overline{K}$ all landowners support the reform policy and so $p_R = 1$.

Individual contributions to the conflict

The individual efforts in the conflict depend on the expectations about post-conflict incomes.

$$\max_{e^i, c^i}[p_R(e^i) * ln\beta(I^i_{2,R}/I^i_{2,S}) + (1-\beta)lnc^i_1] \tag{12}$$

$$c^i_1 + e^i \leq I^i_1 \tag{13}$$

All agents are divided on two groups.

1. If $\Delta^i_R = \beta lnI_{2,R}/I_{2,S} > 0$ then individual supports the reform policy.
2. If $\Delta^i_R < 0$ then individual supports the status quo policy.

$$e^i_R = max\{I_{t+1,1} - \frac{1-\beta}{((E-E_R)/E)\Delta^i_R}, 0\} \tag{14}$$

Within group distribution of wealth

Proposition 2

- If $E > \overline{E}$, then any strict Lorenz-worsening redistribution of capital within the landless group of agents increases the probability of reform policy . The effect is larger for the larger values of the aggregate capital.
- The opposite holds for land distribution inside the landowners

- Income vs consumption channel ($I_{t+1,1} \uparrow \Rightarrow e^i \uparrow$)
- Individual stakes in the political conflict $\Delta_R^i \uparrow \Rightarrow e_R^i \uparrow$
- Free-riding channel ($E_R \uparrow \Rightarrow e_R^i \downarrow$)

Between-group distribution of wealth

Proposition 3
Let η be the share of capital, which belongs to landowners

- For a low level of aggregated capital, redistribution of capital from capitalists to landowners (higher η) lowers p_R^*,
- For a high level of aggregated capital, redistribution of capital from capitalists to landowners (higher η) increases p_R^*.

Capital accumulation

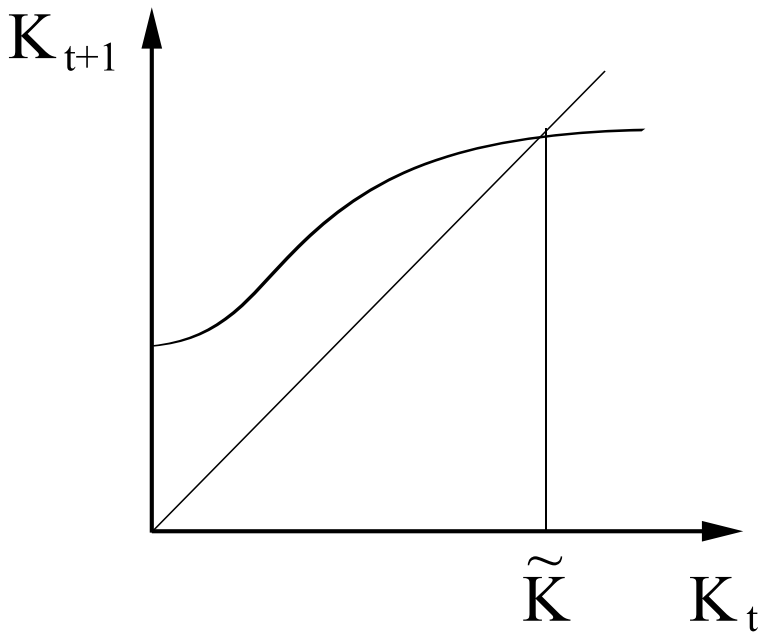
$$K_{t+1} = \beta Y_t = \beta(A_{T,t} T^{\alpha} L_{T,t}^{1-\alpha} + A_{M,t} K_t^{\alpha} L_{M,t}^{1-\alpha}), \tag{15}$$

where,

$$A_{T,t} = A_{M,t-1},$$

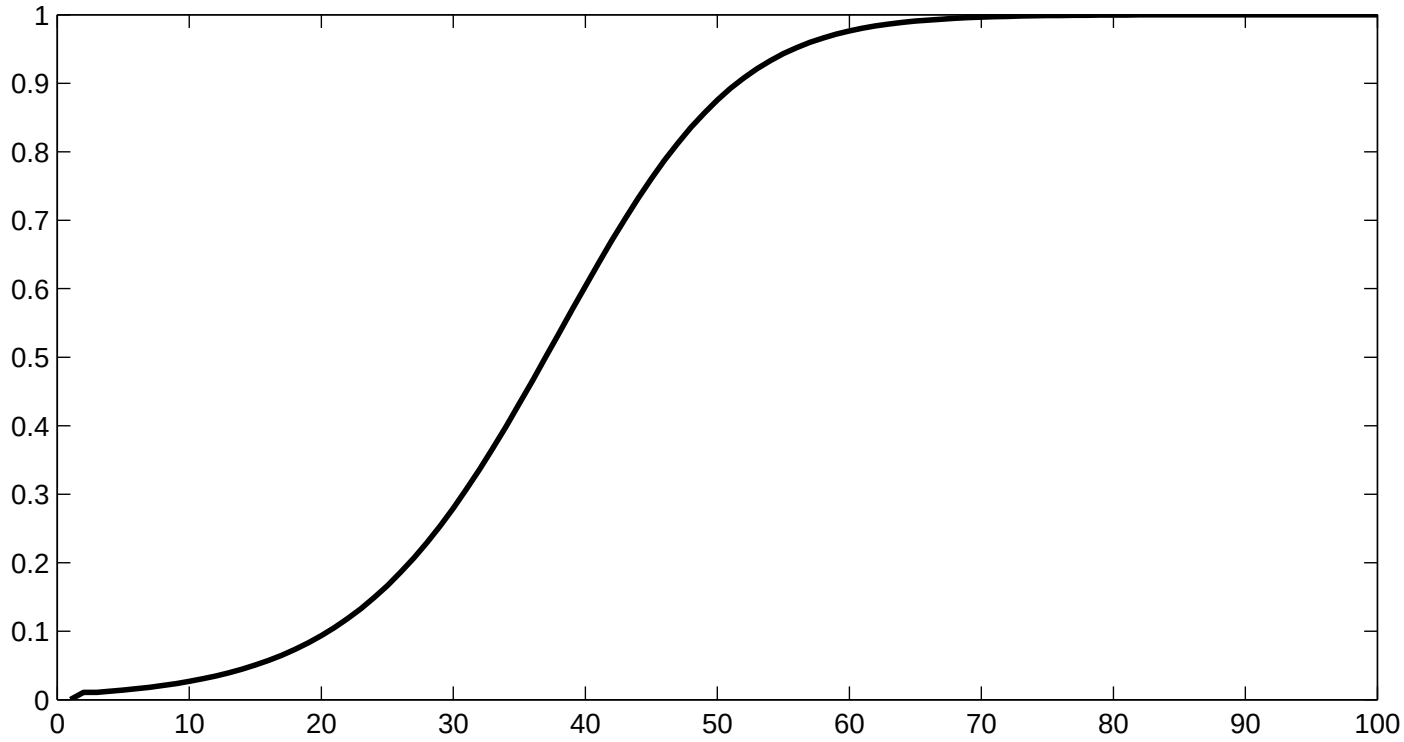
$L_{T,t}$ and $L_{M,t}$ are determined from the market clearing condition and $A_{M,t}$ is determined from the result of the political contest.

Dynamics for a constant level of technology ($A_M = A_T$)

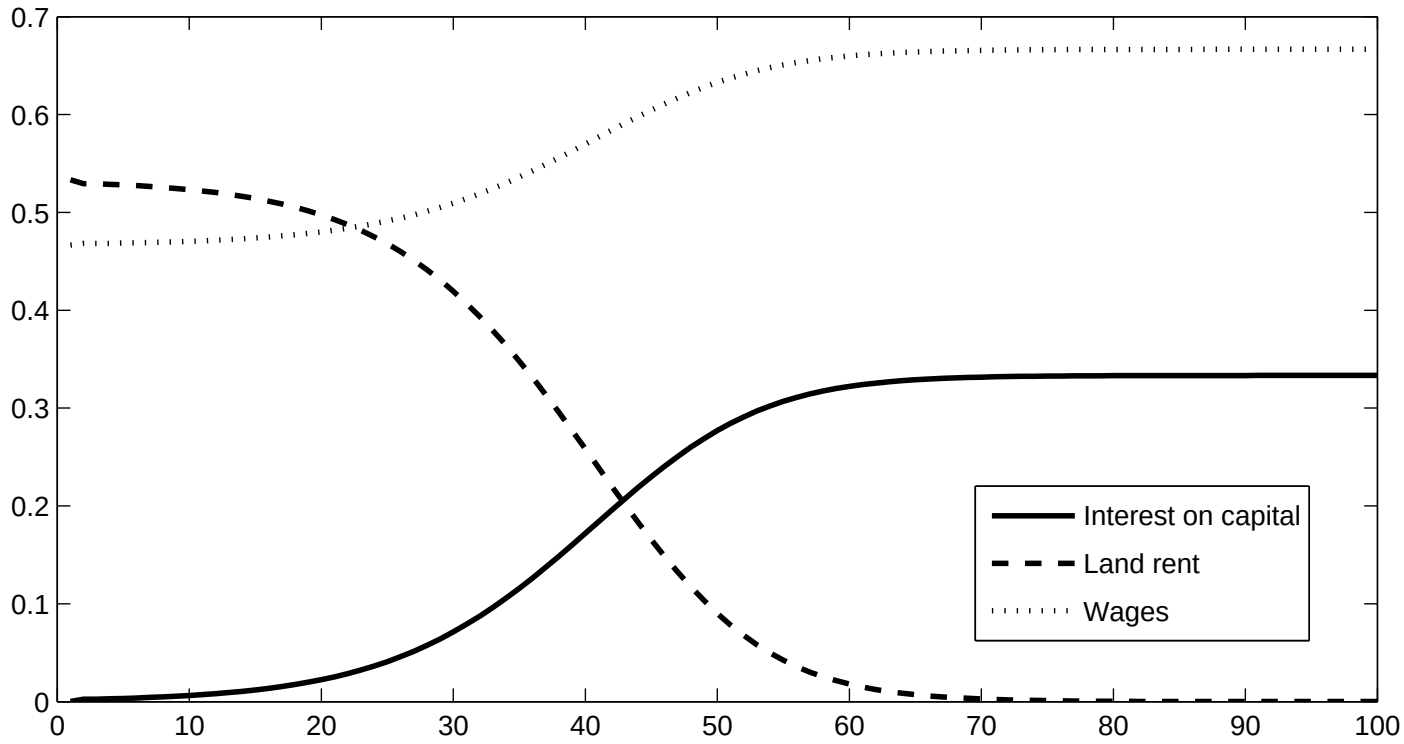


- For a given level of technological progress $A_{T,t} = A_{M,t}$ capital assymptotically converge to the steady state level.
- When the new technology develops, the locus $K_{t+1}(K_t)$ shifts upwards, and the temporary steady state point moves to the right.

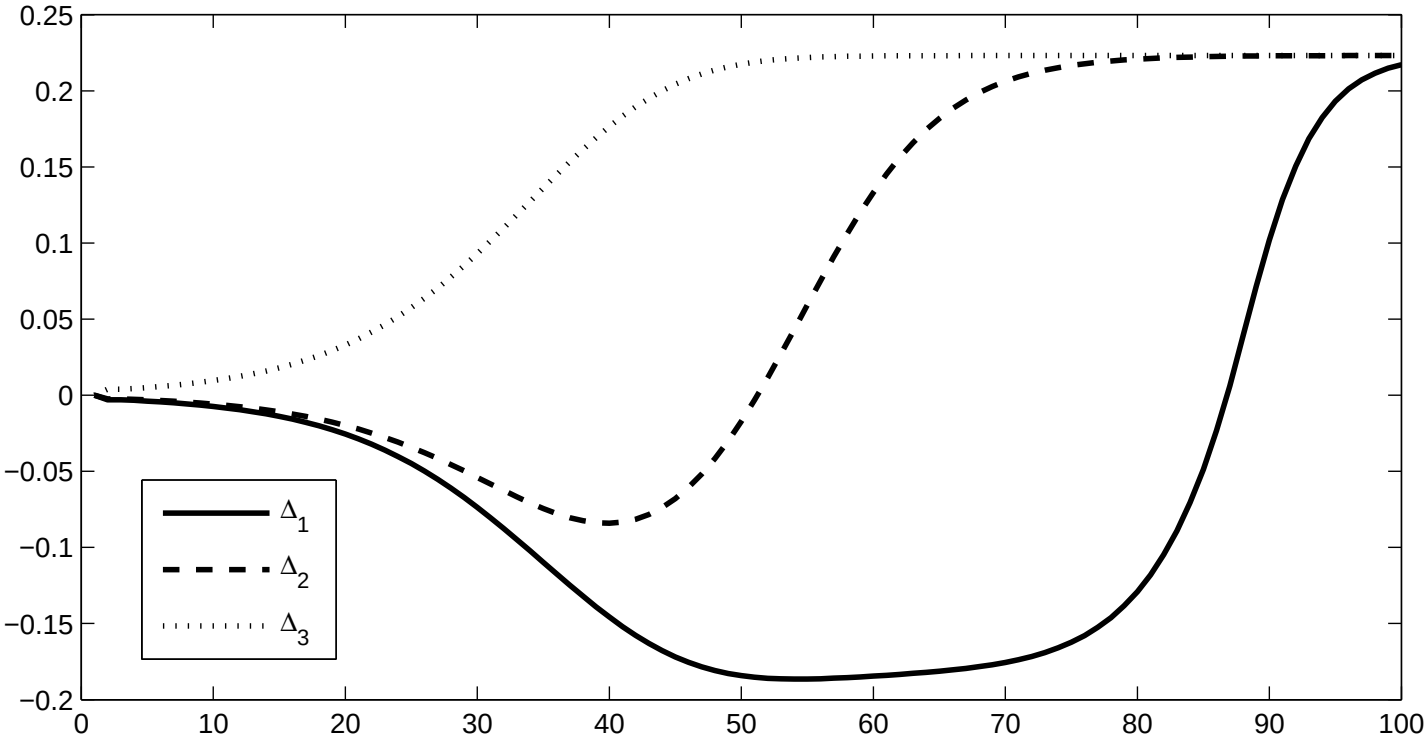
The share of employment in the modern sector



The share of factor incomes in GDP



The dynamics of the gains from the reform policy

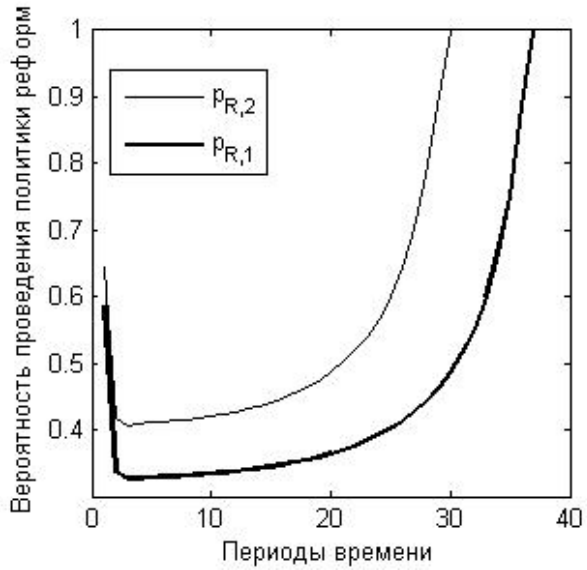


Industrialization phases

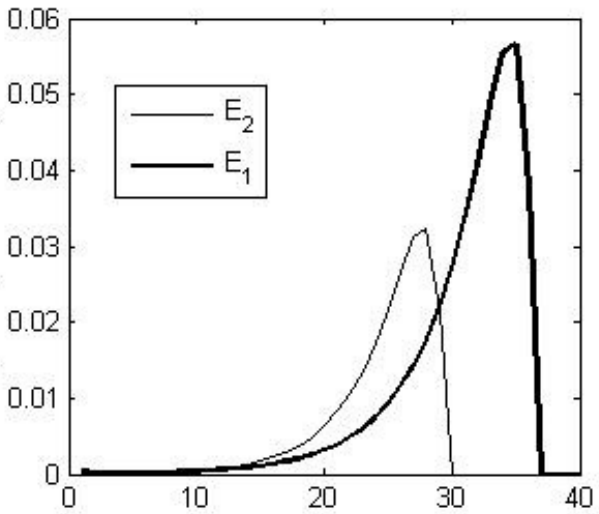
- Conflictual period of industrialization ($p_R < 1$)
  - the first sub-period of increasing social tensions between supporters and opponents of industrialization;
  - the second sub-period of decreasing social tensions between supporters and opponents of industialization;
- Peaceful (consensual) period of industrialization ($p_R = 1$)

The probability that the reform policy is implemented

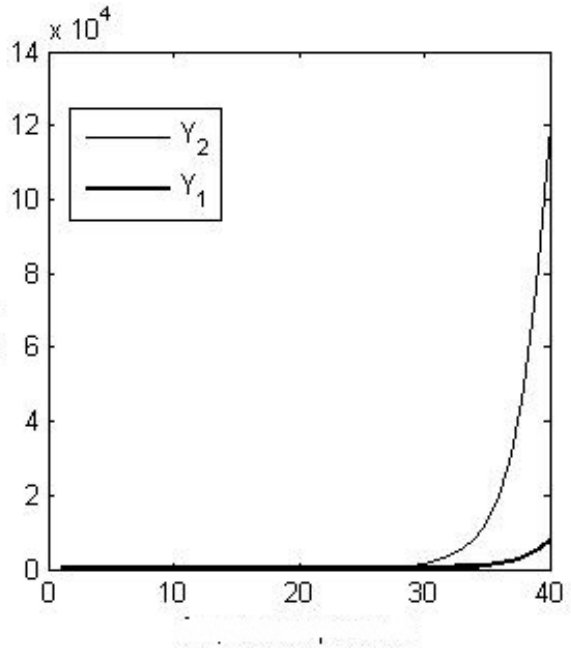
- Two cases
  - The inequality of land within the group of landowners is low (Gini=0.1)
  - The inequality of land within the group of landowners is high (Gini=0.5)



The intensity of the political contest in two cases



GDP per capita dynamics in two cases



Conclusion

- We analyse a new mechanism that explains the transition from stagnation to growth in a two-sector unified growth model.
- In the model technological progress is driven by the endogenous choice of institutions (policies), which are determined in the political contest between social classes.
- The concentration of capital within a class of capitalists leads to faster industrialization and intensifies the contest on early stages.
- The conentration of land within a group of landowners lowers industrialization and intensifies the conflict on later stages.