

Collectivization of Soviet Agriculture and the 1932-1933 Famine

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Some background

- ▶ In 1927 80% of the Soviet population were peasants
- ▶ Inefficient and backward agriculture
- ▶ Long debates on how to improve the situation: collective farms!
 - ▶ Economies of scale
 - ▶ State-of-the art technology
- ▶ 1928: start of the first 5-year plan, need to secure food supply to the growing cities

The famine timeline

- late 1929 Start of the comprehensive collectivization campaign.
- 1930 Good harvest, the government was very optimistic
- 1931 Low harvest
- 1932 Famine started in many rural areas. Low harvest again
- 1933 Winter and spring of 1933 – peak of the famine.

Whole USSR:

- ▶ Conquest (1986): 10 million
- ▶ Russian Duma (2008): 7 million

Ukraine:

- ▶ Libanova (2008): 3.4 million excess mortality (out of population of 30 million)
- ▶ Mesle et al. (2013): 2.6 million excess mortality

- ▶ Narrative history:
 - ▶ Davies and Wheatcroft (2004): drought, grain procurement
 - ▶ Conquest (1986): dekulakization
 - ▶ Viola (1996): drop in livestock
 - ▶ Snyder (2010): genocide
 - ▶ Ellman (2007): starvation was a cheap substitute to more deportations and killing
- ▶ Economics literature: Meng, Qian, and Yared (2015)
 - ▶ Unlike “usual” famines, The Great Famine of 1959-1961 in China was more severe in more productive areas
 - ▶ Importance of **information**: the government must have collected too much grain from areas known to be productive

- ▶ **Incentives:**

\uparrow collectivization \implies \downarrow production \implies \uparrow mortality

- ▶ The effect is comparable in magnitude with mortality due to overprocurement

This paper in more details

- ▶ **Information:**

\uparrow grain production \implies \uparrow overprocurement \implies \uparrow mortality

- ▶ **Incentives:**

\uparrow collectivization \implies \downarrow production \implies \uparrow mortality

- ▶ But the effects *offset* each other:

\uparrow collectivization \implies \uparrow observability of the harvest
 \implies \downarrow overprocurement

- ▶ Ukraine
 - ▶ Was hit the most
 - ▶ Was the “grainbasket” of USSR
 - ▶ Had excellent statistics
- ▶ District level data. In 1933:
 - ▶ 7 provinces + Moldavia
 - ▶ 392 districts

- ▶ 1933 mortality (and natality, infant mortality) from Russian State Archive of the Economy
- ▶ 1925 data from “Materials to describe Ukrainian okruhas” published by the Central Statistical Office of Ukraine (39/41 books)
 - ▶ Arable land
 - ▶ Grain and potato production
 - ▶ Livestock
- ▶ 1927 census: literacy, urbanization, share of Ukrainians
- ▶ 1930 collectivization: “Kolkhozes in 1930” published by Gosplan USSR
- ▶ 1925, 1927, and 1933 maps

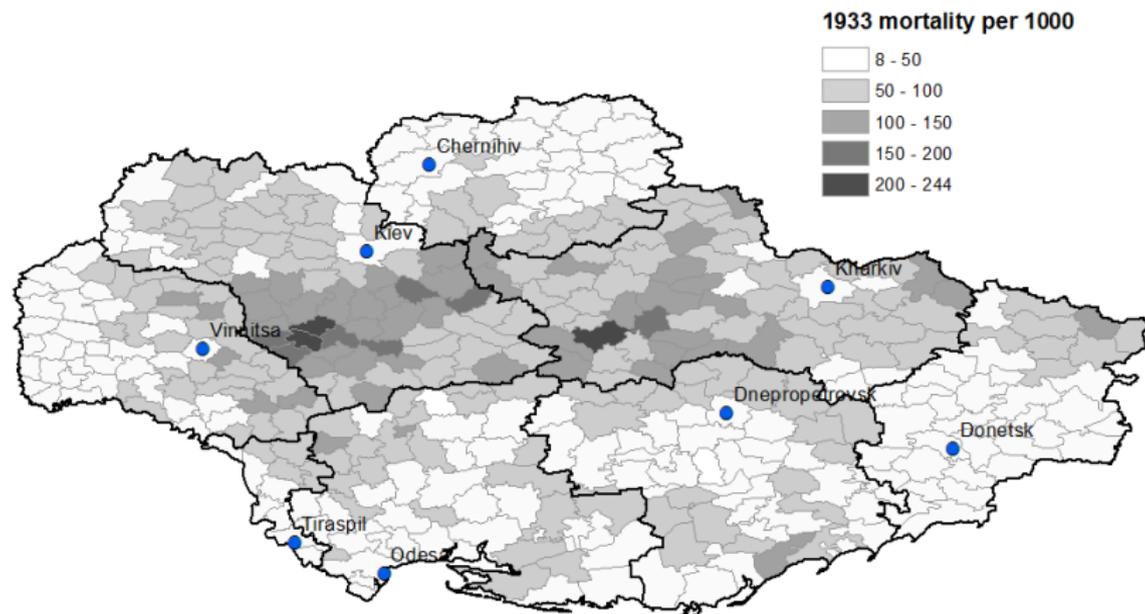
Russian State Archive of the Economy



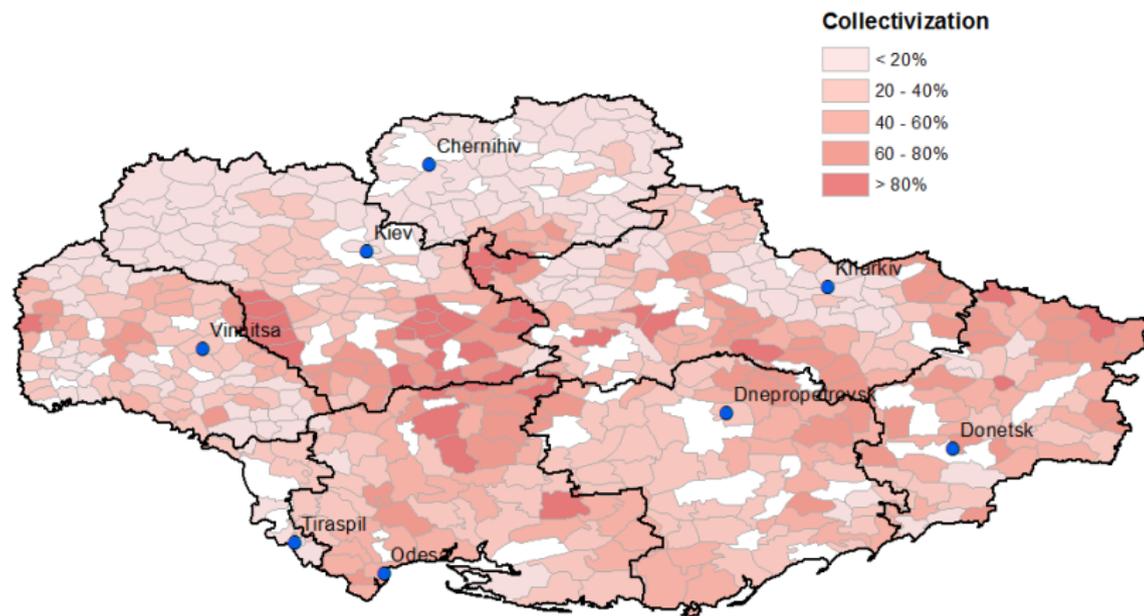
Summary statistics

	<i>N</i> (1)	mean (2)	sd (3)	min (4)	max (5)
Mortality 1933	389	0.064	0.038	0.008	0.244
Mortality 1927	41	0.018	0.002	0.014	0.023
Collectivization 1930	315	0.372	0.213	0.028	0.904
Grain per HH 1925, 100s centners	350	0.327	0.193	0.057	0.927
Cows per HH 1925	356	0.850	0.280	0.220	1.653
Share of Ukrainians 1927	389	0.815	0.179	0.063	0.995
Urbanization 1927	389	0.129	0.148	0.000	0.851
Literacy rate rural 1927	389	0.407	0.069	0.225	0.669

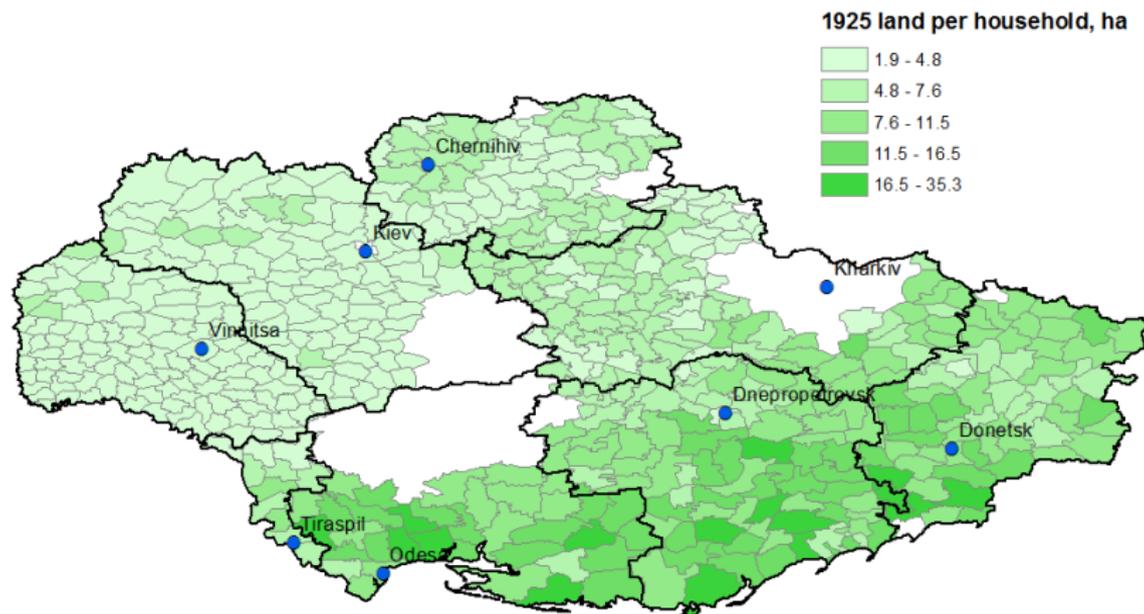
1933 Mortality



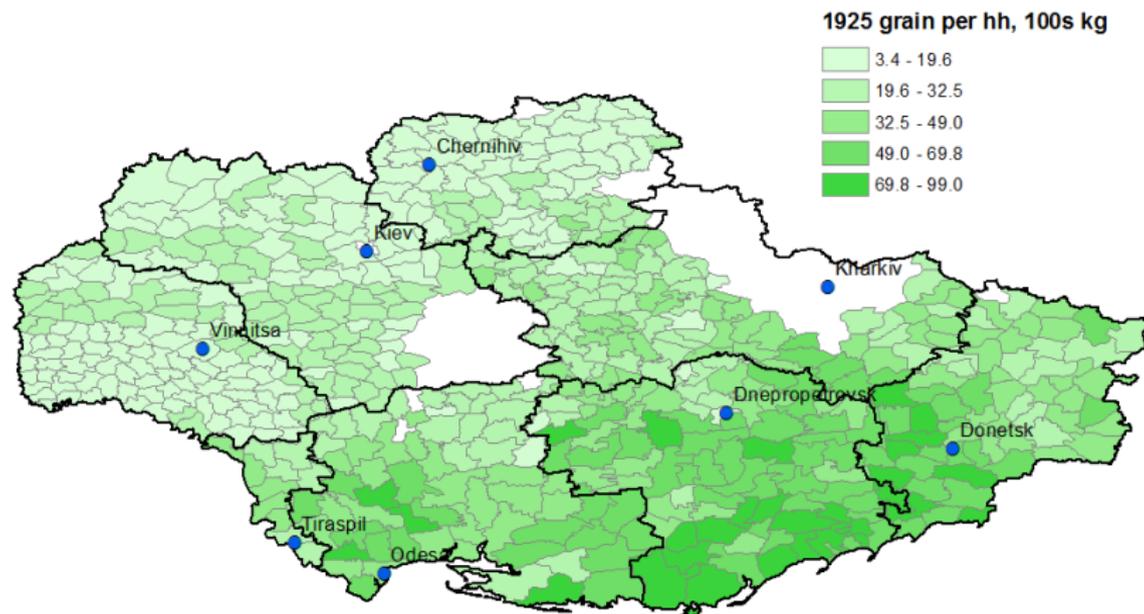
1930 Collectivization



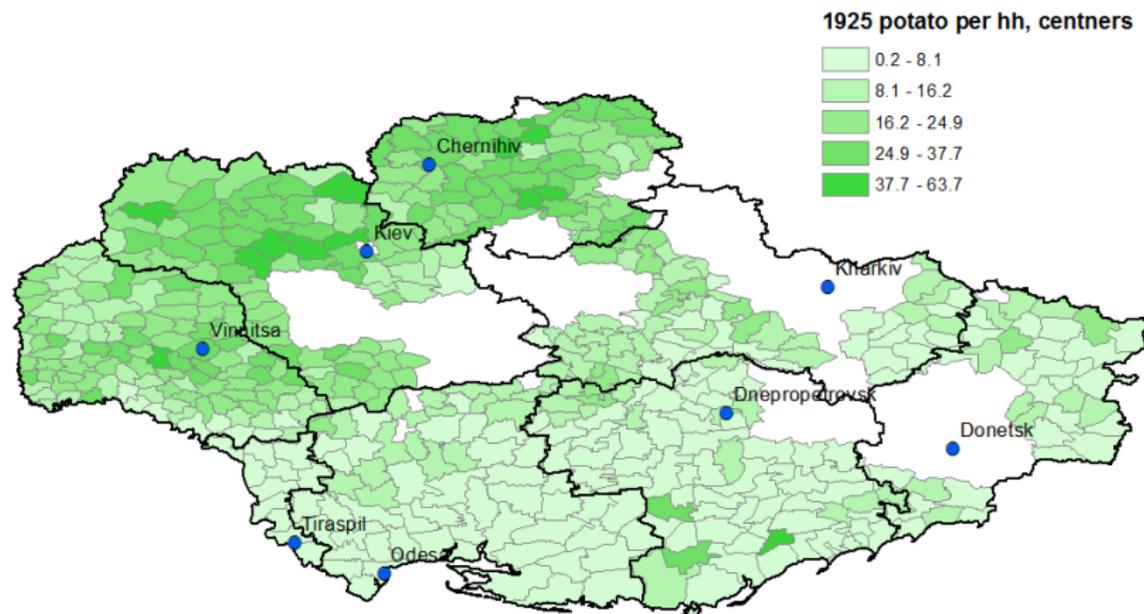
1925 Arable land per rural household



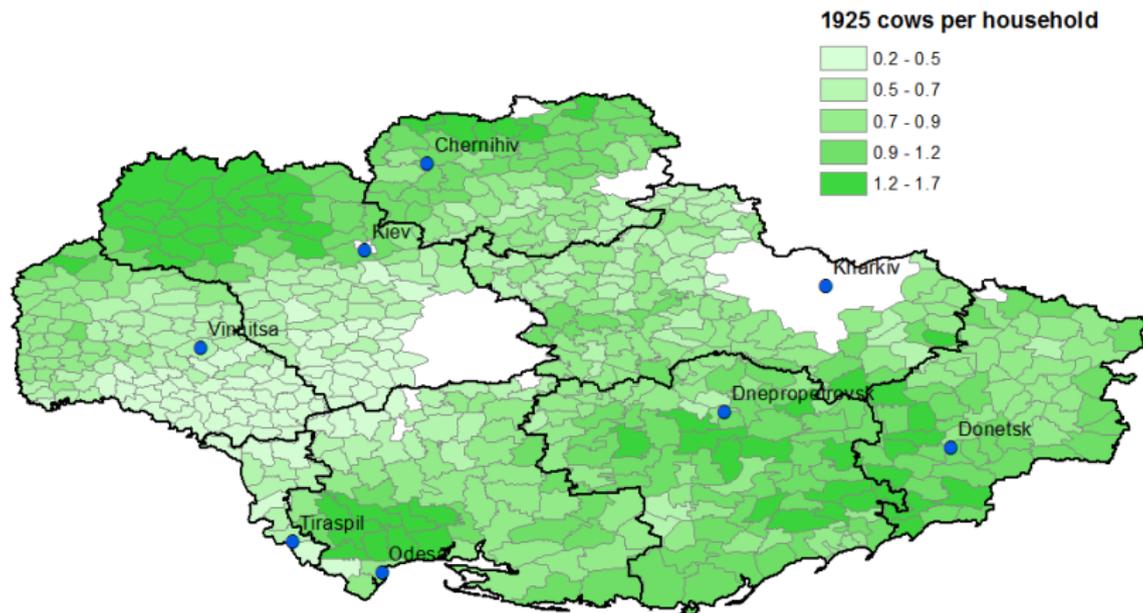
1925 Grain production per rural household



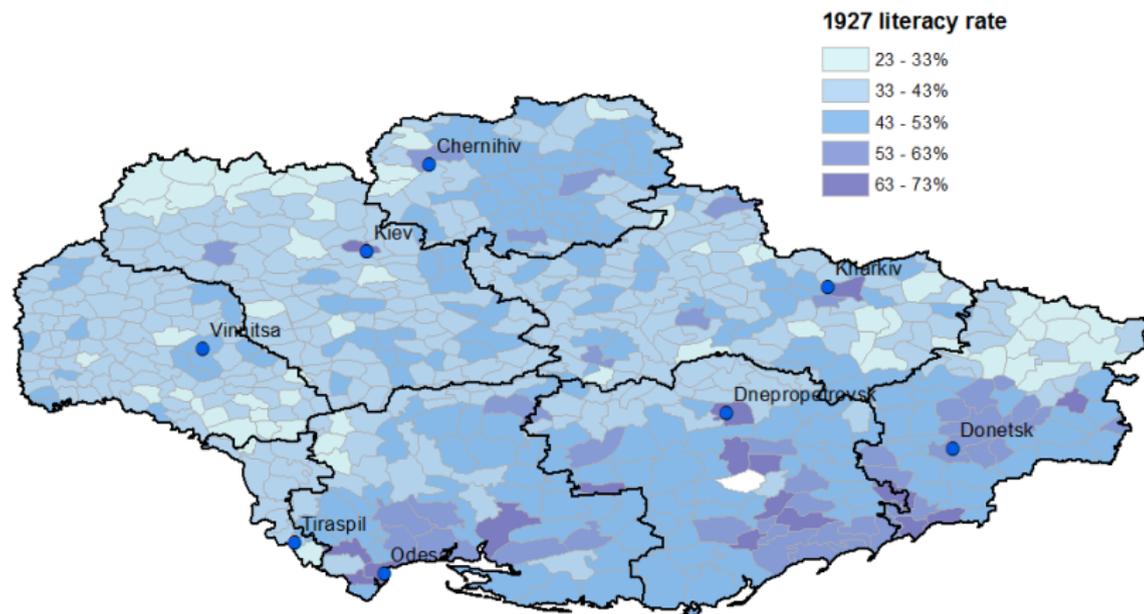
1925 Potato production per rural household



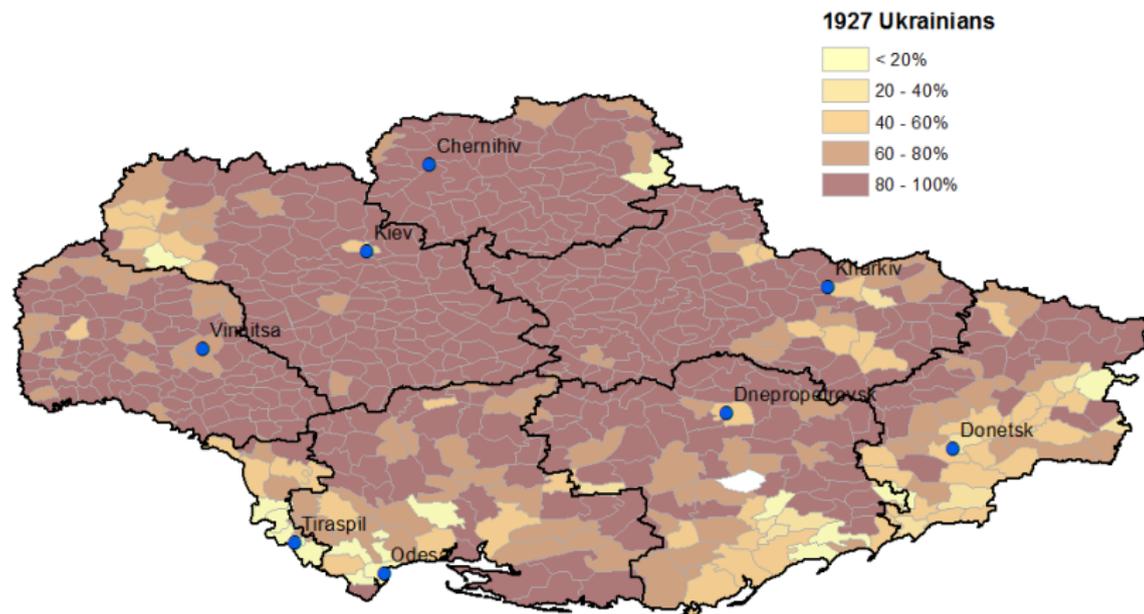
1925 Cows per rural household



1927 Literacy rate



1927 Share of Ukrainians



↑ grain productivity \implies ↑ famine mortality

↑ grain \implies ↑ mortality

Dependent variable: Mortality 1933				
	(1)	(2)	(3)	(4)
Wheat and rye pc 1925	0.001 (0.001)	0.006*** (0.002)	0.007*** (0.002)	0.007*** (0.002)
Value of equipment pc 1925		-0.456*** (0.083)	-0.190** (0.091)	-0.156* (0.091)
Potato, sown area pc 1925			0.075 (0.112)	0.111 (0.115)
Cows pc 1925			-0.303*** (0.040)	-0.293*** (0.038)
Rural share of Ukrainians 1927			0.022* (0.013)	0.025** (0.013)
1927 Census controls			✓	✓
Geographic controls				✓
Constant, Province FE	✓	✓	✓	✓
Observations	347	347	347	347
R^2	0.322	0.371	0.513	0.544

Determinants of collectivization

Determinants of collectivization: rural development

	Collectivization		Difference (2) – (1)
	Low (1)	High (2)	
Rural literacy rate 1927	0.386 (0.069)	0.419 (0.076)	0.033*** (0.008)
Rural share of Ukrainians 1927	0.835 (0.189)	0.860 (0.144)	0.025 (0.019)
Rural population density 1927, people/km2	44.517 (19.245)	37.935 (17.281)	-6.582** (2.061)
Cows per capita 1925	0.176 (0.062)	0.163 (0.045)	-0.013 (0.006)
Arable land per capita 1925, ha	1.086 (0.585)	1.628 (0.83)	0.542*** (0.088)
Grain, sown area per capita 1925, ha	0.624 (0.35)	0.925 (0.439)	0.301*** (0.047)
Potato, sown area per capita 1925, ha	0.047 (0.022)	0.034 (0.016)	-0.013*** (0.002)
Value of agricultural equipment pc 1925, rub	5.609 (2.731)	8.485 (3.764)	2.875*** (0.389)

Determinants of collectivization: urban development

	Collectivization		Difference (2) – (1)
	Low (1)	High (2)	
Urbanization 1927	0.132 (0.144)	0.121 (0.139)	-0.011 (0.016)
Share of industrial workers, 1930	0.025 (0.053)	0.035 (0.077)	0.01 (0.008)
Industrial output per capita, 1930, rub	32.811 (74.532)	50.836 (106.779)	18.026 (11.469)
Distance to railroad 1933, km	12.988 (11.805)	13.879 (14.052)	0.891 (1.462)
Railroad length 1933, km	29.447 (30.699)	31.86 (30.667)	2.413 (3.458)
Density of railroad network 1933, length/area	0.027 (0.024)	0.026 (0.023)	-0.001 (0.003)

Determinants of collectivization: control, attitudes

	Collectivization		Difference (2) – (1)
	Low (1)	High (2)	
Rural soviets per 1000 peasants, 1925	0.475 (0.146)	0.42 (0.133)	-0.055** (0.017)
Agricultural cooperatives per 1000 peasants, 1925	0.281 (0.159)	0.283 (0.124)	0.003 (0.017)
Collective farms per 1000 peasants, 1925	0.173 (0.147)	0.259 (0.255)	0.086** (0.027)
Share of households hiring in workers 1925	0.047 (0.05)	0.032 (0.031)	-0.014** (0.005)
Share of households hiring out workers 1925	0.217 (0.122)	0.191 (0.079)	-0.025* (0.012)

Determinants of collectivization, OLS

Dependent variable: Collectivization 1930			
	(1)	(2)	(3)
Value of equipment pc 1925	0.014*** (0.004)	0.014*** (0.005)	0.017*** (0.005)
Wheat and rye pc 1925	-0.002 (0.009)	-0.002 (0.009)	-0.001 (0.008)
Rural literacy rate 1927		0.079 (0.158)	-0.013 (0.162)
Cows pc 1925			-1.032*** (0.280)
Horses pc 1925			0.477* (0.259)
Potato, sown area pc 1925			-0.458 (0.758)
Rural share of Ukrainians 1927	0.194*** (0.066)	0.208*** (0.066)	0.129* (0.068)
Polissia	-0.220*** (0.039)	-0.219*** (0.039)	-0.169*** (0.037)
Province FE	✓	✓	✓
Observations	281	281	281
R^2	0.367	0.375	0.407

↑ collectivization \implies ↑ famine mortality

↑ collectivization \implies ↑ mortality

Dependent variable: Mortality 1933				
	(1)	(2)	(3)	(4)
Collectivization 1930	0.056*** (0.010)	0.043*** (0.010)	0.041*** (0.009)	0.042*** (0.009)
Cows per capita 1925		-0.161*** (0.043)	-0.148*** (0.042)	-0.157*** (0.042)
Rural literacy rate 1927		-0.008 (0.027)	-0.000 (0.024)	-0.003 (0.024)
Value of equipment pc 1925		-0.115 (0.085)	-0.092 (0.081)	-0.072 (0.082)
Rural share of Ukrainians 1927		0.025* (0.015)	0.029** (0.014)	0.029** (0.014)
1927 Census controls			✓	✓
Geographic controls				✓
Constant, Province FE	✓	✓	✓	✓
Observations	285	285	285	285
R^2	0.357	0.461	0.489	0.492

Potential biases

- ▶ The government wanted to get control over richer areas first
⇒ the effect of collectivization would be biased downward
- ▶ Poor peasants might have had more reasons to join collective farms
⇒ the effect of collectivization would be biased upward

Idea

Use differential impact of Stalin's "Dizzy with success article" published on March 2, 1930

- ▶ After the publication peasants started leaving collective farms
- ▶ But to leave the kolkhoz peasant needed to get land allotment
- ▶ *Unexpectedly* earlier spring \implies less time to obtain land before sowing \implies peasants were *stuck* in collective farms

Instrument

Normalized April temperature 1930 = April temperature in 1930 – average April temperature in 1900-1970

Possible violations to the exclusion restriction

- ▶ Earlier spring \implies higher agricultural productivity:
 - ▶ Use normalization instead of just April temperature
 - ▶ Control for grain productivity
- ▶ Unexpectedly warm spring of 1930 \implies better harvest in 1930 \implies peasants accumulated better reserves before the famine
 - ▶ Will bias IV estimates *downward*
- ▶ Unexpectedly warm spring of 1930 \implies better harvest in 1930 \implies officials observe better harvest and try to extract more in subsequent years
 - ▶ Data on agricultural productivity were available for many years, unlikely that one particular year received much weight

IV estimates: first stage

Dependent variable: Collectivization 1930				
	(1)	(2)	(3)	(4)
Normalized temperature, April 1930	0.104* (0.057)	0.208*** (0.060)	0.205*** (0.059)	0.201*** (0.063)
Cows per capita 1925		-1.165*** (0.269)	-1.093*** (0.264)	-1.140*** (0.284)
Rural literacy rate 1927		0.375* (0.217)	0.363* (0.205)	0.308 (0.227)
Value of equipment pc 1925		1.874*** (0.500)	1.927*** (0.499)	1.994*** (0.537)
Share of Ukrainians 1927		0.058 (0.074)	0.101 (0.070)	0.086 (0.070)
Polissia	-0.274*** (0.042)	-0.200*** (0.043)	-0.207*** (0.042)	-0.213*** (0.044)
1927 Census controls			✓	✓
Geographic controls				✓
Constant, Province FE	✓	✓	✓	✓
Observations	246	246	246	246
R^2	0.357	0.469	0.488	0.494
F	43.798	35.550	30.982	24.694

IV estimates: main results

Dependent variable: Mortality 1933				
	(1)	(2)	(3)	(4)
Collectivization 1930	0.199* (0.108)	0.113** (0.058)	0.111** (0.054)	0.116** (0.058)
Cows per capita 1925		-0.089 (0.065)	-0.091 (0.062)	-0.086 (0.066)
Rural literacy rate 1927		-0.031 (0.035)	-0.037 (0.032)	-0.033 (0.034)
Value of equipment pc 1925		-0.144 (0.130)	-0.114 (0.121)	-0.118 (0.131)
Share of Ukrainians 1927		0.012 (0.017)	0.001 (0.019)	0.002 (0.019)
Polissia	0.009 (0.028)	-0.004 (0.011)	-0.006 (0.011)	-0.004 (0.012)
1927 Census controls			✓	✓
Geographic controls				✓
Province FE	✓	✓	✓	✓
Observations	246	246	246	246

Size of the effects

OLS 1 sd increase in collectivization \implies 8 to 11 people per 1000
increase in 1933 mortality

IV 1 sd increase in collectivization \implies 22 people per 1000

Mechanisms

Distinguish between too much procurement and drop in production

Grain and collectivization

Dependent variable: Mortality 1933				
	(1)	(2)	(3)	(4)
Collectivization 1930	0.040*** (0.009)		0.038*** (0.009)	0.088*** (0.020)
Wheat and rye pc 1925		0.006*** (0.002)	0.006*** (0.002)	0.011*** (0.003)
Collectivization 1930 × Wheat and rye pc 1925				-0.014*** (0.005)
District controls, Province FE	✓	✓	✓	✓
Observations	280	280	280	280
R^2	0.494	0.487	0.518	0.531

District controls: cows pc 1925, rural literacy rate 1927, value of equipment pc 1925, rural share of Ukrainians 1927, urbanization 1927, rural population density 1927, $\ln(\text{distance to 1933 province center})$

Distance to railroad

Dependent variable: Mortality 1933		
	(1)	(2)
Collectivization 1930	0.088*** (0.020)	0.013 (0.022)
Wheat and rye pc 1925	0.011*** (0.003)	0.014*** (0.003)
Collectivization 1930 \times Wheat and rye pc 1925	-0.014*** (0.005)	-0.014*** (0.005)
$\ln(\text{distance to railroad})$	0.001 (0.002)	-0.003 (0.003)
Collectivization 1930 $\times \ln(\text{distance to railroad})$		0.021*** (0.006)
Wheat and rye pc 1925 $\times \ln(\text{distance to railroad})$		-0.001** (0.001)
District controls, Province FE	✓	✓
Observations	280	280
R^2	0.531	0.576

Households per collective farm

Dependent variable: Mortality 1933		
	(1)	(2)
Collectivization 1930	0.088*** (0.020)	0.031 (0.023)
Wheat and rye pc 1925	0.011*** (0.003)	0.009*** (0.003)
Collectivization 1930 × Wheat and rye pc 1925	-0.014*** (0.005)	-0.010** (0.005)
HH per collective farm 1930		0.016*** (0.004)
District controls, Province FE	✓	✓
Observations	280	280
R^2	0.531	0.557

New collective farms were remarkably badly managed:

- ▶ Work done not recorded properly
- ▶ Peasants rewarded according to number of “eaters” in the family
- ▶ No predefined grain collection quota

In 1933 the government had changed procurement policies:

- ▶ Promised to collect predefined fixed amount of grain per hectare of sown area
- ▶ Banned local officials from increasing collections
- ▶ Allowed household plots and collective farm markets

Size of the effects

		Collectivization	
		0	+ 1 sd
Grain	0		↓ production 0.017
	+1 sd	↑ procurement 0.019	0.036 ↑ observability ⇒ ↓ procurement 0.020

Alternative channels

Dependent variable: Mortality 1933						
	(1)	(2)	(3)	(4)	(5)	(6)
MTS 1930	-0.011* (0.006)					
Rural soviets pc, 1925		-0.046* (0.025)				
Agricultural coopera- tives pc, 1925			-0.001 (0.017)			
Collective farms pc peasants, 1925				-0.002 (0.011)		
Share of HH hiring in workers 1925					0.036 (0.038)	
Share of HH hiring out workers 1925						0.037* (0.021)
District controls, Province FE	✓	✓	✓	✓	✓	✓
Observations	214	214	214	214	214	214
R ²	0.562	0.564	0.555	0.555	0.557	0.562

The Soviet government managed to destroy incentives to work and created artificial famine. The famine must have been not only due to grain collections, but also due to substantial drop of production on collective farms.