Endogenous institutions and conflict in the model of transition from stagnation to growth

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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, workers).
- ▶ Some countries experiences early industrialization with the emergence of new class of capitalists (Netherlands, Belgiums), but this early industrialization was unsustainable.
- ▶ What explains the cross-country differences in the pace of industrialization and moments of transition from stagnation to growth?
- ▶ What explains the differences of the intensity of political and social conflict between landowners and emerging class of capitalists?

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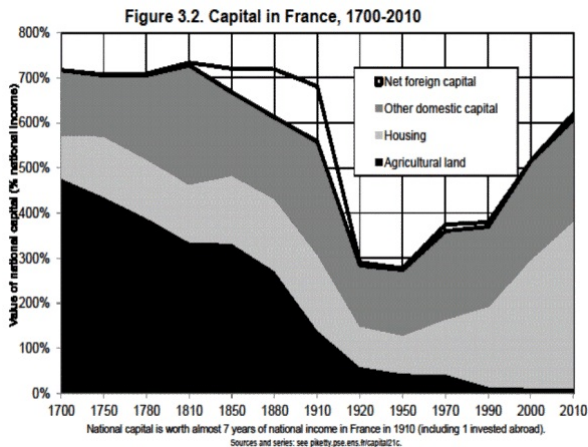# Changes in the structure of wealth (France, 1700-2000)

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

The outlook of the model

- ▶ Two-sector model of transition from stagnation to growth with heterogeneous agents.
- ▶ Agents differ in the structure of their wealth (landowners, capitalists, workers)
- ▶ The possibility of adoption of new technologies is considered in a public policy game between agents
- ▶ Agents invest in the lobbying of their economic interests.
- ▶ The analysis of the joint dynamics of technology, the structure of wealth and the intensity of the contest.

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)

- Inequality and economic development. Galor, Zeira (1993), Galor, Moav (2006), Acemoglu et al. (2008)

- The models of public policy asymmetric contests. Epstein and Nitzan (2006), Baik (2008), Nitzan and Ueda (2014)

A toy version of the model

- A society consists of 1 landowner, 1 capitalist and L workers.
- All agents maximize the current pay-offs.
- The production function in the traditional and in the modern sector is

$$Y_p(t) = T^\beta L_p(t)^{1-\beta}, \tag{1}$$

$$Y_m(t) = L_m(t)^{1-\alpha} A(t)^{1-\alpha} x(t)^\alpha, \tag{2}$$

where

- $L_p, L_m(t)$ - is the employment in the traditional and in the modern sector, $L_p(t) + L_m(t) = L$
- $A(t)$ - the level of technology,
- T - the size of the land and
- $x(t)$ -the number of capital goods.

$$Y(t) = Y_p(t) + Y_m(t) \tag{3}$$

Agents incomes

- Landowners get the rent from the land

$$R(t) = \beta T^{\beta} L_p(t)^{1-\beta} \tag{4}$$

- Capital goods are produced by the monopolistic firms, owned by capitalists.

$$\pi = \widehat{\pi} A(t) L_m(t), \tag{5}$$

where $\widehat{\pi} = (1-\alpha)\alpha^{(1-\alpha)/(1+\alpha)}$

- Labor markets are competitive and wages are equalized between sectors

$$w(t) = (1-\alpha)\alpha^{(2\alpha)/(1+\alpha)} A(t) \tag{6}$$

$$L_p(t) = [\kappa/A(t)]^{1/\beta}. \tag{7}$$

Technological progress

Technological process in the modern sector depends on the employment in this sector (the size of the market effect).

$$g(t) = \Delta A(t)/A(t) = g(L_m(t))$$

, where $g'(L_m) > 0$
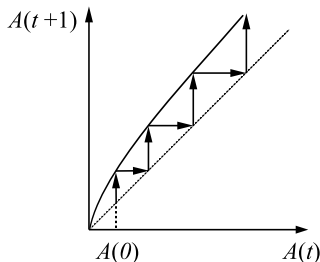
A self-acceleration process of industrialization.

Рис. : The dynamics of technological progress

The technological progress converges to the steady-state level g^*

The description of political contest

- In each of the period the new technologies can be adopted with a probability $\rho(t)$.
- landowners and capitalists influence the probability of adoption by investing their efforts into political contest á la Tullok (1980)

$$\rho = e_C/[e_L + e_C], \qquad (8)$$

- Each agent maximize $U = c_{j,t} - e_{j,t}$ and the optimal efforts depend on the gains from winning a conflict.

$$e_i = V_i^2 V_j/(V_i + V_j), \qquad (9)$$

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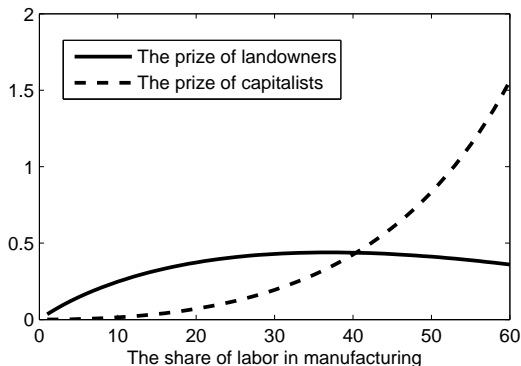- Each agent maximize $U = c_{j,t} - e_{j,t}$ and the optimal efforts depend on the gains from winning a conflict.

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The pay-offs from winning contest

$$V_L = \beta[\kappa/A(t)]^{(1-\beta)/\beta}[1 - 1/\gamma(t)^{(1-\beta)/\beta}] \qquad (10)$$

$$V_c = A(t)[\lambda\widehat{\pi}L_m(t)]^{1/(1-\xi)}\xi^{1/(1-\xi)}(1/\xi - 1), \qquad (11)$$

where ξ is the parameter of the innovations' production function, $\gamma(t) = 1 + \lambda c_R(t)^\xi$,

Рис. : The prize in the contest for landowners and capitalists

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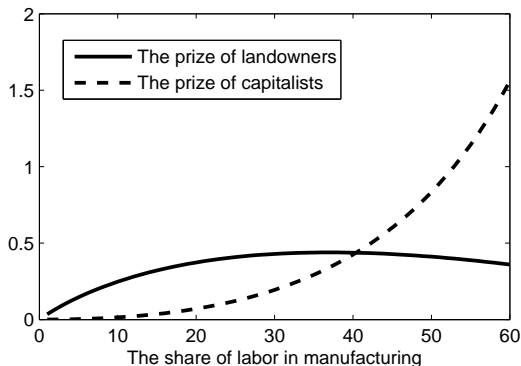

Рис. : The prize in the contest for landowners and capitalists

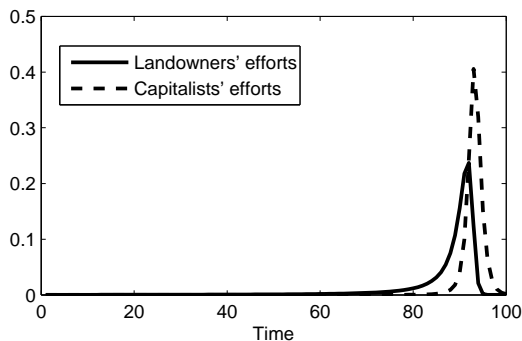# The dynamics of efforts in the political contest

Рис. : The expected dynamics of efforts of landowners and capitalist in a political contest

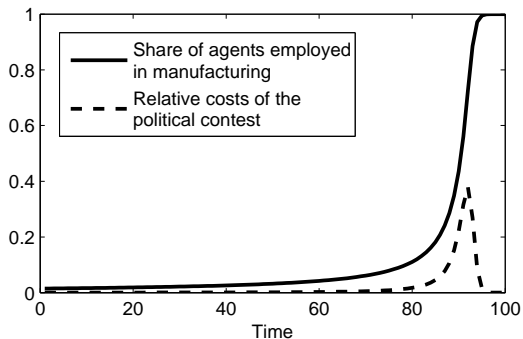# Structural changes and the intensity of the conflict

Рис. : Employment structure and the relative costs of political contest

Preliminary results

- The model generates the transition from stagnation to growth through the changes in the political power of agents
- The model describes the evolution of the intensity of conflict between landowners and emerging class of capitalists
- The model does not explain well the differences in the timing of take-offs and in the intensity of conflict across countries

Basic framework

- Non-overlapping population with a constant size
- Three initially non-homogenous classes: landowners (land + capital), capitalists (capital), workers (no assets initially)
- Agents derive utility from consumption and bequeathing to their offspring
- Incomes come from production factors ownership
- Agents optimally allocate part (possibly zero) of their income to political conflict in order to increase the probability of desired institutional outcome (allowing or not allowing the technological development in the modern sector)

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Basic framework

- The economy consists of two sectors: traditional and modern sector

$$Y_{T,t} = A_{T,t} T^{\alpha} L^{1-\alpha} \qquad (12)$$

and

$$Y_{M,t} = A_{M,t} K^{\alpha} L^{1-\alpha} \qquad (13)$$

- Two types of goods are perfect substitutes

$$Y_t = Y_{T,t} + Y_{M,t} \qquad (14)$$

- Labor are perfectly mobile between sectors.
- Productivity in the modern sector improves by γ with a probability ρ, which is determined in a political process.

Agents endowments and preferences

Each generation of a size 1 lives for two sub-periods of a time

$$U^i(c_{1,t+1}^i, b_{t+1}^i) = (1-\eta)ln(c_{1,t+1}^i) + \eta[(1-\widetilde{\eta})ln(c_{2,t+1}^i) + \widetilde{\eta}ln(b_{t+1}^i)] \tag{15}$$

In the first sub-period agents get bequest, work and spend a part of the income in the political contest

$$l_{t+1,1}^i \geq c_{1,t+1}^i + e_{t+1}^i \tag{16}$$

In the second sub-period the result of the contest is realized, agents work, consume and rest bequest.

$$l_{t+1,2}^i \geq c_{2,t+1}^i + b_{t+1}^i \tag{17}$$

The indirect utility function that agent maximized in a first sub-period is equal to

$$V_i = (1-\eta)ln(c_{1,t+1}^i) + \eta ln(l_{1,t+1}^i) \tag{18}$$

The timing of the model

- Agents get bequest from their parents
- They work and get incomes and consume
- At the end of the first sub-period they invest into political contest
- If the "non-block"policy is chosen, technology in the modern sector improves by γ, otherwise no-changes
- Agents work, get incomes, consume and give bequest.

Endogenous contest

- The technology is adopted with a probability

$$\rho = \sum e^j_{NB}/(\sum e^j_B + \sum e^j_{NB}) \qquad (19)$$

  Each agent maximize the indirect utility function from winning a contest.

- We look for a pure strategy Nash equilibrium in the described between group contest

- We use a share-function approach, proposed by Cornes and Hartley (2000, 2005)

The optimal investment in conflict

The optimal non-negative efforts into the conflict is

$$e_{NB}^i = I^i - (1 - \eta)/[(E - E_{NB})/E\Delta_{NB}^i, \qquad (20)$$

where E is the total sum of efforts of all agents, E_{NB} - the sum of efforts of "pro-growth"agents, $\Delta_{NB}^i = V_{NB}^i/V_B^i$ is the relative gains from winning the contest for an agent i. Within-group inequality in capital distribution.

- ▶ Conflict vs Consumption channel
- ▶ Gains from winning in a conflict channel
- ▶ Free-riding channel

Preliminary results

Higher inequality in capital leads to faster industrialization (the opposite with land):

Between-group inequality in capital distribution

- ▶ When capital-to-land ratio is low, a transfer of capital from capitalists to landowners will demotivate the former, while almost not affect the latter
- ▶ When capital-to-land ratio is high, the same transfer will make landowners to switch their preferences towards industrialization