Was Stalin necessary for Russia's economic development?

Anton Cheremukhin Mikhail Golosov Sergei Guriev Aleh Tsyvinski

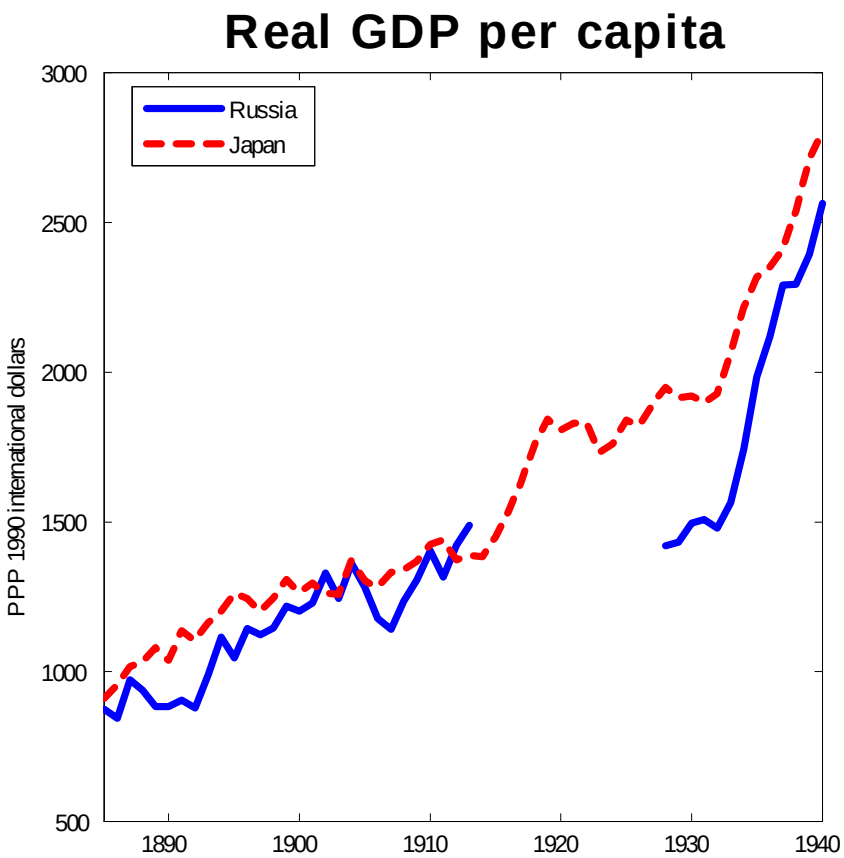
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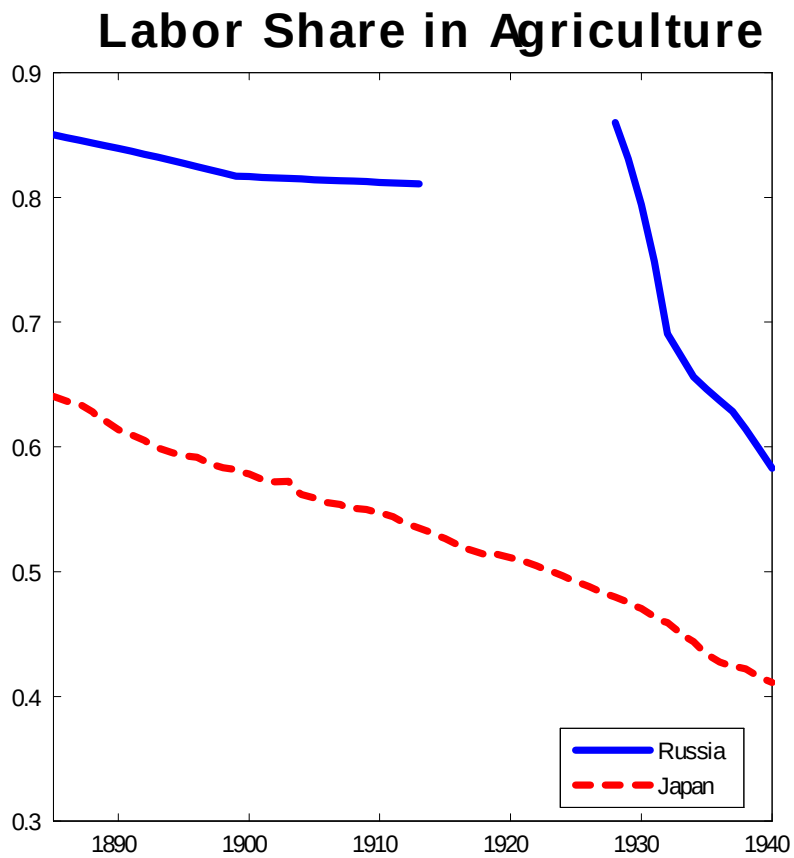
"We are behind advanced countries by 50-100 years.
We have to run this distance in 10 years.
Either we will do it, or we will be crushed"

Joseph Vissarionovich Stalin

Speech *"On the goals of managers"*, Feb. 4, 1931
(published in *Pravda* on Feb. 5, 1931)

Russia and Japan





Russia's structural change 1928-40

- **Industrialization policies under Stalin coincided with dramatic transformation of Russian economy**
  - fraction of labor force in agriculture declined from 74% in 1928 to 54% in 1940
  - GDP per capita increased by 80% over 12 years
  - production of some categories of goods increased even more dramatically (pig iron increased by a factor of 4.5, electricity by a factor of 9, machine tools by a factor of 20)
- **Profound impact on academic views about the role of state in economic development**
  - One of the prime examples of "big push" policies
  - Related view that communist revolution "broke barriers" that prevented efficient allocation of resources
- **Profound impact on policy views about the role of state in economic development**
  - Nehru in India, Mao in China, and countless others inspired

Brief history of Stalin's economic policies

- **In 1928 Stalin consolidated power, two major economic reforms:**
  - **Industrialization:** significant increase in state's investment in manufacturing, especially in heavy industry
  - **Collectivization:** forced organization of peasants into communes with abolishing private property on means of agricultural production (horses, cows, plows, etc.)
- **"Price scissors":**
  - One of the key mechanisms of surplus extraction
  - Peasants were forced to sell agricultural goods at artificially low prices.
  - "Surplus" output was simply requisitioned.
- **Collectivization leads to:**
  - Drop in agricultural production and wide-spread famine in the villages, especially, in the Ukraine and Kazakhstan**.**
  - **Passport system and compulsory registration is introduced**, among other things, for "cleansing of towns from hiding *kulaks*". Peasants can no longer leave village without permission.

Some quotes

- **Alec Nove, Encounter, 1962**
  - " *How far was Stalin, or Stalinism, an integral, unavoidable,"necessary" part of the achievements of the period? How much of the evil associated with the Stalin system is attributable to the peculiar character of the late dictator, and how much was the consequence of the policies ... to impose very rapid industrialization on a peasant country?"*
- **Allen, Farm to Factory, 2003:**
  - *"In the absence of the communist revolution and the Five Year Plans, Russia would have remained ... backward... This fate was avoided by Stalin's economic institutions. They were a further installment of the use of state direction to cause growth in an economy that would have stagnated if left to its own devices"*
- **Acemoglu and Robinson, Why Nations Fail: The Origins of Power, Prosperity and Poverty, 2012**:
  - *"There was ... huge unrealized economic potential for reallocating ... labor from agriculture to industry. Stalinist industrialization was one brutal way of unlocking this potential"*

This paper

- **Systematic analysis of economic performance of Russia**:
  - under the tsars (1885-1913)
  - under Stalin (1928-1940)
  - create consistent measures of aggregate and sectoral variables
- **Standard two-sector neoclassical growth model**
  - follow Cole and Ohanian (2004) and Chari, Kehoe, McGrattan (2007) to measure wedges
  - contribution of each wedge to the performance, connection to policies.
  - first modern analysis of the communist economy
- **Counterfactuals: compare**
  - Stalin's economy (1928-1940) and simulations without WWII (1941-...)
  - Simulated Tsarist economy (with tsarist's distortions)

Main Results

- **Stalin's economy (1928-40):**
  - **1928-1935:**
    - Most wedges significantly worsen; peak coincides with peak of policies
    - No evidence for "big push" theories: TFP drops significantly
  - **1936-1940:**
    - wedges stabilize, some are lower/higher
- **Counterfactuals:**
  - **1928-1940:**
    - Welfare under Stalin **-27%** of consumption lower vs. tsarist simulated
    - Tsarist's economy would have structurally transformed on its own
  - **1941-onward:**
    - Welfare under Stalin **+11.8%** of consumption higher vs. tsarist simulated
    - Stalin did break barriers but in the long run
- **Which wedges/policies?**
  - Price scissors are very important
  - Reduction of capital wedge and decrease in trade

Roadmap

1. **Two sector neoclassical growth economy with and without frictions**
2. Constructing a consistent dataset for Russia
3. Calibration
4. Wedges
5. Counterfactuals: Russia without Communists

Theoretical framework: two-sector growth model (I)

- **Consumers:**

$$\sum_{t=0}^{\infty} \beta^t \left[\eta \log \left(c_t^A - \gamma^A \right) + (1-\eta) \log c_t^M \right], \gamma_A \geq 0$$

- **Producers:**
  - manufacturing (non-agriculture)

$$Y_t^M = F_M \left(K_t^M, N_t^M \right) = A_t^M \left(K_t^M \right)^{\alpha_M} \left(N_t^M \right)^{\beta_M}$$

  - agriculture

$$Y_t^A = F_A \left(K_t^A, N_t^A \right) = A_t^A \left(K_t^A \right)^{\alpha_A} \left(N_t^A \right)^{\beta_A}$$

- **Elasticities:**

$$\begin{aligned} \alpha_{K,A} + \alpha_{N,A} &< 1 \\ \alpha_{K,M} + \alpha_{N,M} &= 1 \end{aligned}$$

Theoretical framework: two-sector growth model (II)

- **Goods market clearing:**

$$N_t c_t^A + ex_t^A = Y_t^A$$
$$N_t c_t^M + ex_t^M + G_t^M + I_t = Y_t^M$$

- **Labor and Capital markets clearing:**

$$N_t^A + N_t^M = \chi_t N$$
$$I_t + (1 - \delta) K_t = K_{t+1}$$
$$K_t^A + K_t^M = K_t$$

- **Exports** (exogenous at price q_t):

$$q_t ex_t^A + ex_t^M = 0$$

Benchmark: competitive equilibrium with no distortions

- **Competitive equilibrium is optimal**
- **First order conditions** ($p_t^M = 1$):

$$\begin{aligned}
\frac{F_{M,K}(t)}{p_{A,t}F_{A,K}(t)} &= \frac{r_M(t)}{r_A(t)} = 1 \\
\frac{F_{L,K}(t)}{p_{A,t}F_{L,K}(t)} &= \frac{w_M(t)}{w_A(t)} = 1 \\
\frac{U_{C,A}(t)}{U_{C,M}(t)} &= p_{A,t} \\
U_{C,M}(t) &= U_{C,M}(t+1)\beta\left(1 + F_{M,K}(t) - \delta\right)
\end{aligned}$$

- **The data will reject the implications of this frictionless economy**

Economy with frictions

- **Chari, Kehoe, McGrattan (2007) accounting procedure:**
  - compute wedges from observed quantities/prices
- Given these wedges, competitive equilibrium replicates data exactly.
- In our context: A_t^M, A_t^A, G_t, $q_t ex_t^M$, ex_t^A, K_0 plus
  - **Inter-sector capital wedge:**

$$\mathbf{1} + \boldsymbol{\tau}_R(\mathbf{t}) = \frac{F_{M,K}(t)}{p_{A,t} F_{A,K}(t)} = \frac{r_M(t)}{r_A(t)}$$

  - **Inter-sector labor wedge:**

$$\mathbf{1} + \boldsymbol{\tau}_W(\mathbf{t}) = \frac{F_{L,K}(t)}{p_{A,t} F_{L,K}(t)} = \frac{w_M(t)}{w_A(t)}$$

  - **Price scissors:**

$$(\mathbf{1} + \boldsymbol{\tau}_C(\mathbf{t})) = \frac{U_{C,A}(t)}{p_{A,t} U_{C,M}(t)}$$

  - **Intertemporal wedge:**

$$\mathbf{1} + \boldsymbol{\tau}_K(\mathbf{t}+\mathbf{1}) = \frac{\beta U_{C,M}(t+1)}{U_{C,M}(t)} \left(1 + F_{M,K}(t+1) - \delta\right)$$

Price Scissors

- **If Agricultural producer faces $p_{A,t}$ and Consumer faces $\tilde{p}_{A,t}$**
- **Price scissor:**

$$(\mathbf{1}+\boldsymbol{\tau}_C(\mathbf{t}))=\frac{\tilde{p}_{A,t}}{p_{A,t}}=\frac{U_{C,A}(t)}{p_{A,t}U_{C,M}(t)}$$

- **Intratemporal distortions for capital and labor:**
  - $1+\tau_R(t)/\left(1+\tau_C(t)\right)$
  - $1+\tau_W(t)/\left(1+\tau_C(t)\right)$

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Data for Tsarist Period (1885-1913)

- **Aggregates and Sectoral Data: Gregory (1982):**
  - National income and components (mostly from official tsarist publications)
  - Output, consumption, investment in agricultural and non-agricultural sectors
- **Sectoral employment – less reliable data:**
  - Only one census in Tsarist Russia (1897)
  - Gregory (1982): only growth rates of labor force by sector in 3 subperiods
  - Gukhman's data in Davies (1990): composition of labor force in 1913
- **Some issues**:
  - **Residential housing:**
    - Included in K_A (no way to separate, but would like to exclude) but not in K_M
  - Agricultural workers doing seasonal manufacturing jobs (**Promysly**)
    - Recompute for 10% of time spent at promysly (as in Soviet period)
  - **Exports:**
    - Data on composition only in 1913; assume the same for the whole period
    - No data on terms of trade, proxy with price for NY price for wheat (Jacks 2005)
  - **Government expenditures:** Defense only; robustness to admin. expenditures

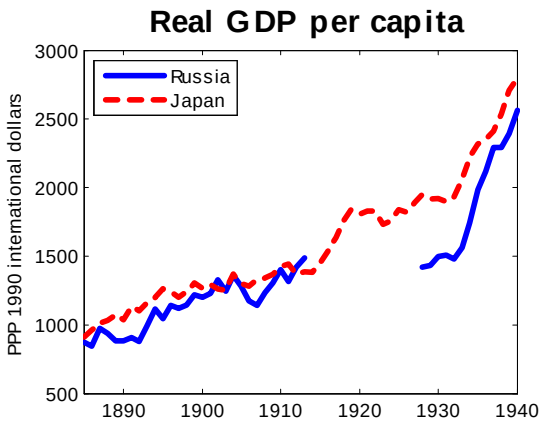
Data for Stalin Period (1928-1940)

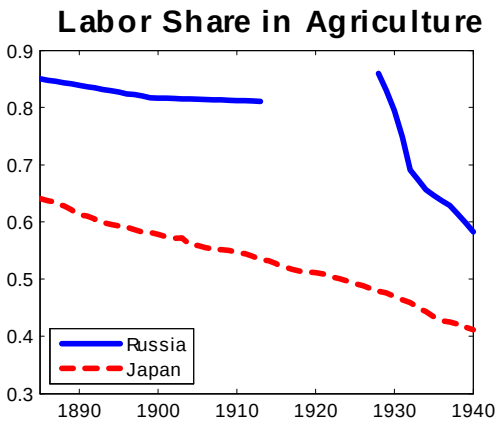
- **Main source – Moorsteen and Powell (1966):**
  - Constructed data according to Western standards
  - Also, Allen (1997), Davies (1990), Davies et. al. (1966)
- **Sectoral employment:**
  - Three censuses: 1926, 1937 (mostly unpublished), 1939 (unreliable)
  - Davies et.al. (1994): composition of labor force in 1926
  - Similar to tsarist: growth rates in non-agricultural, residual is agricultural
- **Agreement among historians: quantities are reliable, prices are not**
  - Measure quantities in 1913 prices
  - Need prices only for price scissors. Follow Allen (1997):
    - Relative price as ration of official procurement price to free retail price
    - Argues this is the best measure of the TOT for private agricultural producer

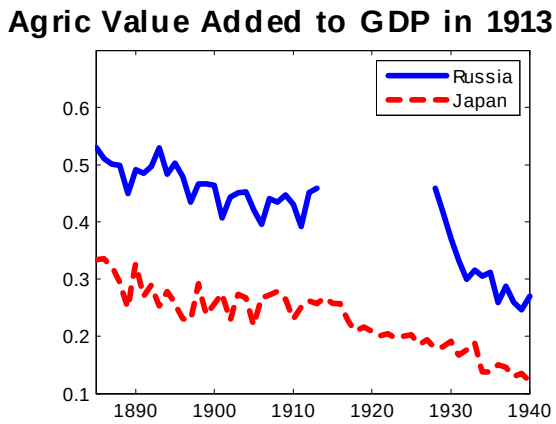
Data for Stalin Period (1928-1940): Some issues

- **Adjustment for borders:**
  - Loss of Finland, Poland, Western Belarus and Ukraine;
  - Gain of Central Asia.
  - Follow Markevich and Harrison (2011): assume land endowments are equal
- **Trade:**
  - Davies (1990) composition of exports in 1927/28; assume same for the rest;
  - Terms of trade from Davies et. al. (1993)
- **Government expenditures:**
  - Defense only; Robustness to admin. expenditures
  - But role of the government dramatically changed, quite narrow
- **Labor force participation for women** may be much higher in Soviet Russia
  - Crisp (1978): not if the work of women on peasant farms is accounted
  - Assume the same ratios for Stalin and tsarist economies.

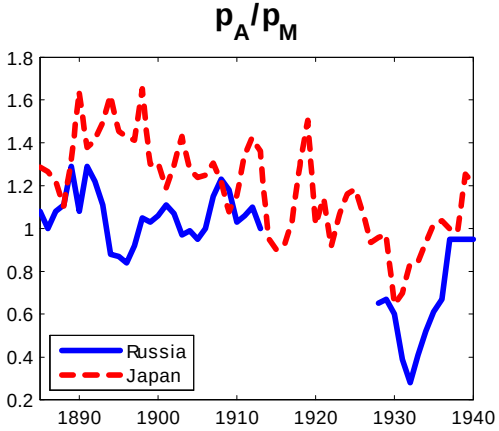
Tsarist Russia and Stalin Russia vs. Japan

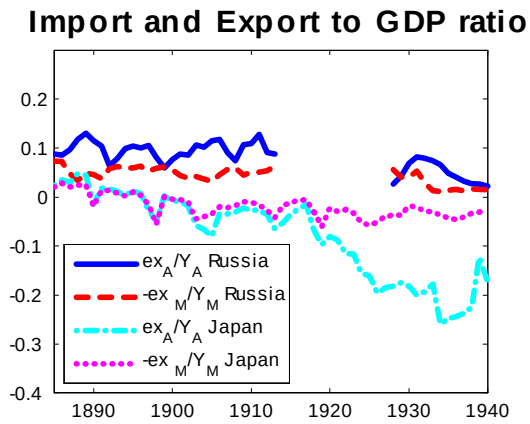




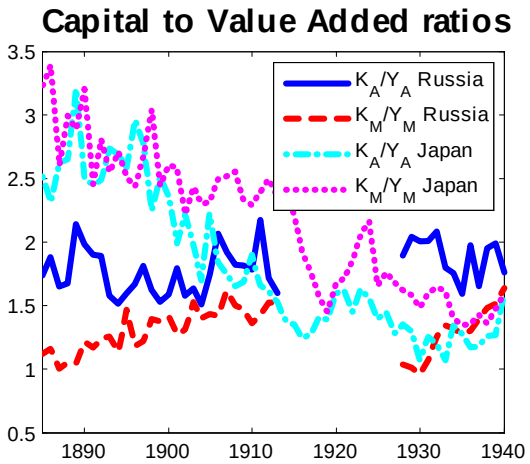


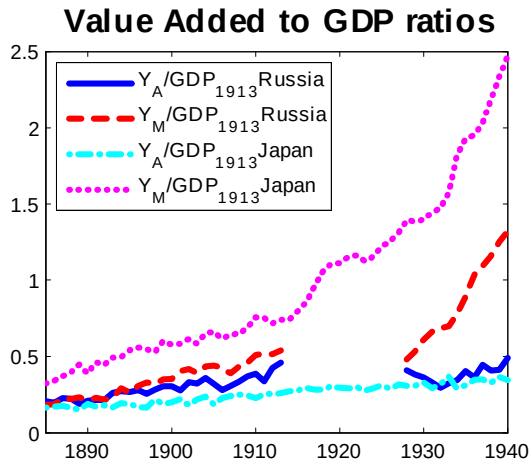


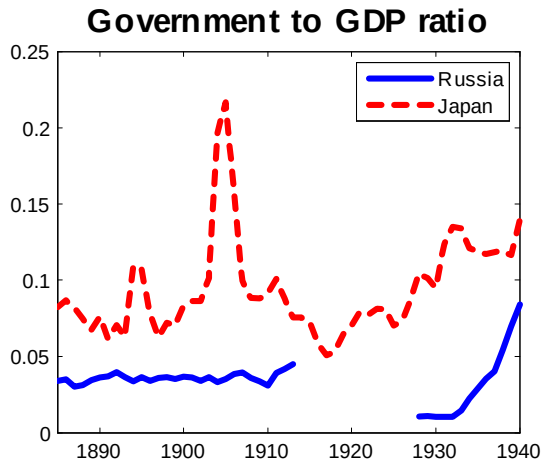


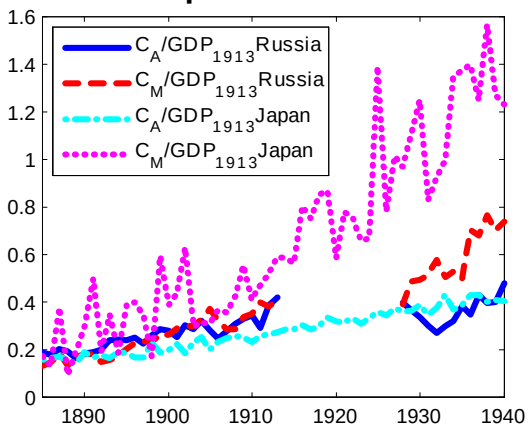


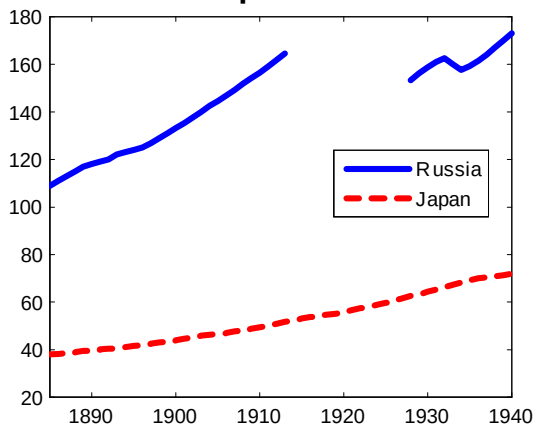
Tsarist Russia and Stalin Russia vs. Japan











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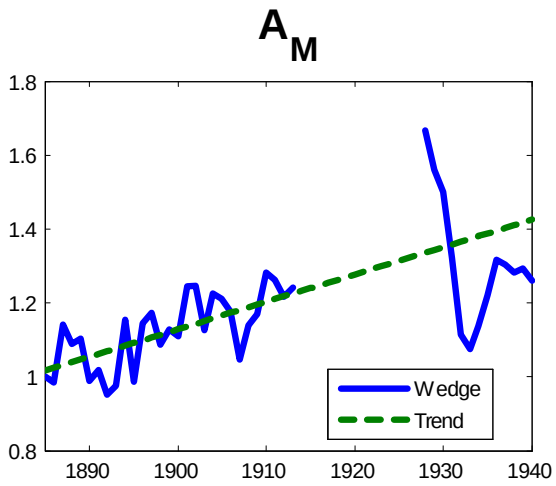
Calibration

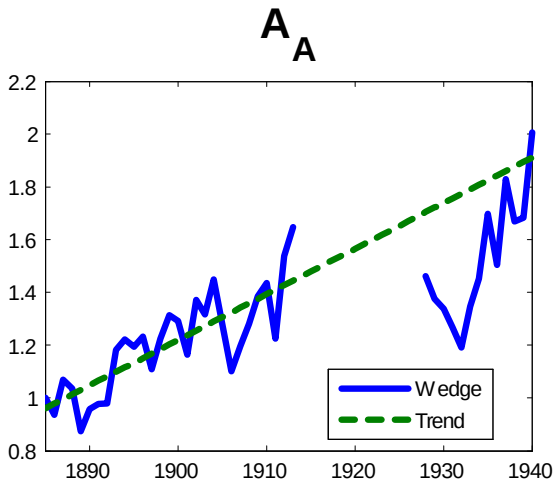
- **Russia and Japan are quite similar before 1913**
  - Use Hayashi-Prescott calibration of preferences and technology in Japan
  - No intermediate goods; assign to labor in M, land in A
- **Parameters from HP:**
  - **Utility:** $\beta = 0.96$; $\eta = 0.15$; $1 - \eta = 0.85$
  - **Manufacturing sector:** $\alpha_{K,M} = 0.3$; $\alpha_{N,M} = 0.7$
  - **Agricultural sector:** $\alpha_{K,M} = 0.14$; $\alpha_{N,A} = 0.54$
- **Other parameters:**
  - **Subsistence** γ^A
    - set to 28 rubles per capita in 1913 prices;
    - 72% of agricultural consumption in1885
  - **Fraction of labor force to population** χ_t
    - set to 1897 census $= 0.53$;
    - slightly higher than 1926, 1939 census

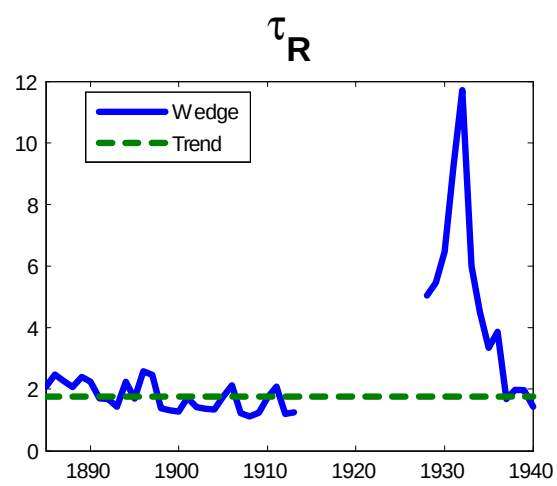
Roadmap

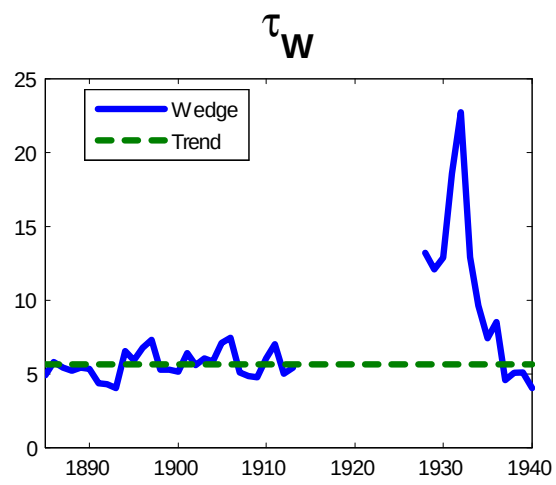
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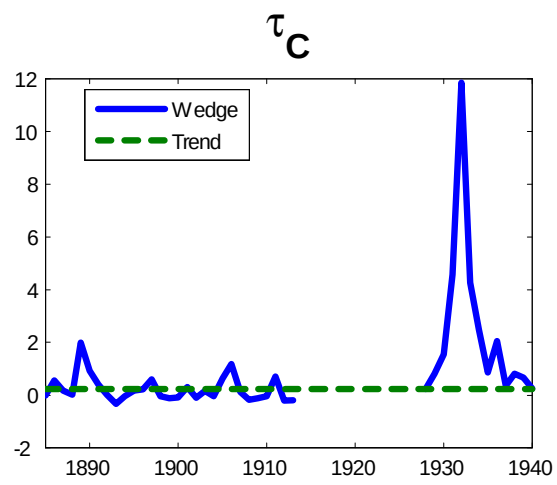
Wedges

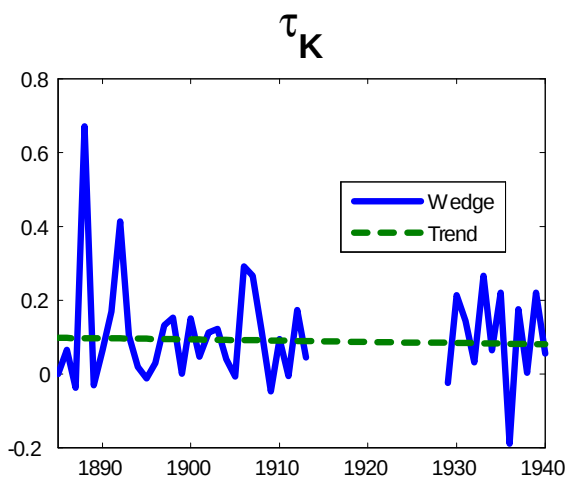

A_M
Wedge
Trend
1.8
1.6
1.4
1.2
1
0.8
1890
1900
1910
1920
1930
1940


A_A
Wedge
Trend
2.2
2
1.8
1.6
1.4
1.2
1
0.8
1890
1900
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1920
1930
1940

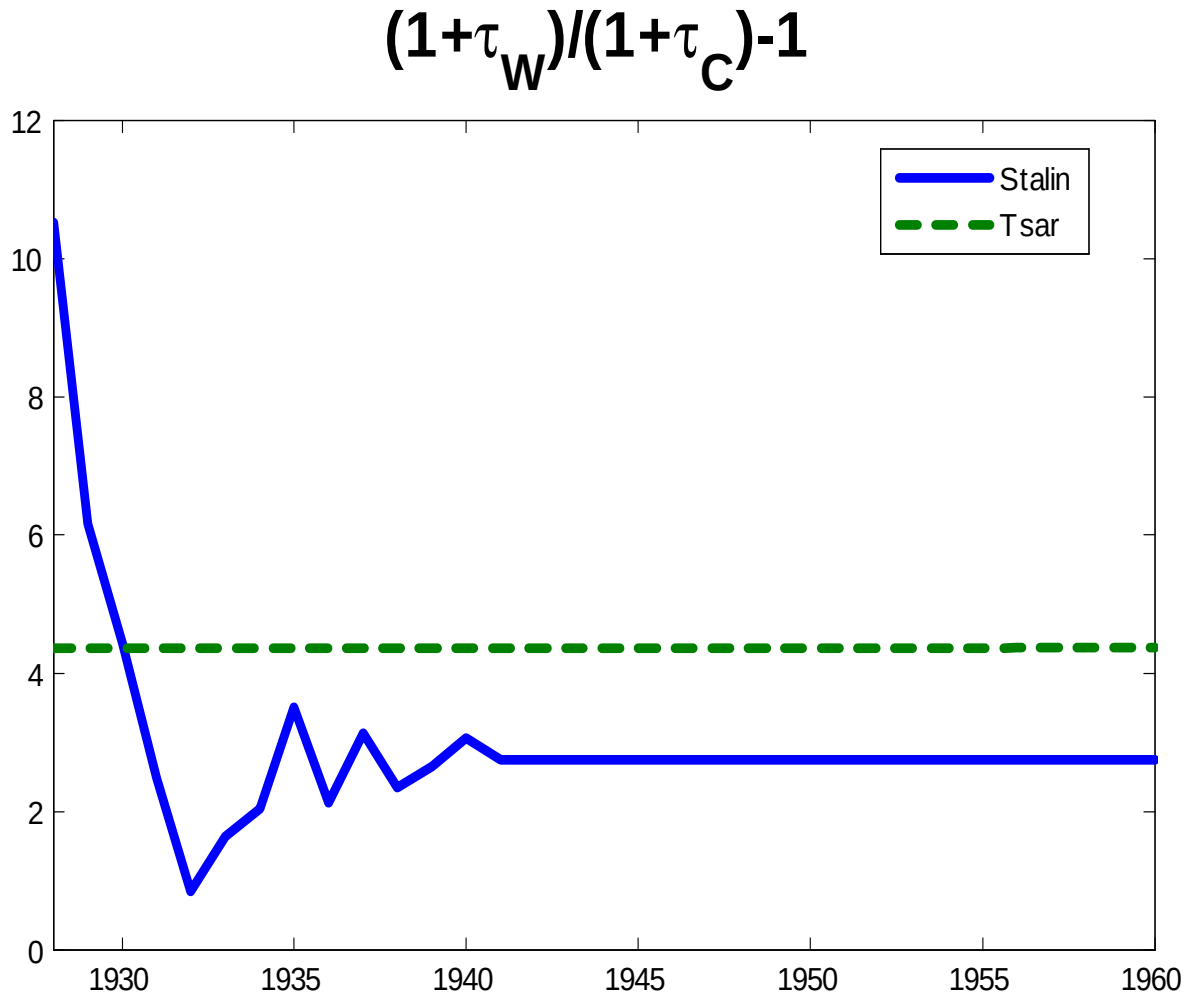

τ_R
Wedge
Trend
12
10
8
6
4
2
0
1890
1900
1910
1920
1930
1940


τ_W
Wedge
Trend
25
20
15
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5
0
1890
1900
1910
1920
1930
1940


τ_C
Wedge
Trend
12
10
8
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4
2
0
-2
1890
1900
1910
1920
1930
1940


τ_K
Wedge
Trend
0.8
0.6
0.4
0.2
0
-0.2
1890
1900
1910
1920
1930
1940

Intersectoral Labor Wedge



Wedges: Summary

- **Tsarist Russia (1885-1913):**
  - TFP growth: 1.25% in agriculture; 0.6% in non-agriculture
  - Noisy, but no prounounced trends in other wedges
- **Initial industrialization and collectivization (1928-1935)**
  - Most wedges have dramatic swings
  - TFP falls dramatically, swings back, remains below Tsarist
  - Wedges same pattern: Peak coincides with the peak of collectivization
- **Period of 1936-1940**
  - Wedges stabilize
  - Average $\tau_{W,t}$, $\tau_{K,t}$ – somewhat below Tsarist
  - Average $\tau_{C,t}$, $\tau_{R,t}$ – somewhat above Tsarist

Effect of price scissors

- **Observe:**
  - drop in A_t^A; **reallocation of labor to non-agriculture**
  - significant decrease in $p_{A,t}/p_{M,t}$
- **In undistorted economy, exactly the opposite:**
  - drop in A_t^A; drop in production and consumption of agricultural goods
  - nonhomotheticity: prices of agricultural goods increase by more than fall in A_t^A
  - **reallocation of labor to agriculture**
- **Price scissors:**
  - Prices of agriculture artificially low; incentive to move to nonagriculture
  - The effect of the price scissor is so large that $\tau_{W,T}$ had to increase
  - $(1+\tau_{W,t})/(1+\tau_{C,t})-1$: 6.2 in 1928; 0.8 in 1932; 2.3 in 1938
  - Davies and Wheatcroft (2004): *"by the autumn of 1932 peasants were moving to the towns in search of food. The growth of urban population ceased, and was partially reversed, only as a result of restrictions on movement and the introduction of an internal passport system"*

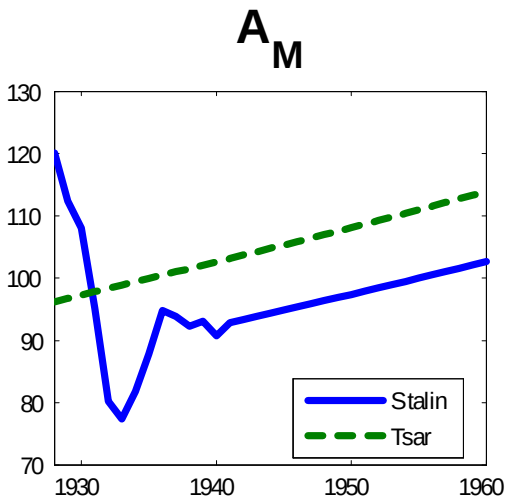
Roadmap

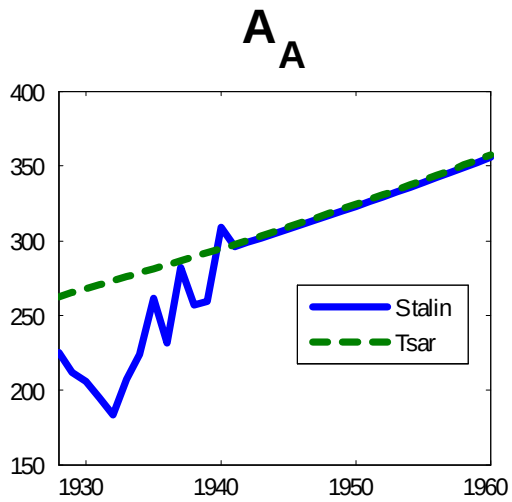
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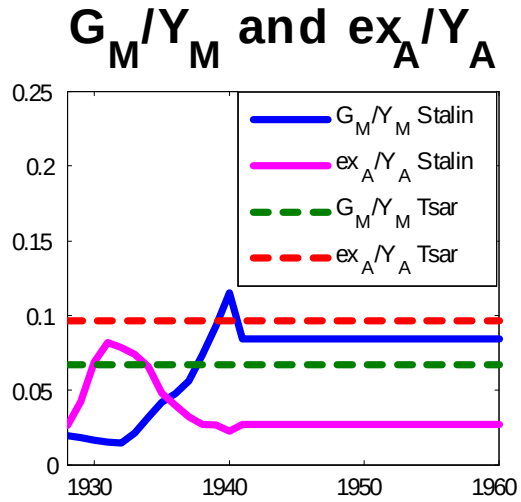
Russia without Communists vs. Stalin

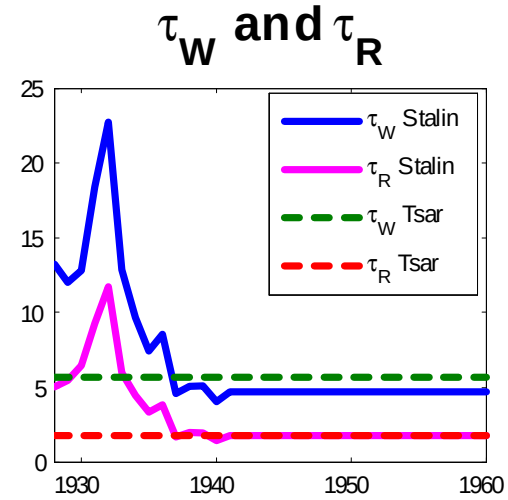
- **Tsarist counterfactual:**
  - Extrapolate average (1885-1913) tsarist wedges
  - Actual population for the whole period
  - Benchmark: no adjustment for lower capital in 1928
- **1928-1940:** compare paths and welfare
  - Data under Stalin
  - Tsarist counterfactual
- **1941-onward (with no WWII)**: compare paths and welfare
  - Simulated economy with Stalin's average 1937-40 wedges
    - TFP growth at tsarist level after 1940
  - Tsarist counterfactual

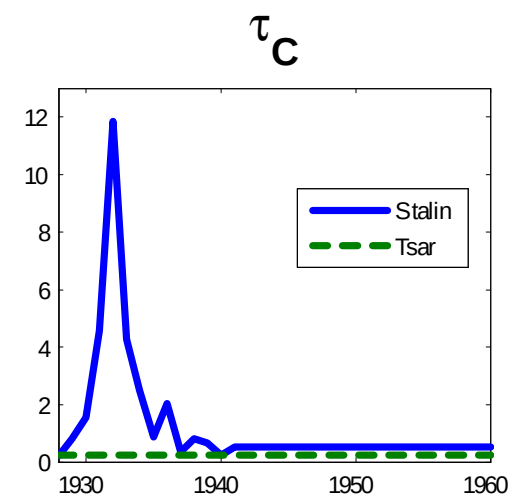
Extrapolating Wedges

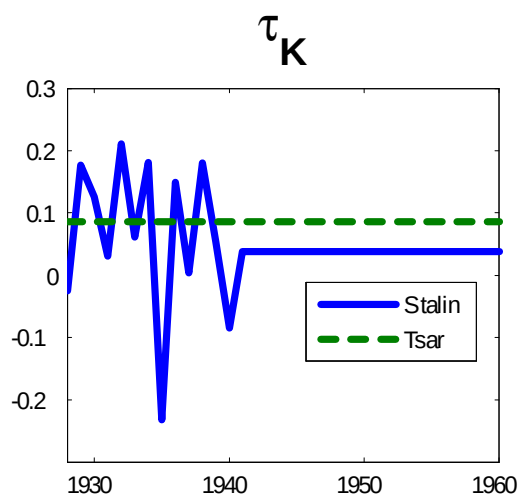




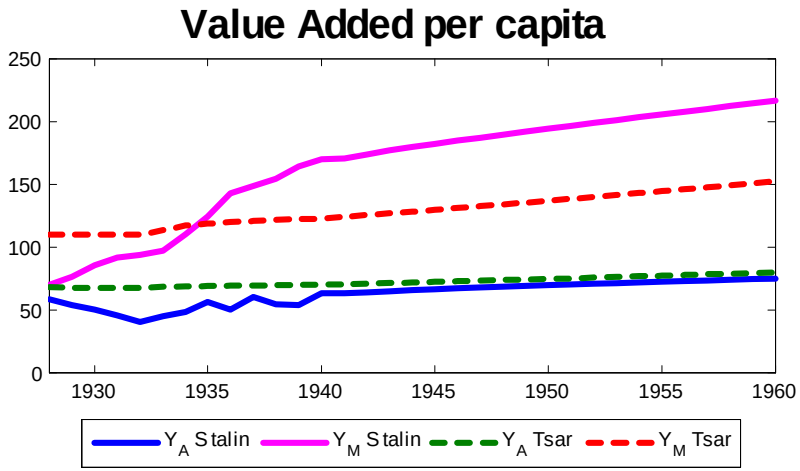


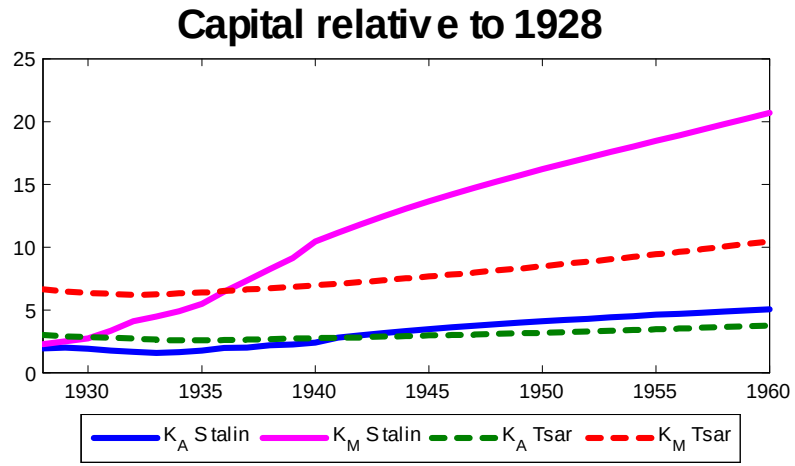


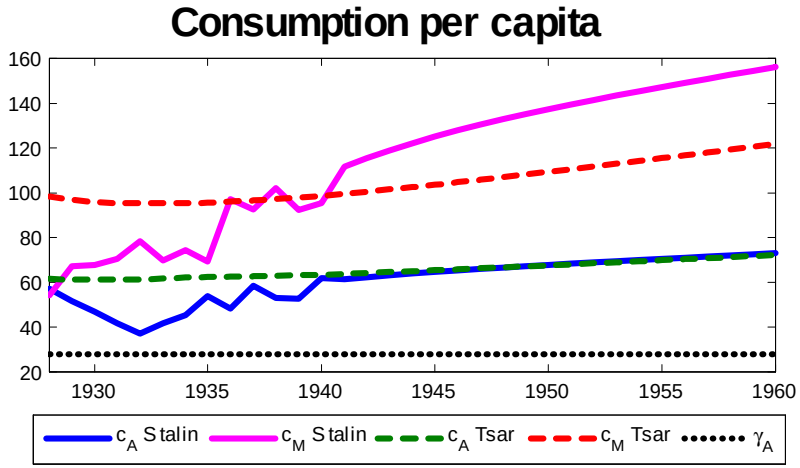


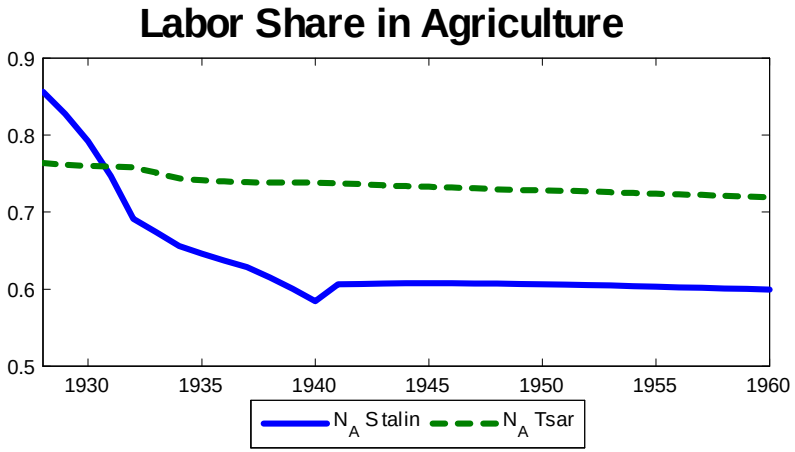


Russia without Communists vs. Stalin









Russia without the Communist Revolution: Summary

- **Welfare comparison in terms of consumption variation**
- **1928-1940: Welfare is significantly lower under Stalin**
  - **Consumption of agricultural is significantly lower**
  - **Consumption of non-agriculture is significantly lower**
    - Except for the last few years
- **1941-onward**: **Welfare is higher under Stalin**
  - Lower wedges lead to **higher capital accumulation**
  - **Consumption and Output overtake** Tsarist counterfactual

No Stalin vs. Tsarist: Wedges and Welfare

Policy	Gain from policy for 28-40	gen 28	gen 40	gen 40, K_{1940}
τ_K	-2.4%	4.5%	8.6%	6.7%
τ_C	17.8%	14.1%	9.7%	7.0%
τ_W	-16.1%	-5.5%	3.8%	5.6%
g_M and τR	2.7%	0.9%	-0.4%	-1.0%
A_M	-2.2%	-7.0%	-10.3%	-9.2%
A_A	-15.6%	-7.2%	-1.2%	-0.1%
ex	5.3%	5.2%	5.1%	4.8%
Total net of population	-27.2%	-2.8%	11.8%	13.6%
Total net of population and K_{1928}	-10.5%	3.4%	12.2%	13.6%

Wedges and Welfare: Summary

- **Generation born in 1928**: lifetime loss **-2.8%** but loss **-27.2%** in 28-40
  - **TFP fall: -14.2%** (#1 largest effect)
  - **Price scissors: cancel in 28-40**; (#2 largest effect overall) **+8.6%**
  - **Decrease in Trade: +5.2%** (#3-#4 largest effect overall)
  - **Reduction of capital wedge:** +4.5% (#3-#4 largest effect overall)
- **Generation born in 1940: lifetime gain +11.8%**
  - Top 3 positive: Price scissors; Reduction in capital wedge; Trade
- **Bottom lines**:
  - Long term welfare gain at a significant short-term cost
  - No evidence of Big Push (TFP fell)
  - Policies (price scissors and reduction of capital wedge) mattered for welfare
    - but mainly in the long run

No Stalin vs. Tsarist: Wedges and Labor Share

- **The difference between Stalin and Tsarist: -12.6%**
- **Price Scissors:**
  - By far the largest factor: **-7.1**% (55% of total)
- **Export and Reduction of Capital wedges:**
  - about equally important

Policy	$\Delta\left(\frac{N_A}{N}\right)$ in 1945	**Contribution**
τ_K	-2.8%	23%
τ_C	-3.1%	24%
τ_W	-4.0%	31%
g_M and τR	-0.3%	3%
A_M	0.4%	-4%
A_A	-0.2%	2%
ex	-2.6%	21%
Total	-12.6%	100%

Welfare ... not just consumption equivalents

- **1932-1933: 7 million people die in famine**
  - *"In this horror filled period in our village many people died from hunger. They ate cats and dogs. People became mad from hunger and even ate people. ... This famine was more horrendous than a war", Famine victim' testimony, President of Ukraine's official site.*
- **1937-1938: Great Purge: 1 575 259 arrested, out of them 681 692 executed:**
  - *"Mariasin's [Head of Central Bank of USSR, 1934-36] trial was delayed ... so that he could continue to be beaten. I ordered to cut off his ear, nose, cut out his eyes, to cut him in pieces. And this will happen to all", NKVD senior officer Dagin, testimony after his own arrest in 1938.*
- **Gulag labor camps, as many as 14 million passed through them in 1929-1953**
  - *"The team of lumberjacks makes wood, and the workers from the mine carries individual trunks. ... The cars are never sent, all horses are sick in stables. Horses weaken much faster than people. ... A horse cannot withstand months of this winter life in cold housing with many hours of hard labor outside in the cold. But a man can. Perhaps he lives on hope? But he has no hopes", Varlam Shalamov, Kolyma stories.*

Conclusions

- **What is done?**
  - Analysis of one of history's most important economic transformations
  - Neoclassical view of communist and non-market economy
  - Assessment of top-down policy pushes (price scissors, "stimulating investment", etc.)
- **Was Stalin necessary?**
  - No, mostly, and Yes, somewhat
  - Higher long term performance but at a giant short term cost
  - No evidence for big push; breaking barriers but in the long term mostly
- **What is left to do?**
  - Careful comparison with Japan post 1928.