American Relief and the Soviet Famine of 1921–1922*

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Abstract

We study the effects of large-scale humanitarian aid using novel data from the American Relief Administration's (ARA) intervention during the 1921–1922 famine in Soviet Russia. We find that the allocation of relief closely tracked underlying food scarcity and was uncorrelated with subnational politics. We show that ARA rations reduced food prices, raised caloric intake, lowered the prevalence of relapsing fever, and increased rural birth cohorts. The aid benefited poorest peasants most and proved most effective in provinces with higher levels of human capital. Back-of-the-envelope calculations suggest that, absent ARA relief, the 1926 population would have been 4.4 million lower.

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I ask all honest European and American People for prompt aid to the Russian people. Give bread and medicine.

Maxim Gorky, open letter on July 13, 1921

1 Introduction

According to the 2025 *Global Report on Food Crises*, more than 295 million people were "at risk" of famine or severe hunger in 2024. The consequences of famines are devastating and long-lasting. In addition to the lives lost to hunger, survivors suffer stunted growth and lifetime health problems (e.g., Chen and Zhou, 2007; Ó Gráda, 2007; Tan et al., 2023; Conti et al., 2024). Understanding whether these harms can be mitigated through rapid international assistance is therefore of central importance. Yet evidence on the effectiveness of famine relief remains limited. Famines typically occur in autocratic or post-conflict settings, where governments have political incentives to suppress information, reliable statistics are scarce, and external monitoring is difficult (de Waal, 2018; Sen, 1981). While recent studies have provided credible small-scale evidence that humanitarian aid improves welfare outcomes (Jeong and Trako, 2022), it remains unclear whether these successes can be replicated at scale. Large-scale relief operations face unique challenges compared to other humanitarian crises: the bigger the operation, the greater the risks of diversion and coordination failures, all of which can undermine aid effectiveness (Sentia et al., 2023).

We advance the humanitarian aid literature by providing direct evidence that a massive food relief operation can be implemented effectively even under severe logistical obstacles and in an adversarial political environment. We study one of the most ambitious and complex famine relief operations of the twentieth century, situated at the origins of modern humanitarianism: the American Relief Administration's (ARA) assistance to Soviet Russia during the 1921-1922 famine. Between 1921 and 1923, a team of 200 Americans distributed more than $60 million in food and medical supplies – equivalent to over $1 billion today (Fisher, 1927, Appendix B). At the peak of the relief effort, they fed 10 million people daily. The ARA maintained detailed disaggregated monthly records of the number of people fed, which we combine with a wealth of Soviet statistics, including food prices, disease prevalence, cohort sizes, and caloric intake. This extensive set of high-frequency indicators at the subnational level allows us to systematically assess the immediate impact of famine relief.

Our case provides a hard test of aid effectiveness. The scale of famine was immense: starvation and disease faced the population of twenty million, dispersed across hundreds of miles (Fisher, 1927, pp. 138-139). The recipient state was emerging from revolution and civil war and its government was deeply suspicious of the West and willing to sacrifice citizens' welfare

to ideological goals. In the words of its own workers, the ARA faced "almost insurmountable obstacles," including surveillance and arrests by the Soviet secret police, lack of cooperation from local officials, a collapsing transport network, as well as "dishonesty, trickery, demoralization, incompetence, [and] apathy" (Frank Golder, quoted in Patenaude (2002, p. 172)). If famine aid made a difference under these conditions, then relief efforts, when well-targeted, could save lives in the harshest environments.

Despite its unprecedented scale and political significance, the ARA's relief operation has not yet received a systematic, data-driven assessment. In 1922, US magazine *The New Republic* credited Americans with preserving five to ten million lives and possibly even saving the young Soviet regime from collapse (Patenaude, 2002, p. 198). By contrast, the Soviet side sought to minimize the ARA's contribution, emphasizing domestic relief and arguing that the American rations were too small (Shmidt, 1926; Smith, 2019; Patenaude, 2002). During the ARA operations, the Soviet secret police reported that the Americans were hiring anti-Soviet elements, spying, and "buying up valuables" (Smith, 2019, p. 71). Later publications by Soviet historians either accused the ARA of supporting counterrevolutionary forces under the guise of aid (e.g., Polyakov, 1985) or ignored its contribution altogether. The 1922 famine itself remains understudied, with estimates of mortality ranging from three (Wheatcroft, 2017) to five million (Shmidt, 1930).

What were the outcomes of the American humanitarian mission in Soviet Russia? Did the ARA manage to allocate food "without regard to race, politics, or religion" (Fisher, 1927), in line with its guiding principle? How many lives did American corn and cocoa ultimately save? We provide the first quantitative assessment of the ARA relief effort using original, hand-digitized data on the organization's monthly feeding reports preserved in the Hoover Institution Archives. To support this analysis, we assembled a comprehensive province-level dataset capturing conditions in Soviet Russia and the Soviet Union during the formative years of communist rule, which includes statistics on the pre-famine levels of grain production, grain procurement, weather conditions, transportation infrastructure, urbanization, administrative capacity, ethnic composition, results of the 1917 Constituent Assembly Election, Communist Party membership, food prices, consumption, epidemiological situation, and cohort sizes from the 1926 census. Most of these data were newly digitized from Soviet statistical publications and used here for the first time.

Our paper proceeds as follows. First, we examine the correlates of ARA feeding. We find that the share of the population receiving ARA rations closely tracked food availability at the province level, as measured by harvest size and a range of indicators capturing both natural and man-made causes of the famine, including the share of crops killed by the drought and the amount of grain confiscated by the Bolsheviks (the name of the Soviet Communist Party

before 1918). Conditional on the severity of the famine, we find no evidence that aid allocation was influenced by political preferences or ethnic composition of the population. These results indicate that the ARA allocated food based on humanitarian need.

Next, we evaluate the impact of the relief operation. Because rye bread constituted a staple of the peasant diet, our main outcome is the price of rye flour, available monthly before and after the start of ARA feeding.[1] This outcome captures a general-equilibrium channel through which in-kind aid benefits not only direct recipients but also non-recipients by lowering the price of food. A key empirical challenge is that ARA feeding was endogenous to food shortages. We address this endogeneity concern in two ways. First, we use a battery of controls that capture the availability of food in fall 1921, following the drought and Bolshevik policies that resulted in famine conditions. Second, we exploit the fact that until the next (August 1922) harvest, in the absence of mass redistribution of internal grain resources between provinces, the local food stocks changed slowly from one month to another, in contrast to the number of people fed by the ARA, which increased rapidly. We are thus able to difference out the (omitted) food scarcity by estimating the effect of ARA feeding in first differences. To the extent that the ARA expanded feeding more rapidly in provinces where the availability of food dropped faster, our estimates are conservative, representing the lower bound of the true effect.

We find a large, negative, and statistically significant relationship between ARA feedings per capita and rye flour prices. A one–standard-deviation increase in ARA feedings per capita reduced rye flour prices by approximately one-fifth of a standard deviation. The results are similar for other staple foods (wheat, potatoes, and oats), but not for cotton cloth, a placebo outcome, or beef, a luxury good in the Soviet context.

To address potential bias from staggered treatment adoption, which can lead to misleading estimates when treatment effects are heterogeneous, we create a binary version of the ARA feeding and estimate a series of event-study models with estimators proposed by Borusyak et al. (2024), Callaway and Sant'Anna (2021), Sun and Abraham (2021), and de Chaisemartin and D'Haultfœuille (2020). Across all specifications, we find that the arrival of ARA aid led to a decline in the prices of rye flour by the third month from the onset of feeding. This analysis also confirms that – conditional on the share of crops killed by the 1921 drought – food prices were similar in treated and untreated provinces *before* the onset of the relief operation.

Using a direct measure of food consumption from nutrition surveys, we find that a standard-deviation increase (8%) in the ARA feedings produced a 9% increase in the average calories consumed, equivalent to roughly one-third of a standard deviation. The largest gains in consumption were observed among peasants who were landless or had only small and medium

[1] Soviet mortality statistics are not available for 1920-1922.

plots, i.e. among those who were most vulnerable to food scarcity, which is consistent with the ARA's mission to distribute relief according to need. This means that the program was not only effective on average, but also successful in ensuring that food reached the most vulnerable segments of the population – the very outcome the ARA hoped to achieve. The positive and statistically significant effect of relief on caloric intake was observed only during the famine months; in the post-famine phase of relief, when caloric intake returned to the physiological norm, the estimated effect of feeding was zero.

We also evaluate the impact of ARA aid on the epidemiological situation, showing that it decreased the prevalence of relapsing fever, transmitted by lice, but not the prevalence of diseases spread through contaminated water, such as typhoid fever. At the same time, we find no effect of aid on peasant unrest, measured using Soviet secret police reports.

In the absence of mortality data, we use the sizes of birth cohorts from the 1926 census to estimate the demographic impact of relief allocation. Relief could impact cohort sizes by increasing child survival during the famine as well as by increasing birth rates among adults (Dyson and Ó Gráda, 2002). We find a positive and statistically significant effect of aid on the following year's rural birth cohort size. We also find a positive relationship between aid and the total size of the rural population in 1926. A back-of-the-envelope calculation based on the difference between the predicted increase in the total population from 1920 to 1926 suggests that, absent the ARA feedings, the population in 1926 would have been approximately 4.4 million people smaller.

Finally, we ask whether the effectiveness of relief varied with the province-level political and economic conditions. We find that ARA food was particularly effective in lowering food prices in provinces with higher human capital, measured using the principal component of the Soviet population's literacy rates, the number of universities, and university students per capita. This pattern aligns with the ARA's accounts about the difficulties of finding qualified native employees outside capital cities. Due to the organization's heavy reliance on local staff – operating at a ratio of one American to every 600 Soviet employees – critical tasks such as selecting aid recipients, monitoring food quality in ARA kitchens, maintaining records, and liaising with local authorities could falter in provinces without the educated labor force. At the same time, we find no significant differences in aid effectiveness across provinces with different levels of Bolshevik support, policing capacity, transportation accessibility, or ethnic fractionalization.

Related literature. Our study provides the first systematic evaluation of one of the most complex famine relief operations in history. To date, credible evidence that famine relief works remains scarce. Scholars have instead focused on understanding the causes and consequences of famines, with particular attention to the Great Irish Famine (Ó Gráda, 1999; Mokyr and

Ó Gráda, 2002), the 1932 Soviet famine (Davies and Wheatcroft, 2009; Rozenas and Zhukov, 2019; Naumenko, 2021; Markevich et al., 2024), and the Great Chinese Famine (Kung and Lin, 2003; Kung and Chen, 2011; Gørgens et al., 2012; Meng et al., 2015; Gooch, 2017; Kung and Zhou, 2021). Evidence that humanitarian aid can improve food security outcomes has instead come primarily from smaller-scale crises (e.g., Hidrobo et al., 2014; Schwab, 2019; Kurdi, 2021)[2] and may not generalize to famines, which are accompanied by epidemics, social conflict, and market collapse. Famines pose distinct operational challenges for humanitarian actors because they are inherently political, involving denied access, suppression of information, and deliberate diversion of relief (de Waal, 2018). These political constraints, together with the (typically) larger magnitude of the crisis and thus the required humanitarian response, make famine relief substantially harder to deliver effectively (Sentia et al., 2023). By studying the 1921-1922 famine, we thus provide one of the few assessments of humanitarian aid during a crisis of exceptional scale and political significance (for an overview of the history of famines, see Ó Gráda (2007), Ó Gráda (2009) and Alfani and Ó Gráda (2017)). Our finding that Americans succeeded in alleviating Soviet famine is also notable in light of evidence that ideological misalignment between donor and recipient governments reduces the effectiveness of foreign aid (Dreher et al., 2015).

We also contribute to the literature on the distortions in the allocation of humanitarian aid, which shows that aid often follows donors' strategic and economic interests rather than recipients' needs (e.g., Fink and Redaelli, 2011; Cheng and Minhas, 2021; Bommer et al., 2022; Arezki et al., 2024; Charnysh, 2022) and may be diverted to other purposes by recipient governments or looted by insurgents (Barnett, 2011; Findley, 2018; Bradley, 2023). Our historical case appeared especially prone to such distortions, given the mutual hostility between the anti-Communist West and the Bolshevik government. Yet we find that, once food scarcity is accounted for, ARA aid was uncorrelated with the political or ethnic composition of the population. We further show that ARA feedings had no measurable effect on the incidence of peasant unrest, pushing against the literature that links aid inflows to the outbreak or prolongation of civil conflict (Crost et al., 2014; Nunn and Qian, 2014; Wood and Sullivan, 2015; Sexton, 2016)[3] as well as against popular claims in the American media that the ARA stabilized Soviet control by reducing mass uprisings.

Finally, our paper contributes to the growing literature on Russian and Soviet economic history (reviewed by Gregg (2024) and Zhuravskaya et al. (2024)) by studying the formative post-revolutionary period that, apart from Markevich and Harrison (2011), has received relatively little scholarly attention. By digitizing Soviet statistics and ARA administrative

[2]One exception is Di Falco and Han (2025), who show that emergency food aid during the 1984-85 Ethiopian famine increased adult height decades later.

[3]See also Mary and Mishra (2020) and Lyall (2019) on how aid can reduce conflict.

records, we provide a rare window into economic and social conditions at the dawn of Soviet rule.

2 Background

2.1 The Causes of the 1921-1922 Famine

In 1921–1922, Soviet Russia experienced one of the worst famines of the 20th century. Nearly 20 million people across an area stretching roughly 800 by 350 miles faced starvation and disease. The immediate trigger was two consecutive years of drought, 1920 and 1921, which crippled harvests in the fertile black soil and middle Volga regions. The 1921 drought was particularly devastating. During the April to June growing season, there was only 7.1 mm of rain, compared to the average of 108.3 mm of rain in the previous 17 years (Adamets, 2002, pp. 122-124). Figure 1a shows the location of drought-stricken provinces.[4]

However, the deeper causes of the famine lay in the cumulative disruptions wrought by World War I, the 1917 Revolution, the Civil War (1918-1920), and the Bolsheviks' War Communism policies (Wheatcroft, 1990; Adamets, 2003). The succession of armed conflicts diverted millions of men and horses from agriculture and damaged productive assets and transport infrastructure (Khryascheva, 1921; Kondratyev, 1922; Castañeda Dower and Markevich, 2018).

The disruption in the exchange of goods between urban and rural areas reduced food availability in the cities in the northern grain-consuming region (see map in Appendix Figure A.3a), where the population relied on imports of grain from the fertile South, creating urban famine conditions in 1918–1920 (Wheatcroft, 1997). To provide food for cities and the armed forces, the Bolsheviks imposed a state monopoly on trade in grain and banned private trade (although the black market persisted). In January 1919, they introduced *prodrazverstka*, the obligatory delivery of "surplus" grain, fodder, and other products from the countryside (Malle, 1985, pp. 399-400). The central government set quotas for the collection of all grain not required for direct peasant consumption and sowing the fields, at fixed prices below market value. The collection of food was enforced through violence, with the help of Food-Requisitioning Army detachments and the secret police (established in December 1917 under the name of the All-Russian Extraordinary Commission and known as *Cheka* for its Russian abbreviation). The *prodrazverstka* backfired, reducing peasants' incentives to produce (Lih, 1990; Litoshenko, 2001; Polyakov, 2009). From 1919 to 1921, the area under cultivation

[4] Appendix Figures A.3b and A.3c show regions that experienced crop failure in 1920 and 1921.

decreased by a third (Krasilnikov, 1924); by 1921, the Soviet GDP per capita was just 37% of the 1913 level (Markevich and Harrison, 2011).

The *prodrazverstka* ended in March 1921 with the introduction of the New Economic Policy (NEP), intended to stimulate economic recovery. Under NEP, the grain and fodder requisitions were replaced by a fixed tax (*prodnalog*) and surpluses could be sold on the market (Malle, 1985). These measures came too little too late: the peasant economy was already depleted and thus extremely susceptible to drought.

In addition to shrinking harvests, grain and seed requisitions fueled peasant revolts. The Cheka recorded 118 separate revolts in February 1921 (Singleton, 1966, p. 499). The largest was led by Alexander Antonov and spread from the province of Tambov to the nearby Voronezh and Saratov provinces. Heavily armed, the rebels broke into grain stores and intimidated Bolsheviks through the summer of 1921 (Smith, 2019, Ch. 1).

2.2 The ARA–Soviet Agreement of 1921

In the summer of 1921, as famine loomed, the Soviet government was reluctant to ask for outside help, perceiving foreign aid as an instrument of subversion. Soviet concerns were not unfounded. American policymakers openly hoped that food aid could stop the spread of Bolshevism in Europe and perhaps even reverse it in Russia. Indeed, only two years earlier, in 1919, the ARA had supplied the White Army—the Bolsheviks' rivals in the Civil War—with food, clothing, and fuel (Smith, 2019, p. 26).

Eventually, the Soviet leaders acquiesced to the creation of the All-Russian Famine Relief Committee (*Vserossiyskiy Komitet Pomoshchi Golodayushchim, VK Pomgol*) composed of concerned activists, intellectuals, and celebrities (Edmondson, 1977). This move had unexpected consequences: Maxim Gorky, the famous writer, published an open letter soliciting private aid on the Committee's behalf. Herbert Hoover responded to Gorky's plea, placing the Lenin's government in a difficult position—they could no longer deny the famine's scale or maintain the fiction that they could manage without help.[5]

After protracted negotiations in Riga, the ARA and the Soviet government reached an agreement on August 21, 1921. The ARA pledged to feed one million children and abstain from politics. To fulfill this commitment, it redirected $5 million from the European relief program to Russia. In return, the Soviet government granted the ARA full control of aid distribution, freedom of movement within the country for investigating local needs, and the

[5]In September 1921, members of the relatively independent *VK Pomgol* were accused of counterrevolution and most were arrested by the Cheka; the government subsequently established its own Central Commission for Relief of the Starving (*Tsentralnaya Komissiya Pomoshchi Golodayushchim, TsK Pomgol*). Gorky left Russia in October 1921.

right to create committees of local citizens to organize feedings, provided that government representatives were also included (Patenaude, 2002, p. 45).

Beneath the formal agreements, each side harbored secret hopes. Hoover believed that once famine-stricken Russians regained their strength, they would rise to "throw off Bolshevik oppressors" (Patenaude, 2002, pp. 32, 43). For their part, the Bolsheviks calculated that they could channel and claim credit for ARA aid, while simultaneously enhancing their regime's international legitimacy by negotiating with the Americans.

2.3 ARA Operations

The organization of relief in Russia. The first ARA men arrived in Moscow on August 27, 1921, to establish a headquarters and prepare for receiving food stocks that were already on the way from Riga, Danzig (Gdańsk), and Hamburg. The Americans initially planned to focus on cities, opening kitchens in the capitals (Moscow and Petrograd). However, they soon realized that the real need lay in the countryside in the grain-producing region (Patenaude, 2002, p. 53).

To obtain information about the local conditions, the ARA team conducted independent investigations. They first examined provinces in the Volga valley, establishing feeding points in the cities of Kazan, Simbirsk, Samara, and Saratov by October 1921. They soon ventured beyond, opening kitchens in Ufa, Orenburg, Tzaritzin, and Astrakhan, as well as in the Kirghiz (modern Kazakhstan) and Bashkir Republics (Fisher, 1927).

Concerned that foreign contact might strengthen anti-Bolshevik uprisings, the Soviet government tried to block Americans' access to Ukraine, claiming that the country produced a grain surplus (Fisher, 1927, pp. 247-266). The ARA personnel discovered that southern Ukraine was also starving only when they traveled there to deliver remittances from the American Jewish Joint Distribution Committee (JDC) and other organizations in December 1921 – January 1922.

When the ARA realized the true scale of the famine, it expanded the mission. On December 30, 1921, the Soviet-ARA agreement was extended to sick adults and eventually to all adults in need. To cover new expenses, the US Congress approved an appropriation in the amount of $20 million to buy corn and seed grain from American farmers.[6] ARA also received medical supplies and funds from the American Red Cross ($3.6 million) and the US Army ($3.5 million) as well as private donations.

[6]This measure was designed, in part, to help the US economy, which faced rising unemployment and an oversupply of crops and manufacturing goods due to increased productivity and a decline in demand after WWI. The farmers would sell their corn to the government and buy manufacturing products, alleviating economic malaise (Fisher, 1927, pp. 140-151).

ARA operations were organized into twelve large districts (groups of provinces), each supervised by an American. Allocations to starving provinces were based on reports submitted by ARA district supervisors. The Moscow headquarters then sent monthly estimates of required supplies to the New York office, which arranged procurement and shipment using funds appropriated by Congress. Some shipments were sent directly to Northern Baltic ports. More frequently, the trans-Atlantic cargoes were discharged at Hamburg and then trans-shipped on small steamers to their final destinations in the Baltic. In ports, relief was stored or immediately shipped by rail or by boat. To deliver aid to remote locations, the ARA relied on sleds, horses, camels, motor trucks,[7] and human backs.

In districts, the ARA sought statistics from the local officials about conditions in each uezd (province subdivision) and made a "theoretical allocation, sending into the uezds in the worst straights a larger number of rations in relation to the total population than [to less stricken uezds]" (Fisher, 1927, p. 98). At the village level, a local aid distribution committee was established; the ARA made sure that these committees included the head of the village government and the local priest, with the additional requirement that at least one member be literate. These committees were responsible for setting up kitchens (usually in the schoolhouse or an abandoned peasant hut) and preparing lists of the aid recipients (Smith, 2019, pp. 67-69). In the first days of the relief operation, the ARA applied the Pelidisi system, which used a formula based on weight and height to determine levels of need. However, relief workers soon realized that in the Soviet countryside it was more practical to rely on local knowledge instead (Patenaude, 2002, pp. 87-88).

The ARA kitchens operated under rigorous rules designed to guarantee adequate nutrition, employing thousands of Soviet citizens as inspectors to oversee compliance. The ARA required that all food be consumed on-site, although in rural areas this rule was sometimes violated (Patenaude, 2002, pp. 88-89). The ARA employed similar principles to determine need for children and adults, but the adults received dry rations of corn, whole or in the form of grits (Fisher, 1927, p. 103).

At the peak of the relief effort in July 1922, ARA kitchens were feeding 4.2 million children and 6.3 million adults (see Figure 2). Thus, the ARA mission expanded more than tenfold from the original plan. Over the course of the entire operation, the ARA delivered 709,507 metric tons of foodstuffs and provided 61,382,192 person-months of food (Fisher, 1927, Appendix B), equivalent to roughly 390 grams of food per person per day. Contemporary Soviet sources criticized these rations as insufficient, at just 600 calories per child and 1,200 calories per adult (Shmidt, 1926). However, at the height of the famine, average peasant consumed 1,200

[7]The ARA brought its own cars and trucks to Russia (Patenaude, 2002, p. 102).

grams of foodstuffs per day; the ARA ration therefore represented an increase of roughly 30% in daily intake (Lositskiy, 1928).

In addition to feeding the population, the ARA distributed medical supplies and launched a massive inoculation campaign. It vaccinated the population against cholera, typhoid, paratyphoid, and dysentery (Patenaude, 2002, p. 179). The ARA also launched a food remittance program, allowing private individuals to pay at the ARA's New York headquarters or at its European offices for food packages that the intended recipients picked up from the ARA delivery stations in Soviet regions.

After the 1922 harvest, relief entered a post-famine phase, which lasted until June 1923. The number of feedings dropped, and the focus of relief shifted from rural to urban areas and closed institutions (hospitals and orphanages). Adult feedings were terminated, with the exception of hospital patients, and feeding was gradually transferred from "open kitchens" run by ARA to "closed" Soviet establishments, in line with Americans' objective of "building-up local institutions" (Patenaude, 2002, p. 180).

ARA relief workers. At the peak, 199 American relief workers managed the relief distribution. Roughly fifty were based in the Moscow headquarters, while the remainder were dispersed across districts or served as couriers (Patenaude, 2002, p. 102). Recruiting a sufficient number of Americans to work in Russia proved easy: the New York office received some 450 applications for the "Russian job" even before the ARA–Soviet agreement was signed (Patenaude, 2002, pp. 7-8). Most recruits were young, well-educated veterans of the First World War. Many had prior experience with the ARA or other relief efforts in Europe' (Patenaude, 2002, pp. 7-8). The ARA explicitly excluded women, deeming the work too dangerous, and Jews, fearing they might be targeted in the event of disorder (Patenaude, 2002, p. 51). Few Americans selected for the ARA mission in Soviet Russia spoke Russian, and language barriers became a serious obstacle in daily operations.

This small American staff oversaw an enormous native workforce of roughly 120,000 people, a staffing structure that reflected the ARA's philosophy of promoting self-help while minimizing administrative costs (Patenaude, 2002, p. 31). Local personnel included paid employees responsible for administration, logistics, and oversight, as well as volunteers, who served on committees in charge of allocating rations. Recruiting qualified staff outside major cities proved difficult, and to the Bolsheviks' frustration, the ARA often relied on members of the former aristocracy, bourgeoisie, and intelligentsia. A small but valuable group of employees consisted of Russians returning from America, who spoke English and were familiar with "American efficiency" (Patenaude, 2002, pp. 77-80). Smith (2019, pp. 68, 85) writes that the ARA's local workforce likely included a substantial number of Cheka informants, who closely monitored its operations and personnel.

Obstacles to the efficient allocation of relief. The ARA operated in a challenging environment. The ports lacked warehouses and were unprepared for handling large shipments. The railways after eight years of WWI and Civil War were in terrible condition. The Soviet authorities failed to supply a sufficient number of cars and fuel, and jams and interruptions were common (Fisher, 1927, p. 186-189). In some districts, armed bands were active, and the ARA had to carry guns for safety (Smith, 2019, pp. 117, 121). In these conditions, the Cheka and its successor, GPU,[8] was sometimes an unlikely ally because it could get things done (Patenaude, 2002, p. 350).

More frequently, however, the Cheka was the problem rather than the solution. Its agents sought to influence the selection of the ARA's Soviet employees, prevent direct contact between the ARA and local Soviets (Patenaude, 2002, p. 359), and received extraordinary powers to spy on the ARA (Smith, 2019, p. 85).

According to the Riga Agreement, the ARA Americans were immune from arrest. The Soviet government generally honored this clause, although it briefly detained one American, William J. Murphy, on charges of assaulting a government representative (Patenaude, 2002, p. 395). Instead, the secret police targeted the ARA's Russian personnel, instructing its agents "to purge the ARA organization of undesirable elements" (Patenaude, 2002, p. 410). The arrests of ARA's native staff paralyzed the organization's work and sowed fear among prospective employees (Patenaude, 2002, pp. 399-401).

To deal with Bolshevik interference, the ARA routinely threatened to scale down its operation or suspend food deliveries. This ultimatum successfully secured the release of William J. Murphy as well as some of the ARA's native employees and led to the return of relief supplies seized by the Soviet government in February 1922 (Fisher, 1927, p. 199). This strategy was effective because of a credible threat of relief termination. Due to the limitations of Soviet transportation infrastructure, relief was shipped to Russia in monthly installments, so only one month's supply was typically provided at a time in each district.

Other humanitarian operations. Several other foreign relief organizations were present in Soviet Russia at the same time as the ARA, including the British Quakers, the Jewish Joint Distribution Committee (JDC), the American Friends Service Committee (US Quakers), and the International Committee for Russian Relief (ICRR) led by Fridtjof Nansen.[9] After October 1921, the Soviet government relief organ, the Central Commission for Relief of the Starving (*TsK Pomgol*), also organized feedings, but on a much smaller scale (Edmondson, 1977, p. 515). At the end of June 1922, ARA supplied more than 70% of total relief (TsK Pomgol

[8] In February 1922, the Cheka was succeeded by the State Political Directorate (*Gosudarstvennoe Politicheskoe Upravlenie, GPU*), which retained the same personnel and functions.

[9] For his humanitarian work and famine relief effort, Nansen was awarded the 1922 Nobel Peace Prize. Hoover was nominated several times but never won (Howard, 2022).

VTsIK, 1922). We plot the distribution of Soviet and other foreign (non-ARA) relief operations in the Appendix Figures A.3d and A.3e.

3 Data and Measurement

The ARA relief operation in Soviet Russia is exceptionally well documented, reflecting its ideological significance. The ARA maintained a separate accounting division to record all transactions and a historical division charged with chronicling American achievements. The operation emphasized reliance on "scientific" methods and the "dispensation of relief using strict accounting practices" (Patenaude, 2002, p. 593). This unusually systematic record-keeping provides quantitative researchers with a rare opportunity to track how aid was distributed across provinces on a month-to-month basis.

We digitized the monthly feeding reports preserved in the Hoover Institution Archives at Stanford (see Appendix Figure A.1). Appendix Figure A.2a illustrates the timing of relief onset and the share of the population receiving ARA rations.

We combine the ARA feeding reports with Soviet data on agricultural conditions, food prices, food consumption, epidemics, peasant unrest, grain harvest and requisitions, and demography, which we digitized for this project from official statistical publications, to create a province-month panel dataset on the interwar Soviet domain covering the territories of present-day Belarus, Kazakhstan, Russia, and Ukraine – 82 provinces in total – in the period from January 1919 to December 1924. To harmonize administrative boundaries, we digitized an official map corresponding to the January 1923 division of the Soviet Union, which serves as the geographic basis for our analysis. Where necessary, we aggregate earlier data to fit these units.

The main limitation of the Soviet statistics is the absence of systematic mortality data for the famine years. Still, despite the political and economic upheavals of the 1920s, Soviet statistics are of high quality. The nutrition surveys, in particular, are regarded as unparalleled for this historical period (Wheatcroft, 1997, p. 529). The surveys were typically conducted in the fall and in winter of each year. For the crucial period of ARA operations, nutritional surveys were conducted every four months: in October 1921, February 1922, June 1922 (only in drought-stricken provinces), October 1922, and February 1923. Importantly, they distinguish between calories consumed by landless peasants and those with small, medium, or large landholdings, allowing us to identify which groups benefited most from ARA assistance.[10]

Further details on data construction and sources are provided in the online Data Appendix.

[10]The subdivision into small, medium, and large landholders was determined relative to the average sown area per household in each province, as reported in the most recent agricultural survey. Households with a sown area up to two-thirds of the provincial average were classified as small farms; those with between

4 Analysis

4.1 The Correlates of ARA Feeding

Prioritizing the most vulnerable areas in relief distribution is crucial for saving lives during famines. As a first step in our investigation, we therefore examine whether ARA feedings were aligned with subnational patterns of food scarcity. Although the ARA emphasized the impartial distribution of relief, Hoover's anti-communist beliefs may have led to the channeling of greater amounts of food toward anti-Bolshevik provinces. Conversely, despite ARA resistance, the Soviet government may have succeeded in diverting some aid toward more politically loyal areas.

Figure 1 compares the share of crops destroyed by the 1921 drought with the share of the population receiving ARA rations at the peak of relief in July 1922. A visual inspection suggests that the ARA did indeed prioritize provinces facing the greater risk of starvation.

To examine the correlates of aid allocation more systematically, we regress total per capita feeding (aggregated from August 1921 to May 1923) on agroclimatic, political, demographic, and infrastructural characteristics. Figure 3 displays coefficient estimates for the most important variables; Appendix Table A.1 reports the full set of results, summary statistics, and correlations. Standard errors are heteroskedasticity-robust.

Panel A of Figure 3 plots the raw correlations between the total ARA feeding per capita and province characteristics, without additional controls. We find strong associations between aid allocation and different measures of famine severity. Provinces experiencing higher crop losses in 1921, less rainfall in May 1921, lower per capita grain harvest in 1920–21, lower rye yields, higher procurement (grain requisitions) in 1919–20, and crop failure indicators reported by the Soviet statisticians all received more food.[11] These patterns indicate that relief allocation closely tracked the severity of the famine, as proxied by its natural (drought) and man-made causes (procurement). We also confirm that, except for the capitals (Moscow and Petrograd), the ARA concentrated feeding outside of the northern grain-consuming region.

To assess the role of political factors in relief allocation, we next incorporate data on the results of the 1917 Constituency Assembly election, Communist Party membership in 1922, indicators of peasant unrest before the ARA's arrival, and information about the ethnic composition of each province. In bivariate regressions, provinces with lower Bolshevik and higher nationalist vote shares in 1917, fewer Communists per capita, greater unrest, and

two-thirds and one-and-one-third of the average as medium farms; and those exceeding one-and-one-third of the average as large farms (Lositskiy, 1928, 44).

[11] Rye yield and procurement data are available since 1919, but total grain harvest data exist only from 1920 onward.

larger non-Russian populations appear to have received more aid. However, once baseline province characteristics capturing famine severity are included, these associations disappear (Figure 3, panel B).

Finally, we find no systematic relationship between transportation infrastructure, measured by railway and waterway density, and the amount of aid received. Taken together, these results suggest that the ARA directed more aid to provinces most severely affected by famine rather than to those preferred for political or logistical reasons.

4.2 The Effect of Relief on Food Prices

Having shown that relief was targeted toward the areas most affected by famine, we next examine its effects on monthly food prices.

Our main outcome variable is the market price of rye flour, measured in 1913 rubles per pood, the only available province-level indicator available continuously from 1919 onward.[12] Grain accounted for over 70% of the peasant diet, and rye bread made up roughly 80% of all bread consumed (Lositskiy, 1928). Figure 4a shows that the average price of rye flour in drought and non-drought provinces moved in parallel until the fall of 1916. In 1919-1920, amid Civil War and War Communism disruptions to trade, food prices were substantially higher in the non-drought northern provinces, whose urban populations relied on grain imports from the South. Prices gradually stabilized thereafter, before rising sharply in response to the drought in 1920 and 1921. At the height of the famine, rye flour cost nearly twice as much in provinces affected by the 1921 drought as in those left untouched.[13]

ARA feeding was endogenous. Both anecdotal evidence and the correlations reported in Section 4.1 indicate that the ARA concentrated its efforts in areas where the combination of drought and grain requisitions produced greater food scarcity — i.e., where food prices were higher and rising more rapidly. Food scarcity is therefore the key omitted variable that may bias our estimates.

[12] We present results for prices on other food and non-food items in Section 4.4 below.

[13] We use bazaar prices in our analysis. While wholesale food trade was banned during War Communism (1918-1920), the black market persisted, and semi-legal urban bazaars still functioned. We verified that the results are very similar if we start our sample in April 1921 (the beginning of NEP), after economic liberalization commenced. These estimates are available upon request.

In the absence of exogenous variation in ARA feeding, our solution is twofold.[14,15] First, we exploit the fact that, until the new harvest in August 1922, food scarcity evolved slowly: conditions that were dire in October 1921 remained dire in November 1921. By contrast, ARA kitchens expanded rapidly from August 1921 onward (see Figure 2). We therefore exploit the monthly frequency of our data and estimate the relationship between ARA feeding and food prices in first differences, which removes much of the unobserved, slow-moving variation in food scarcity. Second, we include controls that proxy for residual differences food scarcity: the share of crops killed by the 1921 drought, grain harvest, and grain requisitions. Because the famine ended with the August 1922 harvest and the ARA altered its procedures thereafter, we estimate effects separately for the pre- and post-harvest periods. Our specification is as follows:

$$\Delta price_{i,t+1} = \alpha \Delta fed_{it} \mathbb{I}[t \leq \text{Aug 1922}] + \beta \Delta fed_{it} \mathbb{I}[t > \text{Aug 1922}] + \delta_t + X_{it}\gamma + \epsilon_{it} \quad (1)$$

Where i stands for province, t – month, fed_{it} is the share of people who received food assistance from the ARA in province i by the end of month t, $price_{i,t+1}$ is logged price of rye flour in province i in month $t+1$, δ_t is month fixed effects, and X_{it} is a vector of controls. We interact time-invariant controls with month-fixed effects.[16]

It is worth noting that if the ARA feeding increased most in provinces where conditions deteriorated fastest, any residual omitted variation in food scarcity would bias the estimates downward. Our estimates therefore provide a conservative lower bound on the true effect.

Table 1 presents the results. In this and all subsequent specifications, we cluster standard errors at the province level.[17] Column (1) only controls for month-fixed effects and the share of crops killed by the 1921 drought interacted with month fixed effects. The coefficient on

[14] Another approach would be to construct a shift-share instrument with exogenous shifts (food shipments) and endogenous shares (drought severity). Unfortunately, this is not feasible. While the total amount of aid was plausibly exogenous, since the expansion of the ARA's mission depended on economic and political conditions in the US, the month-to-month quantity of the food shipped was related to conditions on the ground. As Section 2.3 explains, ARA employees sent monthly requests to headquarters based on their assessment of local needs. Moreover, shift–share instruments work best when there is substantial variation in the shifts and multiple independent sources of such shifts (e.g., import competition from several industries), conditions that are not met in our setting. See Borusyak et al. (2025).

[15] Another potential solution is to use synthetic control methods. These approaches perform best when long pre-treatment outcome series are available and when outcomes are stable enough to allow close matches to treated units (Abadie, 2021). In our setting, however, price data are missing for many months (see Appendix Figure A.2b), and prices are highly volatile during WWI and the Civil War (see Figure 4a). For example, the ratio of standard deviation to mean of log price of rye flour is 6.6, compared to 1.1 before 1915. These features rule out synthetic difference-in-differences methods (Arkhangelsky et al., 2021).

[16] The arrival of the new harvest in August 1922 caused a discrete drop in food scarcity. In Appendix Section F we show that excluding August 1922 from the sample yields similar results.

[17] Appendix Section A and Table A.2 show that clustering at the province level is a conservative choice. Standard errors flexibly adjusted for spatial correlation are smaller.

ARA feeding per capita interacted with pre-August 1922 indicator is negative, statistically significant at the 1% level and large in magnitude.

Next, we introduce additional controls motivated by historical context. To capture food scarcity, we control for grain harvest and procurement per capita. Since grain is harvested in August, harvest and procurement in year y apply from September of year y to August of year $y+1$.[18] We also account for political and economic priorities of the Soviet state. As the capitals, Moscow and Petrograd likely received preferential treatment, so we include a capital-province indicator interacted with month fixed effects. To capture differences in demand structure, we add urbanization in 1920, also interacted with month fixed effects. Finally, because urban populations in northern provinces traditionally relied on grain imports from the South (Kondratyev, 1922), we allow for distinct economic trajectories across northern and southern provinces by including a grain-consuming region indicator interacted with month fixed effects.

Column (2) reports the resulting estimates. The coefficient on ARA feeding per capita interacted with pre-August 1922 indicator is very similar to the one reported in Column (1) and remains statistically significant at the 1% level. Taken literally, the estimates imply that ARA feeding the entire population prior to August 1922 would have reduced food prices by 94%. A one-standard deviation increase in feeding before August 1922 (an increase by 10%) is associated with a decline in prices of about 0.21 standard deviations. We will treat the estimates in Column (2) as the baseline.

Our baseline specification uses food prices expressed in 1913 rubles per pood. To account for hyperinflation in the early 1920s – by 1922 prices had risen into the millions of rubles – we deflate nominal prices using the consumer price index reported by Soviet statisticians. The adjustment may introduce measurement error. To assess robustness, Column (3) replicates the baseline specification using nominal (unadjusted) prices. The sample in Column (3) ends in December 1923, since in 1924 the Soviet government introduced a stable, gold-backed currency (the *chervonets*). The estimated coefficient on ARA feeding per capita by the end of month t interacted with the pre–August 1922 indicator is similar to that in Column (2).[19]

In the baseline, feeding per capita is calculated using population data from the August 1920 census. This census is rarely used since it excludes remote areas still affected by the Civil War, for which only population estimates rather than actual counts were available (Andreev et al., 1998). In Column (4), we instead use figures from the 1897 census, the only earlier census available. Because the 1897 population is much smaller, reflecting more than two decades

[18] Grain harvest data are available only from 1920 and procurement data only through 1923, so including these variables shortens the sample to September 1920-August 1923.

[19] The standardized coefficient is mechanically smaller because nominal prices exhibit much greater variance, so ARA feeding explains a smaller share of overall variation.

of rapid demographic growth, this substitution mechanically inflates feeding per capita and reduces the coefficient on ARA feeding interacted with the pre–August 1922 indicator. Even so, the coefficient remains statistically significant at the 1% level, and the standardized effect is nearly identical to the baseline estimate. These results indicate that the limited reliability of the 1920 census is unlikely to bias our findings.

Estimates in Columns (5) to (8) incorporate controls for alternative food sources. Columns (5) and (6) control for the Soviet and non-ARA foreign aid, respectively. The quality of these data is limited; the official publication of TsK Pomgol VTsIK (1922) reports Soviet and total foreign feeding only for December 1921, March 1922, and June 1922. We construct non-ARA foreign feeding as the difference between total foreign feeding and ARA feeding. To allow for the largest plausible contribution of non-ARA sources, we use the Soviet and other foreign feeding from June 1922 interacted with month fixed effects. The coefficients on ARA feeding interacted with pre-August 1922 indicator remain statistically significant at the 1% level and are very close to the baseline reported in Column (2).

During famines, livestock can serve as an emergency food source. Column (7) therefore controls for livestock per capita, as recorded by in the August 1920 agricultural census, interacted with month fixed effects. The coefficient of ARA feeding interacted with pre-August 1922 indicator remains close to the baseline reported in Column (2) and statistically significant at the 1% level.

Finally, we may be underestimating feeding per capita if refugees fled the most severely affected villages. Unfortunately, the only available data on refugee flows cover centrally organized evacuations of approximately one million people reported by TsK Pomgol VTsIK (1922). Column (8) controls for these refugee flows interacted with month fixed effects. The coefficient of ARA feeding per capita interacted with pre-August 1922 indicator is statistically indistinguishable from the baseline estimate in Column (2).

Is it possible that we *overestimate* the effect of ARA feeding on food prices? For this to be the case, the ARA would have had to systematically increase feeding in provinces where food prices would have fallen even without its intervention. While this counterfactual is unobservable, we can test whether the ARA targeted provinces in which food prices were already declining prior to increased feeding. If so, changes in feeding should be negatively correlated with prior price movements. Appendix Table A.3 examines this possibility by regressing changes in food prices in month t on changes in feeding in month $t+1$, controlling for baseline covariates. Column (1) uses all months in which the ARA operated; Columns (2) and (3) split the sample to pre-August 1922 and post-August-1922 periods. Across all specifications, the estimates are statistically indistinguishable from zero, providing no evidence that the ARA selectively targeted provinces already experiencing price declines. We provide addi-

tional evidence that food prices followed similar trajectories prior to the ARA's intervention in Section 4.3 below.

Additional robustness checks that control for drought indicators using weather data instead of the official Soviet statistics and use additional agricultural controls are discussed in the Appendix Section B. Robustness to political variables, ethnic composition, and transportation infrastructure are discussed in the Appendix Sections C, D, and E. Appendix Sections F and G demonstrate robustness to dropping individual months or provinces and present random permutation tests.

4.3 Event Studies

In addition to standard endogeneity concerns, staggered treatment adoption in our setting raises an additional issue: when treatment effects are heterogeneous, conventional estimators may be biased (Roth et al., 2022; Callaway et al., 2024).

When treatment is binary or continuous but its intensity does not change over time, two sources of bias may arise. First, treatment effects may vary over time – for example, prices may respond differently immediately after ARA feeding begins than several months later, even if feeding (treatment) level remains constant. Second, treatment effects may vary across units, with feeding having different impacts on prices in different provinces.

Our setting differs in an important way. Treatment is continuous and its intensity changes over time: the number of people fed by the ARA in each province increased steadily until August 1922 (see Figure 2 and Appendix Figure A.2a). This feature renders models that allow for heterogeneity across both time and units unidentified.[20] For example, in a province where feeding began three months earlier, observed outcomes after three months could reflect the effect of the initial level of feeding or the cumulative effect of subsequent increases in feeding intensity. Apparent heterogeneity over time may therefore conflate responses to the same treatment with responses to different treatment doses.

In this context, it is reasonable to interpret heterogeneity over time as arising from changes in treatment intensity rather than from a changing response to the same treatment. Feeding 5% of the population should have the same impact on prices in the first month as in the third month of relief operation. By contrast, the increase in feeding from 5% to 10% of the population in the third month of relief operation should produce a larger price response, reflecting the expansion of grain supply.

Under this assumption, we create a binary version of treatment and apply staggered-adoption estimators proposed by de Chaisemartin and D'Haultfœuille (2020), Callaway and Sant'Anna (2021), Sun and Abraham (2021), and Borusyak et al. (2024). Because ARA

[20] Intuitively, each change in feeding intensity starts a new event "treatment dose changed."

feeding declined and in some provinces even stopped after August 1922, we restrict the event-study analysis to the pre-August 1922 period. The first non-trivial intervention (feeding in Kazan) started at the end of September 1921, so we estimate effects for ten post-treatment periods. The length of the panel also allows for the estimatition of twenty-four pre-treatment coefficients. In the event-study specifications, because of computational intensity, we regress rye flour prices in the next month on the share of population fed by the ARA and only control for province and month fixed effects, and the share of sown area killed by the drought interacted with month-fixed effects.[21]

Figure 4b plots event-study estimates obtained using these heterogeneous-treatment-effect-robust methods, alongside the dynamic TWFE version of equation (1). Appendix Table A.4 reports average post-treatment effects in Panel A and the full set of event-study coefficients in Panel B. Two patterns stand out. First, estimates are broadly similar across methods, whether using the dynamic TWFE model or the approaches proposed in Borusyak et al. (2024), Callaway and Sant'Anna (2021), Sun and Abraham (2021), and de Chaisemartin and D'Haultfœuille (2020). If anything, Panel A shows that dynamic TWFE produces estimates of *smaller* magnitude than the event-study methods,[22] suggesting that our baseline estimates are conservative. Second, across all estimators, food prices – conditional on the share of crops destroyed by the 1921 drought – evolve similarly in the pre-treatment period but begin to decline by the third month following the onset of ARA feeding and remain significantly lower throughout the ten months of relief operations. This pattern implies that any omitted factor capable of explaining the estimated relationship would have to emerge precisely at the onset of ARA intervention.

4.4 Other Prices

Next, we examine the relationship between ARA aid and all other available prices: wheat, potatoes, oats, beef, and cotton cloth (*sitets*), a placebo outcome. Appendix Figure A.6 plots the averages of these prices for drought and non-drought provinces. Table 2 reports the estimates. The first three columns demonstrate that ARA feedings during the first phase of the relief effort had a statistically significant negative effect on the prices of other staples in the peasant diet: wheat, potatoes, and oats. The coefficient on ARA feedings for beef prices, a relative luxury in the Soviet context of the early 1920s, is negative but not significant (the ARA did not supply any meat products). Column (5) further demonstrates that ARA feedings did not influence the price of cotton cloth. Taken together, these results reinforce the

[21] The user-written modern staggered-adoption estimators do not converge with additional controls.
[22] This is consistent with the recent findings in Chiu et al. (2025).

interpretation that the observed decline in rye flour prices reflects the impact of ARA rations on food availability, not a general market response to the American presence.

5 Additional Evidence

This section provides additional evidence of the ARA's impact. We show that ARA feedings increased peasants' caloric intake, reduced the prevalence of some deceases, and expanded rural population size, but had no effect on the frequency of peasant unrest.

5.1 Calories

Data from Soviet nutritional surveys closely tracks historical accounts about famine conditions. Figure 5a plots changes in the caloric intake of an adult male peasant against the Soviet physiological norm.[23] In the drought region, food consumption fell sharply, from approximately 3,700 kcal in the fall of 1920 to only 2,200 kcal in February 1922.[24] By contrast, caloric intake in the non-drought region remained stable. Consumption levels in drought and non-drought provinces converged after the 1922 harvest. Caloric intake varied by landholding status: landless peasants and those with small plots consistently consumed fewer calories than those with large farms (see Appendix Figure A.7). At the peak of the famine (June 1922 survey), landless peasants and peasants with small farms reported consuming an average of 1,700 and 1,900 kcal, respectively, compared to about 2,500 kcal consumed by wealthier peasants.

Next, we estimate the effect of ARA feedings on caloric intake using specification (1) with baseline controls and month-fixed effects.[25] Because nutrition data were collected only at discrete survey waves, we aggregate ARA feeding to corresponding intervals. For example, we compare the change in consumption between February and June 1922 with the change in ARA feeding between January and May 1922.

Table 3 reports these estimates.[26] Column (1) indicates that, before the new August 1922 harvest, ARA feedings significantly increased caloric intake: a one–standard-deviation (8%) increase in per-capita feeding raised consumption by 9% – roughly one-third of a standard deviation, or about 300 calories per adult male. Columns (2)–(5) disaggregate by landhold-

[23] The nutrition surveys asked households to report the quantities of food they consumed; these figures were then converted into adult-male-equivalent caloric values based on household composition.

[24] Caloric requirements in rural Russia were high due to the heavy physical labor associated with peasant agriculture, the severity of Russian winters, and a harsh epidemiological environment (Wheatcroft, 1997).

[25] The baseline controls are the same as in the analysis of food prices: grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, urbanization, and indicators for the grain-consuming region and capital cities interacted with month-fixed effects.

[26] Results are very similar when restricting the sample to the 22 provinces covered in the June 1922 nutritional survey; these alternative estimates are available upon request.

ing status. The standardized coefficients indicate that the largest gains accrued to landless peasants or those who held only small- and medium-size farms. The estimated effect for large landowners (Column 5) is smaller and statistically indistinguishable from zero.

We examine the dynamic effects of ARA feeding by interacting the change in feeding per capita t with survey-month indicators. Figure 5b displays standardized coefficients, and Appendix Table A.9 reports the full regression results. The effect of ARA feeding becomes large and statistically significant for all peasant groups by May 1922, when the relief effort reached its peak. In these dynamic estimates, the positive effect remains smallest for peasants with large landholdings, but unlike the estimated effect for large landowners in Table 3 it is statistically significant. By September 1922, with the arrival of the new harvest and the easing of famine conditions, the estimated effect of ARA feedings falls to near zero and loses statistical significance.

Taken together, these results yield two conclusions about the impact of ARA relief. First, poorer peasants, who entered the famine with the lowest caloric intake, benefited most. This pattern is consistent with the ARA's stated humanitarian principle of prioritizing the most vulnerable Soviet citizens. (It also reinforces our interpretation that food scarcity and ARA relief were positively correlated, the key identification concern.) Second, the effect of ARA feedings was concentrated during the famine period, when food shortages were most acute. This underscores the value of high-frequency consumption data for assessing humanitarian aid: large improvements in wellbeing may be obscured in analyses based on country-year aggregates that average over heterogeneous localities and months with sharply different levels of food availability.

5.2 Infectious Diseases

A major epidemic of typhus and typhoid fever swept through Russia before and during the famine.[27] Appendix Figure A.8a shows how disease prevalence evolved in drought and non-drought regions over time.

The ARA's presence could have influenced the disease environment through several channels. First, improved nutrition may have lowered susceptibility to infection and increased the local population's ability to maintain basic hygiene. Second, the ARA implemented sanitation measures, including bathing and delousing programs, that directly targeted louse-borne illnesses such as typhus (Fisher, 1927, pp. 439–440). Finally, the ARA medical division conducted vaccination campaigns and distributed imported drugs for diseases such as malaria and relapsing fever.

[27] Russian contemporary accounts described typhus, typhoid fever, and relapsing fever as a *tif* epidemic. Statistical publications used more precise terminology.

Table 4 examines the relationship between ARA feedings and monthly prevalence of typhus, typhoid fever, relapsing fever, and uncategorized cases of typhus or typhoid fever, available through December 1922, using specification (1) with baseline controls and month fixed effects (as in Tables 1-3). Column (1) indicates that ARA feedings produced a decline in the overall prevalence of these diseases during the initial phase of relief. Columns (2)–(5) disaggregate by disease. We find a negative and statistically significant effect on relapsing fever, which is transmitted by lice. The coefficient on the ARA feedings' effect for typhus, also transmitted by lice, is negative but imprecisely estimated. The estimated effect on typhoid fever, spread through contaminated water, is statistically zero.

Taken together, these results suggest that emergency food relief may help curb diseases linked to nutritional needs and hygiene, but is less effective against epidemics that depend on public infrastructure.

5.3 Birth Cohorts and Population Size

The ultimate test of the ARA's effectiveness is whether it saved lives. Directly counting lives saved is impossible, as systematic mortality data are unavailable. Instead, we follow other recent studies of famines (e.g., Meng et al., 2015; Markevich et al., 2024) and use the sizes of birth cohorts derived from age data in the 1926 Population Census as an indirect measure of famine losses.

Figure 6a plots the birth cohort sizes in drought and non-drought provinces, showing that they follow parallel trends up to the 1918 cohort, but diverge beginning with the 1919 cohort—children who were around three years old during the famine. The largest differences appear for the 1921–22 cohorts, reflecting both lower birth rates and higher infant mortality during the famine.

Because data on birth cohorts are annual, we collapse the monthly feeding data to annual totals and adapt specification (1) accordingly. The model includes the same baseline controls as before: grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, indicators for grain-consuming region and capital cities interacted with year fixed effects, along with the year fixed effects. With yearly data, however, first-differencing is less effective at removing unobserved food scarcity; therefore, these estimates should be interpreted as a lower bound on the true effect of ARA feeding on cohort size.

Panel A of Table 5 examines how ARA feedings per capita in year t affected the size of the cohorts in year $t+1$. We find a positive and statistically significant relationship between aid and cohort size for the total, urban, and rural population. To explore dynamic effects, we interact ARA feeding per capita with year fixed effects. Figure 6b plots the standardized coefficients (with estimates reported in Appendix Table A.10). The results indicate that the

effects are concentrated in rural areas for cohorts born after the 1922 feeding campaign, and in urban areas for cohorts born after the 1923 campaign.

One assumption underlying this analysis is that individuals recorded in the December 1926 census lived in the same province during the famine. However, famine conditions triggered substantial migration out of affected regions, and the number of evacuees was roughly proportional to local food scarcity. If many individuals survived the famine elsewhere and later returned home, our estimates would overstate the impact of ARA feedings on cohort survival. While comprehensive internal migration statistics are lacking, evidence from specific areas—such as the Volga German Commune—suggests that no more than 20% of refugees and evacuees had returned home by 1923 (Malova, 1999).[28]

We also investigate the relationship between ARA feeding and population size using a provincial cross-section. We regress the logged 1926 population on the logged total number of people fed by the ARA between August 1921 and August 1922 (the first phase of the ARA operation) and between Septermber 1922 and May 1923 (the second, post-1922 harvest, phase of the ARA operation) controlling for logged 1920 population, the baseline controls (urbanization 1920, grain per capita 1920-1923, procurement per capita 1919-1923, the share of crops killed by the 1921 drought, grain-consuming region indicator and capital indicator), and the normal (non-famine) population growth rate, operationalized as the difference between the 1913 natality and mortality rates.

Panel B of Table 5 presents the results. The coefficient on the pre-August 1922 ARA aid is positive and statistically significant for the total and rural populations (Columns 1 and 3), and statistically insignificant for the urban population (Column 2). Because these estimates are cross-sectional, they should be interpreted with caution.

Overall, our analysis suggests that the ARA saved lives in the Soviet regions most affected by the famine. Using the coefficient estimates from Panel B, Column (1), we conduct a back-of-the-envelope calculation. In the 43 provinces with available data, the reported total population in 1926 was 74.9 million, while the model predicts 74.8 million, indicating a close fit. The counterfactual predicted population *without* ARA feeding is 70.4 million. This implies that approximately 4.4 million additional people were alive in 1926 as a result of ARA famine relief (74.8 - 70.4). The ARA devoted roughly 80% of its supplies, or $49 million, to feeding these 43 provinces, spending approximately $11 per "preserved life" ($49 million/4.4 million = $11), or about $213 in today's currency. This figure reflects both lives saved and differences in migration patterns and should be interpreted as a lower bound, as it covers only 43 of the 82 Soviet provinces.

[28]To further account for the bias that stems from internal population movements, we control for the number of evacuees from each province in the period from June 1 to September 1 1922. The estimates remain unchanged and are available upon request.

5.4 Peasant Unrest

An important debate in the literature on humanitarian aid concerns its impact on intrastate conflict (Koppenberg et al., 2023). One view holds that relief mitigates violence by meeting basic needs and reducing discontent with the incumbent government (e.g., Koren and Bagozzi, 2016; Mary and Mishra, 2020). An alternative view emphasizes that aid may prolong conflict if it generates local resentments or is captured by insurgents, a risk thought to be especially high in weak states with a history of civil war (Wood and Sullivan, 2015; Nunn and Qian, 2014; Sexton, 2016). Both mechanisms appear plausible in the Soviet case.

To measure peasant unrest, we hand-coded secret police reports on rural conditions from Berelowitch and Danilov (2000–2012), counting monthly mentions of terms associated with unrest (rebel, uprising, deserter, bandits, gang, and discontent). Appendix Figure A.8b shows substantially higher levels of unrest in drought provinces.

We estimate the relationship between ARA feeding and peasant unrest using the province-month panel in Table 6, with the same controls as in the baseline model. Across all specifications, regardless of how we measure unrest, the coefficient on ARA feeding is statistically indistinguishable from zero, suggesting that relief had no impact on peasant unrest.

6 Conditional Effects

In Table 7, we examine how the effectiveness of ARA operation varied with province characteristics. For this analysis, we restrict the sample to pre-August 1922, the period when the effect of ARA was most pronounced, and focus on prices as the most high-frequency outcome.

Authoritarian regimes often try to block or restrict humanitarian access to pro-opposition areas (Bradley, 2023). In the Soviet case, although ARA feedings were uncorrelated with political ideology (see Section 4.1), the ARA may nevertheless have encountered greater interference when opening kitchens in areas with weaker Bolshevik support. To explore this possibility, we interact ARA feeding with a proxy for loyalty to the Bolshevik government, measured as the first principal component of four indicators: votes for the Bolsheviks and votes against the Nationalists in the 1917 Constituent Assembly election, Communist Party membership in 1922, and Communist Party candidacy in 1922. As shown in Column (1) of Table 7, the coefficient on the interaction term is negative but not statistically significant.

Another potential moderator of aid effectiveness is security. In contested or unsafe areas, monitoring aid distribution is harder and diversion or theft is more likely (Sexton, 2016; Nunn and Qian, 2014). Column (2) of Table 7 shows that ARA relief was indeed less effective in provinces with higher pre-famine levels of peasant unrest, measured using secret police reports for the period from January 1920 to August 1921 per 1,000 people. At the same time, Column

(3) shows that policing capacity, measured as militiamen per capita in 1920, did not moderate the effectiveness of relief.

A commonly cited impediment to effective relief provision is poor physical infrastructure (Bollettino et al., 2024). In the Soviet case, food had to travel hundreds of miles, producing delays and increasing opportunities for theft. Yet, as shown in Column (4) of Table 7, the accessibility of a province by boat or railway does not appear to moderate the effect of ARA feeding on prices. This may reflect the ARA's ability to compensate for weak transport networks through careful planning and the use of alternative means of transport such as horse-drawn carts and automobiles.

Studies show that providing relief to ethnically diverse localities is more challenging due to greater informational asymmetries (e.g., Charnysh, 2022) and can amplify existing communal tensions, reducing aid effectiveness (De Juan et al., 2020). However, Column (5) in Table 7 shows no evidence that the effect of ARA relief varied with the ethnic makeup of the population.

By contrast, the analysis suggests that the ARA was more effective in reducing food prices in provinces with higher levels of human capital (see Column (6), Table 7). We measure human capital using the first principal component of literacy rates in 1897 and 1920, as well as the number of universities and university students per capita in January 1922. This finding is consistent with contemporary accounts describing the difficulty of recruiting qualified personnel outside major cities (Patenaude, 2002, pp. 81, 102). Smith (2019, p. 67), for example, notes that although the ARA was "inundated with applications" in Kazan, few applicants "possessed the requisite skills." Educated employees were more likely to speak foreign languages, understand ARA regulations, and carry out administrative and clerical tasks effectively. Access to a more skilled local workforce thus facilitated the organization and supervision of kitchens and ultimately increased the effectiveness of relief.

Finally, column (7) shows that when the interactions of ARA feeding with both human capital and peasant unrest are included in the same regression model, only the former retains statistical significance. We interpret this as tentative evidence on the importance of relying on local expertise when organizing large-scale relief operations abroad.

7 Conclusion

Our analysis provides the first systematic, data-driven assessment of the ARA's contribution to alleviating hunger in Soviet Russia during the 1921–22 famine. Using newly digitized Soviet and American statistics, we first demonstrate that aid was allocated on humanitarian grounds, driven by food scarcity rather than political considerations. Despite operating in

an environment marked by state suspicion, administrative weakness, pervasive insecurity, and profound logistical challenges, the ARA's intervention generated clear and measurable improvements in welfare. Prices of rye flour and other staples of the peasant diet fell within months of ARA feeding and caloric intake rose accordingly, with the larger effects observed among poorer peasants. Relief efforts also reduced the prevalence of relapsing fever. Beyond these short-run effects, we document a substantial demographic impact: relief raised the size of birth cohorts and saved over four million lives in the countryside. Together, these findings suggest that even in the harshest political and logistical environments, well-targeted and well-organized humanitarian assistance can save lives at scale.

How did this mission succeed under such adverse conditions? While we cannot offer a definitive explanation, one of its standout features was the degree of the ARA's control over the distribution of food. Relief efforts relied heavily on local participation. The ARA fed the population primarily through a network of open kitchens staffed by native personnel who moved between sites to monitor meal quality and quantity. Our finding that human capital conditioned the effectiveness of relief underscores the importance of local administrative and organizational capacity for large-scale humanitarian operations.

Moreover, because of the constraints of the Soviet transportation system, aid was delivered on a monthly basis – a strategy that fit logistical realities but also limited opportunities for Soviet interference, since the ARA could credibly threaten to suspend deliveries if obstructed.

An important question for future work is whether the ARA mission had lasting political and social effects on the Soviet population. Exposure to American relief may have shaped perceptions of the Soviet government and attitudes toward the United States. More broadly, our findings invite comparative analyses across famine contexts to better understand when aid succeeds under adverse conditions and how factors such as human capital, administrative capacity, and control over aid distribution shape its effectiveness.

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Table 1: ARA Feeding and Food Prices

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$							
					Additional Controls:			
	Only control for the share of crops killed by the 1921 drought × Month FE (1)	baseline (2)	Alt. Dep. Var.: Δ Log Price not adjusted for inflation in Month $t+1$ (3)	Alt. Expl. Var.: Δ ARA Fed / 1897 Population (4)	Soviet Feeding pc Jun 1920 × Month FE (5)	Other Foreign Feeding pc Jun 1920 × Month FE (6)	Livestock pc 1920 × Month FE (7)	Refugees pc × Month FE (8)
Δ ARA fed pc by the end of month t × Before Aug 1922	−0.944***	−0.939***	−0.938***	−0.694***	−0.939***	−0.937***	−0.951***	−0.905***
	(0.284)	(0.285)	(0.286)	(0.207)	(0.285)	(0.312)	(0.281)	(0.241)
Standardized coeff.	*-0.145*	*-0.213*	*-0.044*	*-0.214*	*-0.213*	*-0.213*	*-0.214*	*-0.156*
Δ ARA fed pc by the end of month t × After Aug 1922	−0.097	−0.202	−0.201	−0.158	−0.202	−0.158	−0.330	−0.081
	(0.180)	(0.175)	(0.175)	(0.121)	(0.175)	(0.200)	(0.307)	(0.532)
Standardized coeff.	*-0.005*	*-0.010*	*-0.003*	*-0.011*	*-0.010*	*-0.008*	*-0.017*	*-0.004*
Observations	2,777	2,155	1,720	2,155	2,155	2,155	2,028	2,058
Provinces	75	71	71	71	71	71	63	64
Months	71	48	40	48	48	48	48	48
R-squared	0.168	0.238	0.566	0.237	0.238	0.245	0.276	0.247
Avg. price before Aug 1922	*1.605*	*1.600*	*2,316,358*	*1.600*	*1.600*	*1.600*	*1.617*	*1.595*
Avg. price after Aug 1922	*0.634*	*0.633*	*369,700,000*	*0.633*	*0.633*	*0.633*	*0.631*	*0.635*
Avg. ARA feeding pc before Aug 1922	*0.018*	*0.027*	*0.027*	*0.036*	*0.027*	*0.027*	*0.027*	*0.020*
Avg. ARA feeding pc after Aug 1922	*0.004*	*0.005*	*0.008*	*0.006*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level. Column (1) includes months from January 1919 to December 1924; columns (2) and (4)-(8) include months from September 1920 to August 1924; column (3) includes months from September 1920 to December 1923 (until the introduction of stable gold-backed currency). In columns (1)-(2) and (4)-(8), the price of rye flour is measured in 1913 rubles per pood; in column (3), price of rye flour is measured in rubles per pood not adjusted for inflation. In columns (1)-(3) and (5)-(8), fed per capita is the number of people that received food assistance from ARA divided by the 1920 population; in column (4), fed per capita is the number of people that received food assistance from ARA divided by the 1897 population. All estimates control for the share of crops killed by the 1921 drought interacted with month fixed effects, and month fixed effects. Estimates in columns (2)-(8) also control for grain per capita, procurement per capita; and grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects. Column (5) also controls for Soviet feeding per capita in June 1920 interacted with month fixed effects. Column (6) also controls for other foreign feeding per capita in June 1920 interacted with month fixed effects. Column (7) also controls for 1920 livestock per capita interacted with month fixed effects. Column (8) also controls the the number of famine refugees per capita interacted with month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Robustness: ARA Feeding and Additional Prices

	Dependent Variable: Δ Log Price in Month $t+1$				
	Wheat (1)	Potatoes (2)	Oats (3)	Beef (4)	Cotton Cloth (5)
Δ ARA fed pc by the end of month t	-1.040^{***}	-1.473^{*}	-2.012^{***}	-0.278	0.256
× Before Aug 1922	(0.239)	(0.770)	(0.711)	(0.402)	(0.325)
Standardized coeff.	*-0.364*	*-0.231*	*-0.516*	*-0.061*	*0.108*
Δ ARA fed pc by the end of month t	0.197	0.872	0.073	0.008	-0.280^{**}
× After Aug 1922	(0.206)	(0.551)	(0.247)	(0.244)	(0.136)
Standardized coeff.	*0.013*	*0.025*	*0.004*	*0.0004*	*-0.019*
Observations	1,172	2,182	1,921	2,159	1,747
Provinces	73	78	76	78	78
Months	44	44	44	44	44
R-squared	0.343	0.318	0.274	0.281	0.418
Avg. price before Aug 1922	*1.677*	*0.446*	*0.798*	*0.074*	*0.156*
Avg. price after Aug 1922	*0.713*	*0.285*	*0.504*	*0.103*	*0.265*
Avg. ARA feeding pc before Aug 1922	*0.053*	*0.039*	*0.034*	*0.030*	*0.034*
Avg. ARA feeding pc after Aug 1922	*0.007*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level; the sample includes months from September 1920 to August 1924. Price of wheat, potatoes, and oats is measured in 1913 rubles per pood; price of beef is measured in 1913 rubles per funt; price of cotton cloth is measured in 1913 rubles per arshin. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: ARA Feeding and Rural Calories

	Dependent Variable: Δ Log Daily Calories per Adult Male in Month $t+1$				
	Rural Average (1)	Landless (2)	Small Farm (3)	Medium Farm (4)	Large Farm (5)
Δ Fed pc by the end of month t	1.167***	1.549***	1.167***	1.155***	0.672
× Before Aug 1922	(0.315)	(0.554)	(0.357)	(0.423)	(0.456)
Standardized coeff.	*0.324*	*0.387*	*0.286*	*0.300*	*0.183*
Δ Fed pc by the end of month t	0.315	0.303	0.281	0.485	0.496
× After Aug 1922	(0.210)	(0.272)	(0.281)	(0.414)	(0.370)
Standardized coeff.	*0.048*	*0.033*	*0.032*	*0.066*	*0.070*
Observations	454	418	452	451	445
Provinces	78	76	77	77	77
Months	9	9	9	9	9
R-squared	0.731	0.502	0.626	0.627	0.606
Avg. calories before Aug 1922	*2,986*	*2,489*	*2,822*	*3,039*	*3,194*
Avg. calories after Aug 1922	*3,951*	*3,494*	*3,818*	*3,969*	*4,183*
Avg. feeding pc before Aug 1922	*0.017*	*0.017*	*0.018*	*0.017*	*0.017*
Avg. feeding pc after Aug 1922	*0.005*	*0.005*	*0.005*	*0.004*	*0.004*

Notes: Observations are at the province and month level; the sample includes all months for which data on calories are available. Daily calories is the average number of calories consumed by an adult male as reported by direct nutritional surveys. Rural average includes all surveyed peasants in the province; landless, small farm, medium farm, and large farm include respectively landless peasants, peasants with small, medium, and large land holdings, as classified by nutritional surveys. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. Δ Calories refers to the change in calories from the previous to the current survey wave (e.g., the change from February 1922 to June 1922); Δ Fed pc refers to the corresponding change in feeding per capita (e.g., the change from January 1922 to May 1922). All estimates control for grain per capita, procurement per capita; the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: ARA Feeding and Infectious Diseases

	Dependent Variable: Infectious Diseases, Δ Cases per 1,000 in Month $t+1$				
		Louse-borne		Waterborne	Unclear Transmission
	All (1)	Typhus (2)	Relapsing Fever (3)	Typhoid Fever (4)	Uncategorized Typhus or Typhoid Fever (5)
Δ Fed pc by the end of month t	−1.877*	−1.226	−0.869***	0.033	0.192
× Before Aug 1922	(1.077)	(0.766)	(0.264)	(0.206)	(0.215)
Standardized coeff.	*-0.085*	*-0.102*	*-0.098*	*0.008*	*0.064*
Δ Fed pc by the end of month t	0.544	0.224	−0.027	0.195	0.138
× After Aug 1922	(0.633)	(0.232)	(0.426)	(0.157)	(0.167)
Standardized coeff.	*0.007*	*0.007*	*-0.001*	*0.020*	*0.014*
Observations	1,353	1,352	1,345	1,335	1,267
Provinces	63	63	61	61	59
Months	27	27	27	27	27
R-squared	0.372	0.417	0.297	0.187	0.172
Avg. cases per 1,000 before Aug 1922	*2.032*	*0.824*	*0.708*	*0.333*	*0.187*
Avg. cases per 1,000 after Aug 1922	*1.082*	*0.360*	*0.469*	*0.160*	*0.103*
Avg. feeding pc before Aug 1922	*0.019*	*0.019*	*0.019*	*0.019*	*0.020*
Avg. feeding pc after Aug 1922	*0.007*	*0.007*	*0.007*	*0.007*	*0.006*

Notes: Observations are at the province and month level. The sample includes months from September 1920 to December 1922. "All infectious diseases" is the number of cases of typhus, typhoid fever, relapsing fever, and uncategorized typhus or typhoid fever per 1,000 of the 1920 population. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: ARA Feeding and Birth Cohorts and Population

	Total (1)	Urban (2)	Rural (3)
	A. Dependent Variable: Δ Cohort Size per 1,000 in Year $t+1$		
Δ Fed pc in year t	0.577***	0.637*	0.635***
	(0.153)	(0.369)	(0.192)
Standardized coeff.	*0.062*	*0.057*	*0.075*
Observations	253	252	253
Provinces	69	68	69
Years	4	4	4
R-squared	0.793	0.737	0.781
Avg. cohort size per 1,000	*26.821*	*22.071*	*28.040*
Avg. feeding pc	*0.141*	*0.142*	*0.141*
	B. Dependent Variable: Log Population 1926		
Log Fed Aug 1921 – Aug 1922	0.009*	0.008	0.011**
	(0.005)	(0.020)	(0.005)
Standardized coeff.	*0.103*	*0.063*	*0.120*
Log Fed Sep 1922 – May 1923	−0.0001	−0.022	0.003
	(0.005)	(0.013)	(0.005)
Standardized coeff.	*-0.001*	*-0.150*	*0.026*
Observations	43	43	43
R-squared	0.995	0.960	0.997
Avg. Log Population 1926	*14.199*	*12.219*	*13.994*
Avg. Log Fed Aug 1921 – Aug 1922	*6.103*	*6.103*	*6.103*
Avg. Log Fed Sep 1922 – May 1923	*6.346*	*6.346*	*6.346*

Notes: In Panel A, observations are at the province and year level from 1920 to 1924. Cohort size is the number of people born each year according to the 1926 Population Census divided by the total 1926 population. Fed per capita is the number of people that received food assistance from ARA (aggregated from monthly data) divided by the 1920 population. The estimates control for grain per capita, procurement per capita; and share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with year fixed effects, and year fixed effects. Standard errors are clustered at the province level.

In Panel B, observations are at the province level. Fed Aug 1921 – Aug 1922 and Fed Sep 1922 – May 1923 are the total number of people that received food assistance from ARA, respectively from August 1921 till August 1922 and from September 1922 till May 1923 (aggregated from monthly data). The estimates control for log population 1920, log urban population 1920, grain per capita 1920–1923, procurement per capita 1919–1923, the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, urbanization 1920, and the natural population increase rate (natality minus mortality) in 1913. Robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

Table 6: ARA Feeding and Peasant Unrest

	Dependent Variable:			
	Δ Mentions of Unrest in Month $t+1$ (1)	Δ Mentions of Unrest in Months $t+1$, $t+2$, $t+3$ /3 (2)	Δ Indicator That Unrest was Mentioned in Month $t+1$ (3)	Δ Mentions of Unrest in Month $t+1$ per 100,000 (4)
Δ Fed pc by the end of month t × Before Aug 1922	3.565	1.238	0.333	0.102
	(4.274)	(0.896)	(0.465)	(0.286)
Standardized coeff.	*0.064*	*0.032*	*0.062*	*0.022*
Δ Fed pc by the end of month t × After Aug 1922	0.412	−0.314	0.108	−0.057
	(0.852)	(0.370)	(0.338)	(0.071)
Standardized coeff.	*0.009*	*-0.011*	*0.006*	*-0.009*
Observations	3,420	3,420	3,420	3,420
Provinces	79	79	79	79
Months	48	48	48	48
R-squared	0.147	0.155	0.127	0.157
Avg. unrest before Aug 1922	*1.789*	*1.694*	*0.348*	*0.144*
Avg. unrest after Aug 1922	*0.194*	*0.187*	*0.098*	*0.019*
Avg. feeding pc before Aug 1922	*0.022*	*0.022*	*0.022*	*0.022*
Avg. feeding pc after Aug 1922	*0.004*	*0.004*	*0.004*	*0.004*

Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1924. Mentions of unrest is the number of times peasant unrest was mentioned in reports to Soviet leadership. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

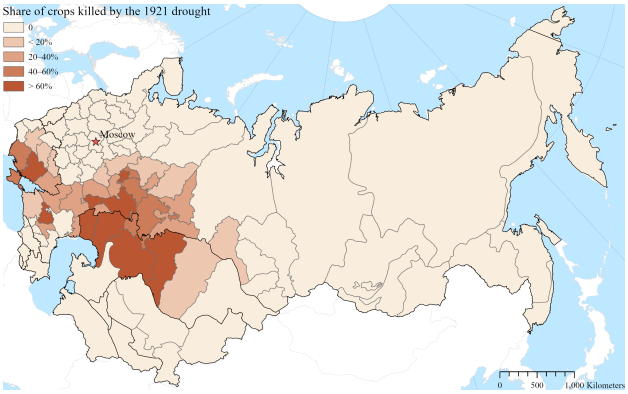
Table 7: Heterogeneous Effects on Food Prices by Province Characteristics

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Fed pc by the end of month t	−1.116***	−1.339***	−1.021***	−1.011***	−0.938***	−1.067**	−0.947
	(0.381)	(0.440)	(0.307)	(0.338)	(0.245)	(0.489)	(0.847)
Δ Fed pc by the end of month t	−0.149						
× Loyalty to Bolsheviks	(0.269)						
Δ Fed pc by the end of month t ×		16.658*					−7.955
Reports of peasant unrest		(9.355)					(36.198)
per 1,000 Jan 1920 – Aug 1921							
Δ Fed pc by the end of month t			−0.450				
× Militia pc 1920			(0.380)				
Δ Fed pc by the end of month t				−0.133			
× Transportation				(0.267)			
Δ Fed pc by the end of month t					−0.247		
× Ethnic fractionalization 1920					(0.967)		
Δ Fed pc by the end of month t						−1.285***	−1.248**
× Education and human capital						(0.424)	(0.521)
Observations	916	916	860	916	893	683	683
R-squared	0.243	0.244	0.270	0.243	0.243	0.336	0.336

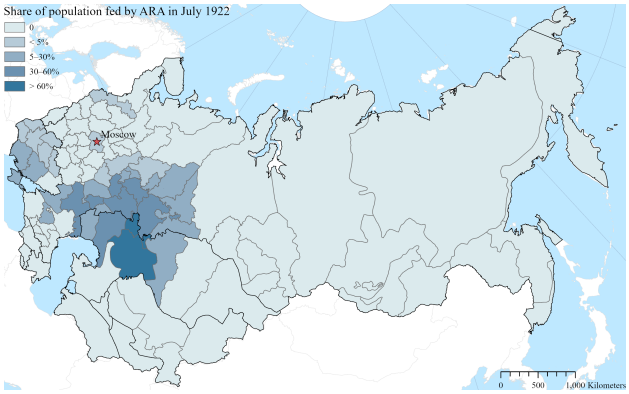
Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1922. Price of rye flour is measured in 1913 rubles per pood. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. Loyalty to Bolsheviks is the first principal component of 1917 Bolshevik vote share, 1 − 1917 nationalist vote share, Communist Party members per capita in 1922, and candidates to become Communist Party members per capita in 1922. Transportation is the first principal component of railroad density (length per area), 1910 rail station density (number per area), 1910 waterway density (length per area), and 1910 water dock density (number per area). Human capital is the first principal component of the 1920 share of the literate population, the 1897 share of the literate population, the 1922 number of university students per capita, and the 1922 number of universities per capita. Reports of peasant unrest per 1,000, militia per capita 1920, and ethnic fractionalization 1920 are normalized to have zero mean. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Maps

(a) 1921 Drought

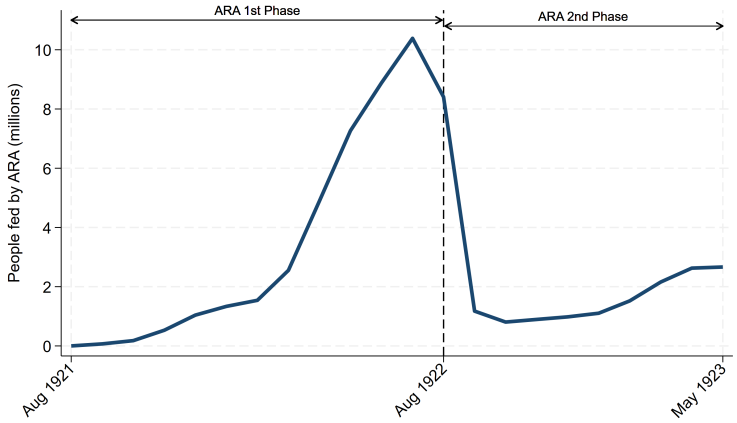


(b) ARA Feeding in July 1922



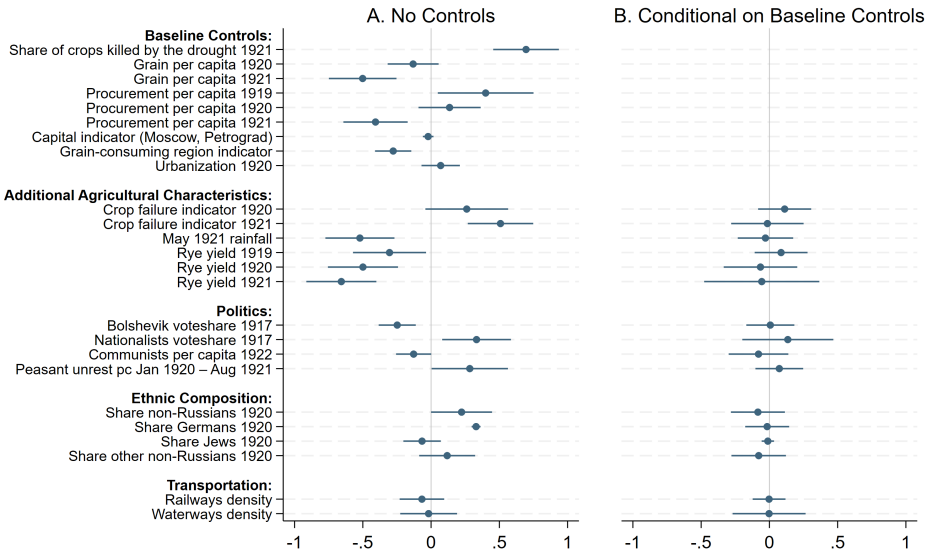
Notes: Feeding by the end of the month. *Source:* see the Data Appendix.

Figure 2: ARA Feeding



Notes: Number of people receiving food assistance from ARA by the end of the month. *Source:* see the Data Appendix.

Figure 3: Correlates of ARA Feeding

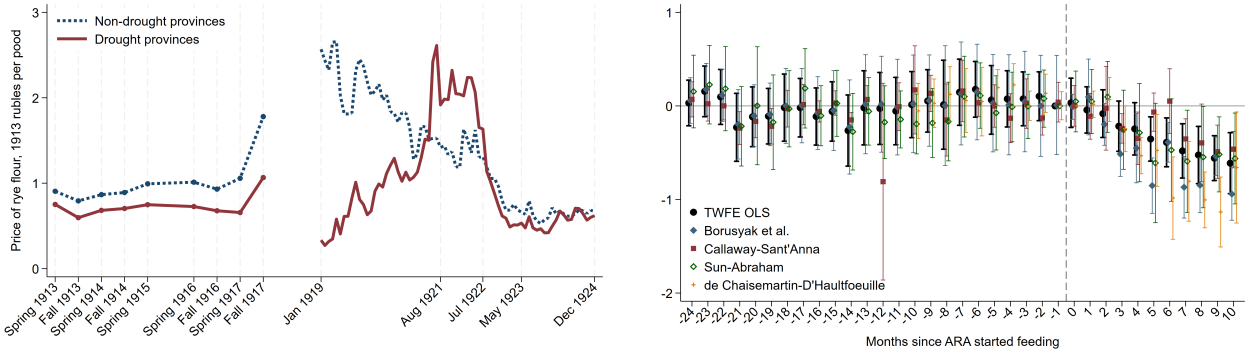


Notes: Each row shows a standardized coefficient from regressing ARA feeding per capita from August 1921 to May 1923 on the province characteristic. Each row represents a separate regression. The bars represent 95 percent confidence intervals. Robust standard errors. Panel A: no controls; Panel B: control for the baseline characteristics (share of crops killed by the 1921 drought, grain per capita 1920 and 1921, procurement per capita in 1919, 1920, and 1921, capital indicator, grain-consuming region indicator, and urbanization 1920). All coefficients are shown in Appendix Table A.1.

Figure 4: Food Prices

(a) Average Food Prices

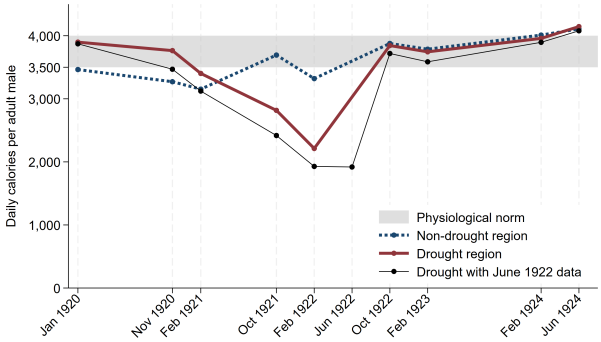
(b) ARA Feeding and Food Prices: Event Studies



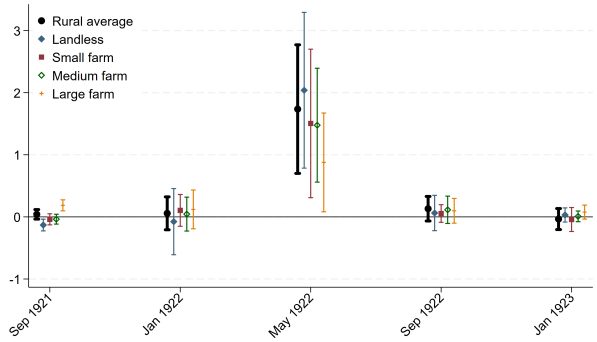
Notes: Figure (a) shows the average price of rye flour in drought and non-drought provinces. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. Price of rye flour in 1913 rubles per pood. Figure (b) overlays the event-study plots constructed using five different estimators: the dynamic TWFE version of equation (1), estimated using OLS, Borusyak et al. (2024), Callaway and Sant'Anna (2021), Sun and Abraham (2021), and de Chaisemartin and D'Haultfœuille (2020). The outcome variable is log price of rye flour in month $t+1$ measured in 1913 rubles per pood. The treatment variable is a binary indicator that ARA is providing food assistance in month t. All estimates control for the share of crops killed by the 1921 drought interacted with month fixed effects, province and month fixed effects. The figure displays only ten postperiods because from September 1921 to August 1922 only ten postperiods could be estimated. For the de Chaisemartin and D'Haultfœuille (2020) estimator we estimate only ten pre-periods because the estimator does not allow the number of pre-periods to exceed the number of post-periods. The bars represent 95 percent confidence intervals. Standard errors are clustered at the province level. Appendix Table A.4 Panel A shows the post-treatment average coefficients; Panel B shows all event-study coefficients.

Figure 5: Rural Calories

(a) Average Rural Calories



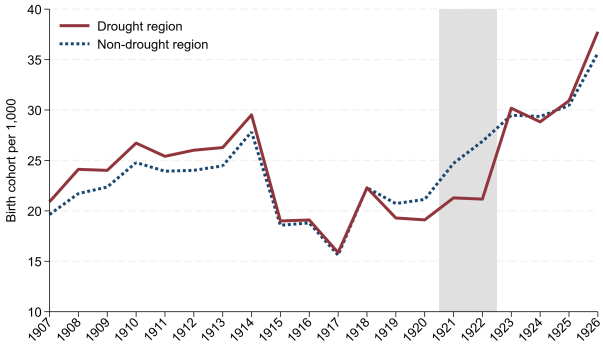
(b) ARA Feeding and Rural Calories



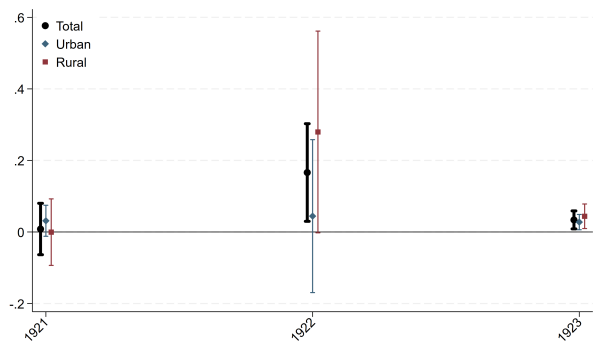
Notes: Figure (a) shows the average calories consumed by an adult male peasant in drought and non-drought provinces, as reported by direct nutrition surveys. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. The physiological norm is suggested by direct nutrition surveys (Lositskiy, 1928). Figure (b) overlays the standardized coefficients from regressing changes in log rural calories in month $t+1$ on changes in feeding per capita by the end of month t interacted with month fixed effects. It shows coefficients for five different outcomes: changes in the overall rural average calories, the calories consumed by landless peasants, and calories consumed by peasants with small, medium, and large land holdings. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. The bars represent 95 percent confidence intervals. Standard errors are clustered at the province level. Appendix Table A.9 shows the coefficients with their standard errors.

Figure 6: Birth Cohorts

(a) Average Birth Cohorts



(b) ARA Feeding and Birth Cohorts



Notes: Figure (a) shows the average birth cohorts in drought and non-drought provinces. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. For each year, cohort size is the number of people born that year divided by the total population, as reported by the 1926 Population Census. Figure (b) overlays the standardized coefficients from regressing the change in cohort size in year $t+1$ on the change in feeding per capita in year t interacted with year fixed effects. It shows coefficients for three different outcomes: total, urban, and rural cohort sizes. All estimates control for grain per capita, procurement per capita; and share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with year fixed effects, and year fixed effects. The bars represent 95 percent confidence intervals. Standard errors are clustered at the province level. Appendix Table A.10 shows the coefficients with their standard errors.

Online Appendix

A Standard Errors

Appendix Table A.2 presents spatially correlated standard errors for the ARA feeding coefficients from Table 1. Colella et al. (2019) note that spatial correlation cutoffs that are too small or too large may produce standard errors that are too small, and recommend selecting the cutoff that generates the largest standard errors. The median province length in our sample is 396 kilometers; we allow the spatial correlation cutoff to vary from 400 to 3,000 kilometers. All spatially correlated standard errors are heteroskedasticity-robust and corrected for autocorrelation within 70 months (the length of our sample). Across all spatial correlation cutoffs, the spatially corrected standard errors are smaller than those clustered at the province level, with one exception in Column (8) – but even there, estimates remain statistically significant at the 1% level. We therefore report province-clustered standard errors in our main specifications, as this represents the most conservative choice.

B Robustness to Weather and Additional Agricultural Controls

Appendix Table A.5 presents robustness checks for additional agricultural controls. For comparison, column (1) repeats the baseline. Column (2), in addition to the baseline controls, controls for crop failure indicators in 1920 and 1921, as reported by the Soviet statisticians, interacted with month fixed effects. Column (3), instead of using the 1921 drought information reported by the Soviet statisticians, uses a drought indicator estimated from Matsuura and Willmott (2014), interacted with month fixed effects; the drought indicator equals one if May 1921 rainfall is more than one standard deviation below the 1910-1950 average. Column (4) controls for the May 1921 rainfall from Matsuura and Willmott (2014) interacted with month fixed effects. Column (5), instead of controlling for grain per capita, which is only available since 1920, controls for rye yield (harvest per unit of sown area), which is available since 1919. Weather (frost, heat, snow) could have a direct impact on famine severity and therefore on food prices; column (6) controls for monthly temperature and precipitation. Kazan was the epicenter of the drought; column (7) controls for the distance to Kazan interacted with month fixed effects. Finally, column (8) controls for latitude, longitude, and latitude $\times$ longitude, all interacted with month fixed effects. The baseline estimate of ARA feeding per capita interacted with the pre-August 1922 indicator is robust to these controls.

C Robustness to Political Controls

Appendix Table A.6 presents robustness checks for political controls. For comparison, column (1) repeats the baseline estimates. Column (2), in addition to the baseline controls, controls for the Bolshevik vote share in the 1917 Constituent Assembly elections interacted with month fixed effects. Column (3) controls for the 1917 nationalist vote share interacted with month fixed effects (there were many small nationalist parties representing non-Russian minorities; we add them up to a single nationalist vote share). Column (4) controls for the imputed 1917 election turnout. Column (5) controls for the 1922 Communist Party members per capita interacted with month fixed effects. Column (6) controls for the 1922 candidates to

become Communist Party members per capita interacted with month fixed effects. Column (7) controls for the 1922 Communist Party members and candidates interacted with month fixed effects. Column (8) controls for the number of reports of peasant unrest from January 1920 to August 1921 interacted with month fixed effects, and Column (9) controls for the number of reports of peasant unrest per 1,000 population in 1920 interacted with month fixed effects. The estimate of the ARA feeding interacted with the pre-August 1922 indicator is robust to these additional controls.

D Robustness to Ethnic Composition

Appendix Table A.7 presents robustness checks for ethnic composition. For comparison, column (1) repeats the baseline estimates. All additional controls in this table are time-invariant, so we add these controls interacted with month fixed effects. Column (2) controls for the share of non-Russians according to the 1920 Population Census. Column (3) controls for the 1920 share of ethnic Germans. Column (4) controls for the 1920 share of Jews. Column (5) controls for the 1920 share of other non-Russians (that is, non-Russians who are neither German nor Jewish). Columns (6) to (9) repeat the estimates using the data from the 1897 Population Census instead of the 1920 Population Census; importantly, the 1897 Census did not report ethnic composition – only mother tongue – we assign ethnic composition based on the mother tongue. Our baseline estimate of the ARA feeding per capita interacted with the pre-August 1922 indicator is robust to these additional controls.

E Robustness to Transportation Infrastructure

Appendix Table A.8 presents robustness checks for the transportation infrastructure. All additional controls in this table are time-invariant, so we add them interacted with month fixed effects. For comparison, column (1) repeats the baseline. Column (2) controls for the railroad density (railroad length divided by province area). Column (3) controls for rail station density (the number of towns with a rail station in 1910 divided by the province area). Column (4) controls for the density of waterways (rivers and canals). Column (5) controls for water dock density (the number of towns that had a water dock in 1910 divided by the province area). Our baseline estimate of ARA feeding per capita interacted with the pre-August 1922 indicator is robust to these additional controls.

F Robustness to Dropping Individual Months or Provinces

To investigate whether our results are driven by feeding in one particular month or province, we re-estimate the baseline specification from Table 1 Column (2) on samples that sequentially omit either one month between August 1921 and May 1923 or one province. Appendix Figures A.4a and A.4b plot the baseline estimates with their 95% confidence intervals alongside the estimates obtained from each restricted sample. The results remain stable, providing no evidence that our findings are driven by feeding in any particular month or province.

G Random Permutation Tests

To assess whether our findings could plausibly arise by chance, we conduct random permutation tests. First, we randomly permute the full trajectory of per capita feeding from August 1921 to May 1923 across provinces and re-estimate the relationship between food prices and this permuted ARA feeding. We repeat this procedure 10,000 times and plot the resulting distribution of coefficients in Appendix Figure A.5a. The probability of obtaining a coefficient equal to or smaller than our baseline estimate is 0.005. Second, we permute the full trajectory of food prices from January 1919 to December 1924 across provinces and re-estimate the relationship between the permuted food prices and ARA feeding, again with 10,000 repetitions. Appendix Figure A.5b plots the resulting distribution of coefficients. The probability of obtaining a coefficient equal to or smaller than our baseline estimate is 0.025. We conclude that our results are unlikely to be driven by chance.

Table A.1: Summary Statistics and Correlates of ARA Feeding

Province Characteristics	A. Summary				B. Regress total ARA feeding per capita on each province characteristic					C. Regress total ARA feeding per capita on each province characteristic controlling for the baseline characteristics				
	Min	Mean	Sd	Max	Coef.	Std. Err.	Std. coef.	Obs.	R^2	Coef.	Std. Err.	Std. coef.	Obs.	R^2
Baseline														
(1) Share of crops killed by the drought 1921	0.000	0.167	0.253	0.870	2.900***	(0.511)	0.696	82	0.484					
(2) Grain per capita 1920, poods	2.800	13.448	7.942	49.585	−0.020	(0.014)	−0.132	59	0.017					
(3) Grain per capita 1921, poods	0.394	12.911	7.670	41.575	−0.072***	(0.018)	−0.501	72	0.251					
(4) Procurement per capita 1919, poods	0.000	1.627	2.815	15.059	0.151**	(0.068)	0.400	80	0.160					
(5) Procurement per capita 1920, poods	0.000	2.491	3.228	14.835	0.045	(0.038)	0.136	80	0.018					
(6) Procurement per capita 1921, poods	0.000	1.672	1.756	9.639	−0.246***	(0.073)	−0.407	80	0.166					
(7) Capital indicator (Moscow, Petrograd)	0.000	0.024	0.155	1.000	−0.146	(0.135)	−0.022	82	0.000					
(8) Grain-consuming region indicator	0.000	0.280	0.452	1.000	−0.646***	(0.158)	−0.278	82	0.077					
(9) Urbanization 1920	0.000	0.135	0.100	0.517	0.737	(0.751)	0.070	82	0.005					
Additional Agricultural Characteristics														
(10) Crop failure indicator 1920	0.000	0.146	0.356	1.000	0.774*	(0.458)	0.261	82	0.068	0.331	(0.293)	0.112	58	0.692
(11) Crop failure indicator 1921	0.000	0.341	0.477	1.000	1.122***	(0.270)	0.508	82	0.259	−0.037	(0.341)	−0.015	58	0.684
(12) Drought indicator from May 1921 rainfall	0.000	0.415	0.496	1.000	1.019***	(0.245)	0.480	82	0.230	−0.208	(0.299)	−0.086	58	0.686
(13) May 1921 rainfall, mm	0.021	29.664	20.847	104.206	−0.027***	(0.007)	−0.521	80	0.272	−0.002	(0.006)	−0.029	58	0.684
(14) Rye yield 1919, poods per desyatina	18.300	40.860	14.230	98.100	−0.024**	(0.011)	−0.304	64	0.093	0.010	(0.011)	0.086	55	0.688
(15) Rye yield 1920, poods per desyatina	3.600	33.105	15.806	68.600	−0.035***	(0.009)	−0.499	64	0.249	−0.005	(0.010)	−0.065	54	0.683
(16) Rye yield 1921, poods per desyatina	0.900	35.584	19.893	79.900	−0.037***	(0.007)	−0.657	65	0.432	−0.003	(0.013)	−0.056	52	0.732
Politics														
(17) Bolshevik voteshare 1917	0.000	0.202	0.170	0.619	−1.600***	(0.447)	−0.248	74	0.062	0.047	(0.617)	0.007	55	0.682
(18) Nationalists voteshare 1917	0.000	0.252	0.312	0.960	1.168**	(0.451)	0.333	74	0.111	0.654	(0.824)	0.135	55	0.688
(19) Election turnout 1917	0.299	0.580	0.102	0.800	−1.484	(1.382)	−0.138	73	0.019	−1.896	(1.238)	−0.149	54	0.709
(20) Communist Party members per 1,000 1922	0.138	3.343	3.572	27.806	−0.035*	(0.018)	−0.119	81	0.014	−0.050	(0.070)	−0.103	58	0.686
(21) Candidates to become Communist Party member per 1,000 1922	0.058	0.862	0.665	3.088	−0.205*	(0.103)	−0.129	81	0.017	−0.041	(0.120)	−0.022	58	0.684
(22) Communists (members and candidates) per 1,000 1922	0.196	4.205	4.003	30.700	−0.034*	(0.017)	−0.128	81	0.016	−0.033	(0.047)	−0.080	58	0.685
(23) Peasant unrest Jan 1918 – Aug 1921	0.000	57.232	59.405	290.000	0.002	(0.002)	0.131	82	0.017	0.001	(0.002)	0.047	58	0.686
(24) Peasant unrest per 1,000 Jan18 – Aug 1921	0.000	0.038	0.032	0.174	4.704	(3.690)	0.145	82	0.021	2.951	(2.510)	0.078	58	0.689
(25) Peasant unrest Jan 1920 – Aug 1921	0.000	38.427	46.499	235.000	0.004	(0.003)	0.176	82	0.031	0.001	(0.002)	0.034	58	0.685
(26) Peasant unrest per 1,000 Jan 1920 – Aug 1921	0.000	0.025	0.024	0.096	12.476*	(6.274)	0.284	82	0.080	3.672	(4.509)	0.073	58	0.687
Ethnic Composition														
(27) Share non-Russians 1920	0.003	0.338	0.324	0.982	0.771*	(0.393)	0.223	70	0.050	−0.376	(0.451)	−0.084	57	0.686
(28) Share Germans 1920	0.000	0.020	0.117	0.977	3.164***	(0.160)	0.330	70	0.109	−0.153	(0.774)	−0.016	57	0.683

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Table A.1 – *Continued from the previous page*

Province Characteristics	A. Summary				B. Regress total ARA feeding per capita on each province characteristic					C. Regress total ARA feeding per capita on each province characteristic controlling for the baseline characteristics				
	Min	Mean	Sd	Max	Coef.	Std. Err.	Std. coef.	Obs.	R^2	Coef.	Std. Err.	Std. coef.	Obs.	R^2
(29) Share Jews 1920	0.000	0.013	0.026	0.133	−2.797	(2.964)	−0.066	70	0.004	−0.972	(1.946)	−0.012	57	0.683
(30) Share other non-Russians 1920	0.002	0.305	0.303	0.975	0.435	(0.386)	0.118	70	0.014	−0.380	(0.493)	−0.078	57	0.686
(31) Ethnic fractionalization 1920	0.007	0.304	0.220	0.765	1.389***	(0.517)	0.273	70	0.075	0.205	(0.437)	0.037	57	0.684
(32) Share non-Russians 1897	0.002	0.414	0.338	0.970	0.261	(0.245)	0.084	82	0.007	−0.279	(0.344)	−0.068	58	0.686
(33) Share Germans 1897	0.000	0.011	0.041	0.356	8.940***	(0.757)	0.351	82	0.123	−0.558	(2.382)	−0.022	58	0.684
(34) Share Jews 1897	0.000	0.016	0.036	0.160	−3.501**	(1.635)	−0.119	82	0.014	0.495	(1.565)	0.012	58	0.684
(35) Share other non-Russians 1897	0.001	0.387	0.319	0.944	0.187	(0.278)	0.057	82	0.003	−0.321	(0.390)	−0.074	58	0.686
(36) Ethnic fractionalization 1897	0.003	0.353	0.226	0.870	1.457***	(0.463)	0.313	82	0.098	0.119	(0.537)	0.022	58	0.684
Transportation														
(37) Railroad density, length (km)/area (1,000s km^2)	0.000	8.871	7.594	29.197	−0.009	(0.012)	−0.067	82	0.004	−0.0004	(0.010)	−0.002	58	0.684
(38) Rail stations density 1910, # stations/area (1,000s km^2)	0.000	0.077	0.084	0.381	−1.953**	(0.905)	−0.155	82	0.024	0.078	(0.976)	0.005	58	0.684
(39) Waterways density, length (km)/area (1,000s km^2)	0.000	8.398	7.043	24.993	−0.003	(0.016)	−0.018	82	0.0003	−0.0004	(0.023)	−0.002	58	0.684
(40) Waterway docks density 1910, # docks/area (1,000s km^2)	0.000	0.087	0.095	0.362	−1.271	(0.776)	−0.115	82	0.013	−1.059	(1.295)	−0.077	58	0.688

Notes: Observations are at the province level. Panel A: each row presents a summary of the province characteristic. Panel B: each row shows a regression of ARA feeding per capita from August 1921 to May 1923 on the province characteristic without controls. Panel C: each row shows a regression of ARA feeding per capita from August 1921 to May 1923 on the province characteristic controlling for the baseline characteristics (share of crops killed by the 1921 drought, grain per capita 1920, 1921, procurement per capita 1919, 1920, 1921, capital indicator, grain-consuming region indicator, urbanization 1920). Robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Spatially Correlated Standard Errors of the Main Estimates from Table 1

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$							
					Additional Controls:			
	Only control for the share of crops killed by the 1921 drought × Month FE	baseline	Alt. Dep. Var.: Δ Log Price not adjusted for inflation in Month $t+1$	Alt. Expl. Var.: Δ ARA Fed / 1897 Population	Soviet Feeding pc Jun 1920 × Month FE	Other Foreign Feeding pc Jun 1920 × Month FE	Livestock pc 1920 × Month FE	Refugees pc × Month FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ ARA fed pc by the end of month t × Before Aug 1922 coeff.	−0.944	−0.939	−0.938	−0.694	−0.939	−0.937	−0.951	−0.905
Standard errors:								
Clustered at the province level (baseline)	(0.284)***	(0.285)***	(0.286)***	(0.207)***	(0.285)***	(0.312)***	(0.281)***	(0.241)***
Adjusted for spatial correlation within:								
400 km	(0.283)***	(0.266)***	(0.266)***	(0.193)***	(0.266)***	(0.278)***	(0.260)***	(0.218)***
600 km	(0.271)***	(0.245)***	(0.244)***	(0.177)***	(0.245)***	(0.260)***	(0.243)***	(0.221)***
800 km	(0.269)***	(0.237)***	(0.236)***	(0.170)***	(0.237)***	(0.250)***	(0.232)***	(0.233)***
1,000 km	(0.274)***	(0.237)***	(0.237)***	(0.171)***	(0.237)***	(0.250)***	(0.225)***	(0.232)***
1,200 km	(0.282)***	(0.247)***	(0.246)***	(0.182)***	(0.247)***	(0.261)***	(0.236)***	(0.241)***
1,400 km	(0.285)***	(0.250)***	(0.249)***	(0.187)***	(0.250)***	(0.265)***	(0.244)***	(0.250)***
1,600 km	(0.286)***	(0.250)***	(0.249)***	(0.188)***	(0.250)***	(0.267)***	(0.250)***	(0.261)***
1,800 km	(0.285)***	(0.249)***	(0.248)***	(0.187)***	(0.249)***	(0.267)***	(0.252)***	(0.269)***
2,000 km	(0.282)***	(0.245)***	(0.244)***	(0.184)***	(0.245)***	(0.264)***	(0.254)***	(0.273)***
2,200 km	(0.279)***	(0.242)***	(0.241)***	(0.181)***	(0.242)***	(0.262)***	(0.254)***	(0.276)***
2,400 km	(0.276)***	(0.238)***	(0.237)***	(0.179)***	(0.238)***	(0.259)***	(0.255)***	(0.278)***
2,600 km	(0.274)***	(0.235)***	(0.234)***	(0.176)***	(0.235)***	(0.256)***	(0.254)***	(0.280)***
2,800 km	(0.271)***	(0.233)***	(0.231)***	(0.174)***	(0.233)***	(0.253)***	(0.254)***	(0.282)***
3,000 km	(0.269)***	(0.230)***	(0.229)***	(0.172)***	(0.230)***	(0.251)***	(0.253)***	(0.283)***
Observations	2,777	2,155	1,720	2,155	2,155	2,155	2,028	2,058
R-squared	0.168	0.238	0.566	0.237	0.238	0.245	0.276	0.247

Notes: The table reproduces estimates from Table 1 with different versions of standard errors. Baseline standard errors are clustered at the province level. All spatially-adjusted standard errors are heteroskedasticity-robust and autocorrelation-corrected for temporal correlation over a 70-month window (the length of the sample). See Colella et al. (2019) for details. *** p<0.01, ** p<0.05, * p<0.1

Table A.3: Selection Into Feeding

	Dependent Variable: Δ ARA Fed pc by the End of Month $t+1$		
Sample:	Full: Sep 1921 – Apr 1923	Phase 1: Sep 1921 – Jul 1922	Phase 2: Aug 1922 – Apr 1923
	(1)	(2)	(3)
Δ Log price of rye flour in month t	0.002	−0.002	0.017
	(0.004)	(0.004)	(0.012)
Standardized coeff.	*0.013*	*-0.016*	*0.070*
Observations	915	516	399
Provinces	68	63	67
Months	20	11	9
R-squared	0.535	0.403	0.599

Notes: Observations are at the province and month level; the sample includes months from September 1921 to April 1923 (months when ARA operated in Soviet Russia). Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. Price of rye flour is measured in 1913 rubles per pood. All estimates control for grain per capita, procurement per capita; the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Event Study Coefficients

	Dependent Variable: Log Price of Rye Flour in Month $t+1$				
Method:	TWFE OLS	BJS	CS	SA	deChDH
	(1)	(2)	(3)	(4)	(5)
	A. Post-Treatment Average				
ARA feeding indicator	-0.197^{*}	-0.382^{***}	-0.207^{***}	-0.332^{*}	-0.427^{***}
	(0.099)	(0.095)	(0.050)	(0.191)	(0.095)
	B. All Event-Time Coefficients				
Pre-24	0.032	0.057	0.070	0.154	
	(0.124)	(0.124)	(0.096)	(0.198)	
Pre-23	0.155	0.177	0.022	0.227	
	(0.138)	(0.142)	(0.094)	(0.214)	
Pre-22	0.096	0.114	0.0003	0.184	
	(0.150)	(0.143)	(0.077)	(0.230)	
Pre-21	−0.229	−0.197	-0.237^{***}	−0.218	
	(0.185)	(0.189)	(0.090)	(0.217)	
Pre-20	−0.116	−0.106	-0.165^{*}	0.002	
	(0.163)	(0.169)	(0.089)	(0.322)	
Pre-19	−0.110	−0.091	-0.217^{**}	−0.174	
	(0.151)	(0.171)	(0.097)	(0.258)	
Pre-18	−0.018	−0.0001	−0.029	−0.031	
	(0.183)	(0.204)	(0.100)	(0.208)	
Pre-17	−0.019	0.003	0.014	0.188	
	(0.159)	(0.203)	(0.110)	(0.216)	
Pre-16	−0.113	−0.076	−0.059	−0.105	
	(0.156)	(0.198)	(0.058)	(0.164)	
Pre-15	−0.059	−0.049	0.031	0.028	
	(0.162)	(0.217)	(0.067)	(0.180)	
Pre-14	−0.263	−0.225	-0.150^{***}	−0.276	
	(0.194)	(0.257)	(0.041)	(0.209)	
Pre-13	−0.020	0.018	0.069	−0.058	
	(0.202)	(0.270)	(0.076)	(0.184)	
Pre-12	−0.027	0.018	−0.809	−0.174	
	(0.196)	(0.262)	(0.536)	(0.198)	
Pre-11	−0.055	−0.013	−0.009	−0.144	
	(0.184)	(0.261)	(0.130)	(0.155)	
Pre-10	0.014	0.022	0.171	−0.193	−0.053
	(0.180)	(0.266)	(0.240)	(0.163)	(0.151)
Pre-9	0.054	0.057	0.134	−0.182	0.028
	(0.170)	(0.249)	(0.099)	(0.188)	(0.133)
Pre-8	0.013	0.003	−0.150	−0.167	0.125
	(0.243)	(0.326)	(0.197)	(0.215)	(0.150)
Pre-7	0.146	0.133	0.159	0.099	0.058
	(0.180)	(0.281)	(0.167)	(0.220)	(0.175)
Pre-6	0.177	0.148	0.035	0.110	0.046
	(0.152)	(0.261)	(0.075)	(0.178)	(0.187)
Pre-5	0.064	0.029	−0.001	−0.075	0.196^{**}

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Table A.4 – *Continued from the previous page*

	Dependent Variable: Log Price of Rye Flour in Month $t+1$				
Method:	TWFE OLS	BJS	CS	SA	deChDH
	(1)	(2)	(3)	(4)	(5)
	(0.187)	(0.265)	(0.116)	(0.202)	(0.098)
Pre-4	0.075	0.012	−0.131	−0.011	0.225*
	(0.153)	(0.273)	(0.134)	(0.190)	(0.115)
Pre-3	0.076	0.047	0.025	−0.006	0.001
	(0.147)	(0.274)	(0.135)	(0.175)	(0.080)
Pre-2	0.103	0.001	−0.128	0.078	0.135
	(0.133)	(0.276)	(0.093)	(0.156)	(0.104)
Pre-1		0.010	0.040	0.002	
		(0.270)	(0.108)	(0.077)	
Post-0	0.033	−0.009	0.0004	0.047	
	(0.134)	(0.068)	(0.111)	(0.166)	
Post-1	−0.043	0.096	−0.111	0.047	0.018
	(0.126)	(0.207)	(0.125)	(0.174)	(0.072)
Post-2	−0.082	−0.197*	−0.025	0.096	0.069
	(0.130)	(0.114)	(0.228)	(0.193)	(0.120)
Post-3	−0.217	−0.514***	−0.240***	−0.255	−0.243*
	(0.137)	(0.122)	(0.080)	(0.216)	(0.125)
Post-4	−0.245*	−0.451**	−0.346**	−0.286	−0.532***
	(0.143)	(0.189)	(0.143)	(0.268)	(0.098)
Post-5	−0.354***	−0.852***	−0.066	−0.610*	−0.476**
	(0.121)	(0.151)	(0.104)	(0.325)	(0.196)
Post-6	−0.389***	−0.389***	0.051	−0.472*	−0.985***
	(0.133)	(0.108)	(0.177)	(0.280)	(0.225)
Post-7	−0.481***	−0.869***	−0.353***	−0.592**	−0.806***
	(0.148)	(0.168)	(0.110)	(0.279)	(0.217)
Post-8	−0.525***	−0.848***	−0.395*	−0.547**	−1.005***
	(0.156)	(0.150)	(0.212)	(0.276)	(0.152)
Post-9	−0.558***	−0.539***	−0.490***	−0.518**	−1.134***
	(0.122)	(0.105)	(0.145)	(0.205)	(0.191)
Post-10	−0.612***	−0.942***	−0.463***	−0.562**	−0.658**
	(0.166)	(0.143)	(0.097)	(0.248)	(0.303)
Observations	1,561	1,555	1,488	1,561	1,561

Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1922. Price of rye flour is measured in 1913 rubles per pood. ARA feeding indicator is equal to one if the number of people that received food assistance from ARA by the end of month t is greater than zero, and zero otherwize. All estimates control for the share of crops killed by the 1921 drought interacted with month fixed effects, province and month fixed effects. Column (1) shows the estimates from TWFE model estimated using OLS, column (2) shows coefficients estimated using Borusyak et al. (2024), column (3) – Callaway and Sant'Anna (2021), column (4) – Sun and Abraham (2021), and column (5) – de Chaisemartin and D'Haultfœuille (2020). Panel A shows the post-treatment average coefficients; Panel B shows all event-study coefficients. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.5: ARA Feeding and Food Prices: Robustness to Additional Agricultural Controls

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$							
	baseline (1)	Crop failure indicators 1920, 1921 × Month FE (2)	1921 Drought indicator from weather data × Month FE (3)	May 1921 Precip. × Month FE (4)	Rye yield instead of grain pc (available since 1919) (5)	Temp. and Precip. (6)	Log Distance to Kazan × Month FE (7)	Lat, Lon, Lat × Lon × Month FE (8)
Δ Fed pc by the end of month t × Before Aug 1922	−0.939***	−1.000***	−0.931***	−0.974***	−0.792**	−0.940***	−1.100***	−0.981***
	(0.285)	(0.324)	(0.281)	(0.287)	(0.319)	(0.294)	(0.275)	(0.292)
Standardized coeff.	*-0.213*	*-0.227*	*-0.211*	*-0.221*	*-0.132*	*-0.213*	*-0.250*	*-0.223*
Δ Fed pc by the end of month t × After Aug 1922	−0.202	−0.167	−0.173	−0.173	−0.199	−0.234	−0.301*	−0.300*
	(0.175)	(0.205)	(0.180)	(0.192)	(0.184)	(0.171)	(0.166)	(0.167)
Standardized coeff.	*-0.010*	*-0.008*	*-0.009*	*-0.009*	*-0.010*	*-0.012*	*-0.015*	*-0.015*
Observations	2,155	2,155	2,155	2,155	2,455	2,155	2,155	2,155
Provinces	71	71	71	71	71	71	71	71
Months	48	48	48	48	60	48	48	48
R-squared	0.238	0.309	0.276	0.289	0.243	0.240	0.252	0.305
Avg. price before Aug 1922	*1.600*	*1.600*	*1.600*	*1.600*	*1.605*	*1.600*	*1.600*	*1.600*
Avg. price after Aug 1922	*0.633*	*0.633*	*0.633*	*0.633*	*0.630*	*0.633*	*0.633*	*0.633*
Avg. feeding pc before Aug 1922	*0.027*	*0.027*	*0.027*	*0.027*	*0.019*	*0.027*	*0.027*	*0.027*
Avg. feeding pc after Aug 1922	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level. Columns (1)-(4) and (6)-(8) include months from September 1920 to August 1924; column (5) includes months from September 1919 to August 1924. Price of rye flour is measured in 1913 rubles per pood. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Additional controls are listed in column headers. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.6: ARA Feeding and Food Prices: Robustness to Political Controls

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$								
	baseline (1)	1917 Bolsheviks Voteshare × Month FE (2)	1917 Nationalists Voteshare × Month FE (3)	1917 Elections Turnout × Month FE (4)	1922 Communist Party Members pc × Month FE (5)	1922 Communist Party Candidates pc × Month FE (6)	1922 Communist Party Members + Candidates pc × Month FE (7)	Peasant Unrest Jan 1920 – Aug 1921 × Month FE (8)	Peasant Unrest per 1,000 Jan 1920 – Aug 1921 × Month FE (9)
Δ Fed pc by the end of month t × Before Aug 1922	−0.939***	−0.940***	−0.889***	−0.991***	−0.878***	−0.923***	−0.886***	−1.044***	−1.012***
	(0.285)	(0.296)	(0.283)	(0.283)	(0.299)	(0.307)	(0.301)	(0.295)	(0.284)
Standardized coeff.	*-0.213*	*-0.213*	*-0.202*	*-0.225*	*-0.199*	*-0.209*	*-0.201*	*-0.237*	*-0.230*
Δ Fed pc by the end of month t × After Aug 1922	−0.202	−0.177	−0.197	−0.181	−0.189	−0.181	−0.187	−0.124	−0.152
	(0.175)	(0.187)	(0.176)	(0.199)	(0.182)	(0.188)	(0.184)	(0.198)	(0.199)
Standardized coeff.	*-0.010*	*-0.009*	*-0.010*	*-0.009*	*-0.010*	*-0.009*	*-0.009*	*-0.006*	*-0.008*
Observations	2,155	2,125	2,125	2,121	2,155	2,155	2,155	2,155	2,155
Provinces	71	69	69	68	71	71	71	71	71
Months	48	48	48	48	48	48	48	48	48
R-squared	0.238	0.267	0.289	0.261	0.269	0.278	0.273	0.258	0.253
Avg. price before Aug 1922	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*
Avg. price after Aug 1922	*0.633*	*0.630*	*0.630*	*0.631*	*0.633*	*0.633*	*0.633*	*0.633*	*0.633*
Avg. feeding pc before Aug 1922	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*
Avg. feeding pc after Aug 1922	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1924. Price of rye flour is measured in 1913 rubles per pood. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Additional controls are listed in column headers. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.7: ARA Feeding and Food Prices: Robustness to Ethnic Composition

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$								
	baseline	Share non-Russians 1920 × Month FE	Share Germans 1920 × Month FE	Share Jews 1920 × Month FE	Share Other non-Russians 1920 × Month FE	Share non-Russians 1897 × Month FE	Share Germans 1897 × Month FE	Share Jews 1897 × Month FE	Share Other non-Russians 1897 × Month FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Fed pc by the end of month t × Before Aug 1922	−0.939***	−0.920***	−1.044***	−0.898***	−0.957***	−1.003***	−0.950***	−0.984***	−0.988***
	(0.285)	(0.311)	(0.318)	(0.326)	(0.332)	(0.348)	(0.340)	(0.323)	(0.356)
Standardized coeff.	*-0.213*	*-0.214*	*-0.243*	*-0.209*	*-0.223*	*-0.228*	*-0.216*	*-0.223*	*-0.224*
Δ Fed pc by the end of month t × After Aug 1922	−0.202	−0.369*	−0.225	−0.314*	−0.376*	−0.357**	−0.280*	−0.315*	−0.337*
	(0.175)	(0.193)	(0.184)	(0.174)	(0.197)	(0.174)	(0.167)	(0.168)	(0.180)
Standardized coeff.	*-0.010*	*-0.019*	*-0.012*	*-0.016*	*-0.020*	*-0.018*	*-0.014*	*-0.016*	*-0.017*
Observations	2,155	2,055	2,055	2,055	2,055	2,155	2,155	2,155	2,155
Provinces	71	66	66	66	66	71	71	71	71
Months	48	48	48	48	48	48	48	48	48
R-squared	0.238	0.294	0.259	0.299	0.301	0.290	0.253	0.289	0.288
Avg. price before Aug 1922	*1.600*	*1.619*	*1.619*	*1.619*	*1.619*	*1.600*	*1.600*	*1.600*	*1.600*
Avg. price after Aug 1922	*0.633*	*0.631*	*0.631*	*0.631*	*0.631*	*0.633*	*0.633*	*0.633*	*0.633*
Avg. feeding pc before Aug 1922	*0.027*	*0.028*	*0.028*	*0.028*	*0.028*	*0.027*	*0.027*	*0.027*	*0.027*
Avg. feeding pc after Aug 1922	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1924. Price of rye flour is measured in 1913 rubles per pood. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Additional controls are listed in column headers. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.8: ARA Feeding and Food Prices: Robustness to Transportation Infrastructure

	Dependent Variable: Δ Log Price of Rye Flour in Month $t+1$				
	baseline	Railroad Length / Area × Month FE	Railroad Stations / Area × Month FE	Waterways Length / Area × Month FE	Waterways Docks / Area × Month FE
	(1)	(2)	(3)	(4)	(5)
Δ Fed pc by the end of month t × Before Aug 1922	−0.939***	−0.927***	−0.887***	−0.930***	−0.906***
	(0.285)	(0.294)	(0.282)	(0.275)	(0.293)
Standardized coeff.	*-0.213*	*-0.210*	*-0.201*	*-0.211*	*-0.206*
Δ Fed pc by the end of month t × After Aug 1922	−0.202	−0.213	−0.197	−0.252	−0.250
	(0.175)	(0.191)	(0.180)	(0.201)	(0.188)
Standardized coeff.	*-0.010*	*-0.011*	*-0.010*	*-0.013*	*-0.013*
Observations	2,155	2,155	2,155	2,155	2,155
Provinces	71	71	71	71	71
Months	48	48	48	48	48
R-squared	0.238	0.278	0.276	0.261	0.269
Avg. price before Aug 1922	*1.600*	*1.600*	*1.600*	*1.600*	*1.600*
Avg. price after Aug 1922	*0.633*	*0.633*	*0.633*	*0.633*	*0.633*
Avg. feeding pc before Aug 1922	*0.027*	*0.027*	*0.027*	*0.027*	*0.027*
Avg. feeding pc after Aug 1922	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*

Notes: Observations are at the province and month level. The sample includes months from September 1920 to August 1924. Price of rye flour is measured in 1913 rubles per pood. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Additional controls are listed in column headers. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.9: The Dynamic Relationship between ARA Feeding and Rural Calories

	Dependent Variable: Δ Log Daily Calories per Adult Male in Month $t+1$				
	Rural Average (1)	Landless (2)	Small Farm (3)	Medium Farm (4)	Large Farm (5)
Δ Fed pc by the end of month t × Sep 1921	3.419	−9.956***	−3.752	−3.164	16.987***
	(3.208)	(3.609)	(4.308)	(3.404)	(4.066)
Standardized coeff.	*0.041*	*-0.131*	*-0.039*	*-0.037*	*0.186*
Δ Fed pc by the end of month t × Jan 1922	0.653	−1.116	1.357	0.546	1.419
	(1.515)	(3.877)	(1.665)	(1.674)	(1.847)
Standardized coeff.	*0.057*	*-0.077*	*0.105*	*0.045*	*0.120*
Δ Fed pc by the end of month t × May 1922	1.303***	2.339***	1.245**	1.603***	1.144**
	(0.390)	(0.722)	(0.497)	(0.500)	(0.520)
Standardized coeff.	*1.735*	*2.039*	*1.504*	*1.476*	*0.877*
Δ Fed pc by the end of month t × Sep 1922	0.272	0.158	0.193	0.429	0.413
	(0.205)	(0.361)	(0.252)	(0.414)	(0.421)
Standardized coeff.	*0.132*	*0.063*	*0.054*	*0.114*	*0.098*
Δ Fed pc by the end of month t × Jan 1923	−0.232	0.320	−0.333	0.068	0.531
	(0.567)	(0.593)	(0.762)	(0.341)	(0.391)
Standardized coeff.	*-0.035*	*0.031*	*-0.042*	*0.009*	*0.077*
Observations	454	418	452	451	445
Provinces	78	76	77	77	77
Months	9	9	9	9	9
R-squared	0.747	0.535	0.653	0.651	0.635

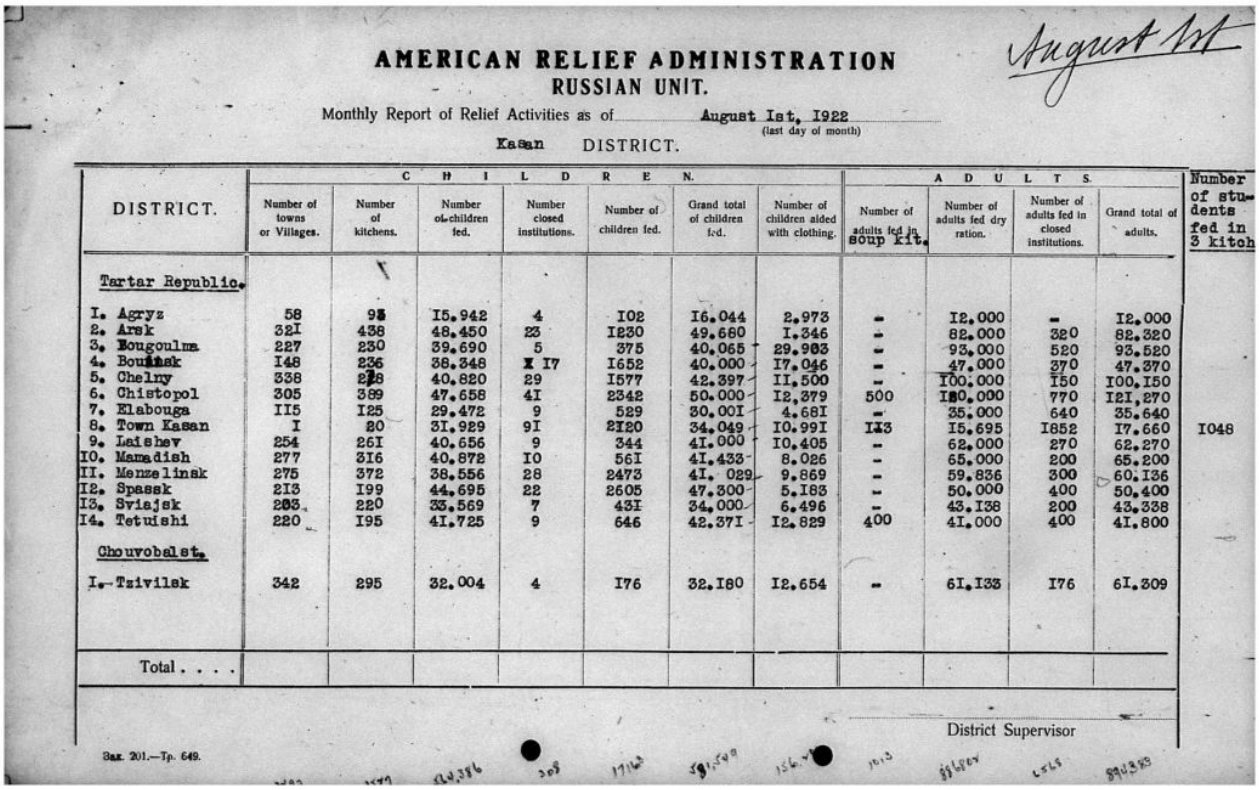
Notes: Observations are at the province and month level; the sample includes all months for which data on calories are available. Daily calories is the average number of calories consumed by an adult male as reported by direct nutritional surveys. Rural average includes all surveyed peasants in the province; landless, small farm, medium farm, and large farm include respectively landless peasants, peasants with small, medium, and large land holdings, as classified by nutritional surveys. Fed per capita is the number of people that received food assistance from ARA divided by the 1920 population. Δ Calories refers to the change in calories from the previous to the current survey wave (e.g., the change from February 1922 to June 1922); Δ Fed pc refers to the corresponding change in feeding per capita (e.g., the change from January 1922 to May 1922). All estimates control for grain per capita, procurement per capita; the share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with month fixed effects, and month fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Table A.10: The Dynamic Relationship between ARA Feeding and Birth Cohorts

	Dependent Variable: Δ Cohort Size per 1,000 in Year $t+1$		
	Total	Urban	Rural
	(1)	(2)	(3)
Δ Fed pc in year t × 1921	0.902	3.128	−0.048
	(3.914)	(2.171)	(4.691)
Standardized coeff.	*0.008*	*0.031*	*-0.0005*
Δ Fed pc in year t × 1922	0.585**	0.257	0.725*
	(0.241)	(0.621)	(0.366)
Standardized coeff.	*0.166*	*0.044*	*0.280*
Δ Fed pc in year t × 1923	0.731***	1.004**	0.693**
	(0.273)	(0.390)	(0.272)
Standardized coeff.	*0.034*	*0.028*	*0.044*
Observations	253	252	253
Provinces	69	68	69
Years	4	4	4
R-squared	0.796	0.746	0.785

Notes: Observations are at the province and year level from 1920 to 1924. Cohort size is the number of people born each year according to the 1926 Population Census divided by the total 1926 population. Fed per capita is the number of people that received food assistance from ARA (aggregated from monthly data) divided by the 1920 population. All estimates control for grain per capita, procurement per capita; and share of crops killed by the 1921 drought, grain-consuming region indicator, capital indicator, and urbanization 1920 interacted with year fixed effects, and year fixed effects. Standard errors are clustered at the province level. *** p<0.01, ** p<0.05, * p<0.1

Figure A.1: Example of ARA Feeding Report



AMERICAN RELIEF ADMINISTRATION
RUSSIAN UNIT.

August 1st

Monthly Report of Relief Activities as of August 1st, 1922
(last day of month)

Kasan DISTRICT.

DISTRICT.	CHILDREN.							ADULTS.				Number of students fed in 3 kitch
	Number of towns or Villages.	Number of kitchens.	Number of children fed.	Number closed institutions.	Number of children fed.	Grand total of children fed.	Number of children aided with clothing.	Number of adults fed in soup kit.	Number of adults fed dry ration.	Number of adults fed in closed institutions.	Grand total of adults.	
Tartar Republic.												
1. Agryz	58	95	15.942	4	102	16.044	2.973	-	12.000	-	12.000	
2. Arsk	321	438	48.450	23	1230	49.680	1.346	-	82.000	320	82.320	
3. Bougoulma	227	230	39.690	5	375	40.065	29.983	-	93.000	520	93.520	
4. Bouinsk	148	236	38.348	X 17	1652	40.000	17.046	-	47.000	370	47.370	
5. Chelny	338	228	40.820	29	1577	42.397	11.500	-	100.000	150	100.150	
6. Chistopol	305	389	47.658	41	2342	50.000	12.379	500	180.000	770	121.270	
7. Elabouga	115	125	29.472	9	529	30.001	4.681	-	35.000	640	35.640	
8. Town Kasan	1	20	31.929	91	2120	34.049	10.991	143	15.695	1852	17.660	1048
9. Laishev	254	261	40.656	9	344	41.000	10.405	-	62.000	270	62.270	
10. Mamadish	277	316	40.872	10	561	41.433	8.026	-	65.000	200	65.200	
11. Menzelinsk	275	372	38.556	28	2473	41. 029	9.869	-	59.836	300	60.136	
12. Spassk	213	199	44.695	22	2605	47.300	5.183	-	50.000	400	50.400	
13. Sviajsk	283	220	33.569	7	431	34.000	6.496	-	43.138	200	43.338	
14. Tetuishi	220	195	41.725	9	646	42.371	12.829	400	41.000	400	41.800	
Chouvobalst.												
1. Tzivilsk	342	295	32.004	4	176	32.180	12.654	-	61.133	176	61.309	
Total												

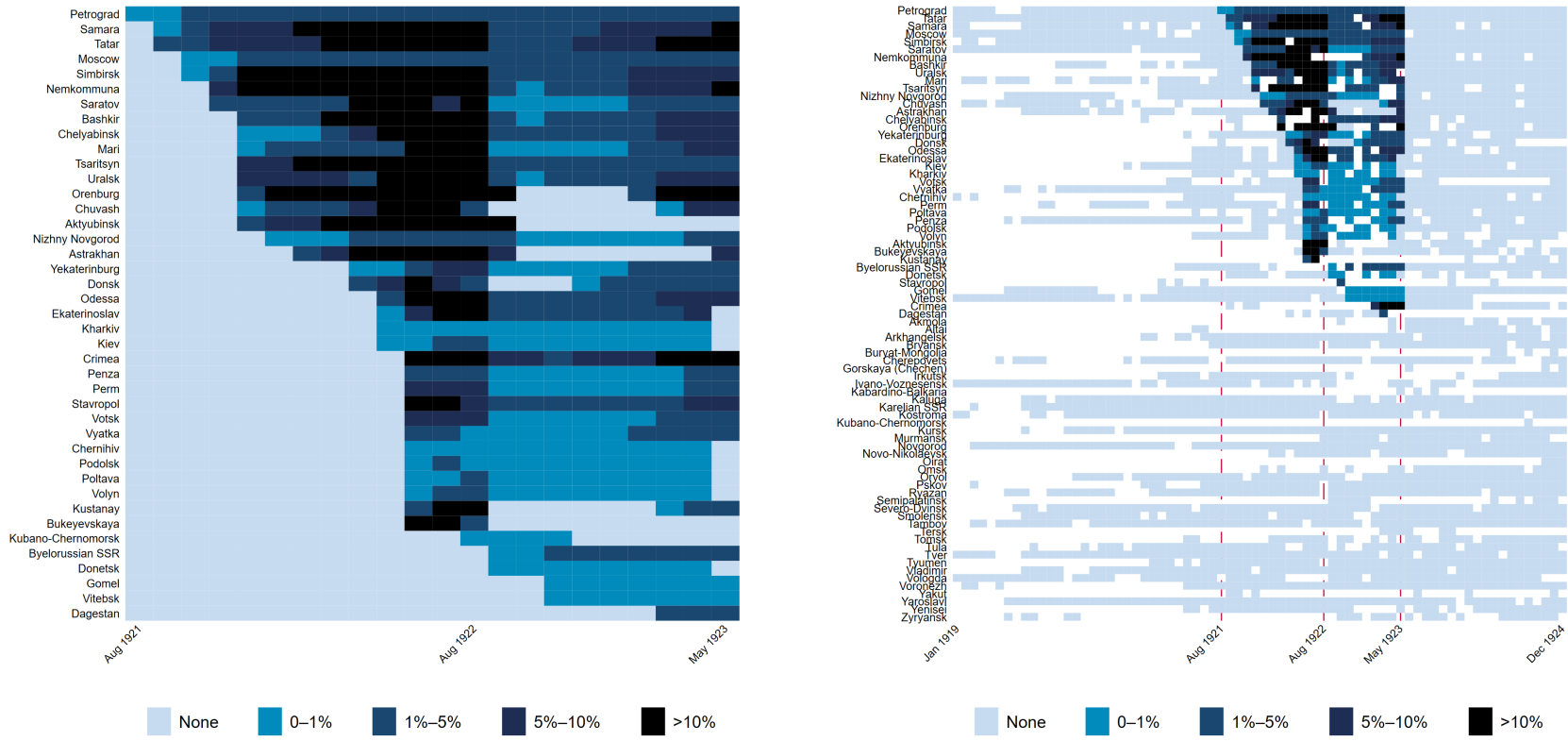
District Supervisor

Зак. 201.—Тр. 649.

Figure A.2: ARA Feeding Rollout and Price Data Availability

(a) ARA Feeding Rollout

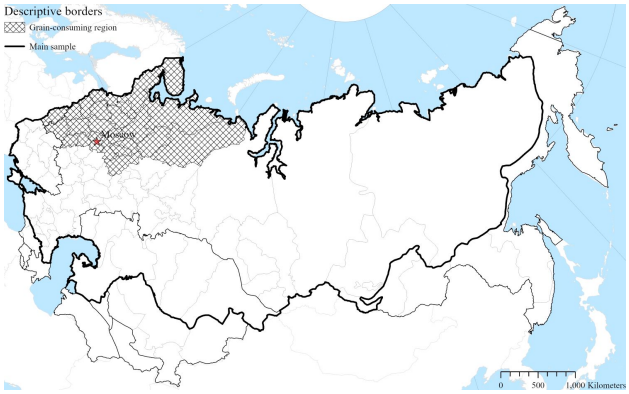
(b) Price Data Availability (no data in white)



Notes: The share of the population that received food aid from ARA. Figure (a) shows only provinces where ARA operated. Figure (b) shows all province-month observations for which the price of rye flour is available (province-month observations for which the price of rye flour is not available are in white). *Source:* see the Data Appendix.

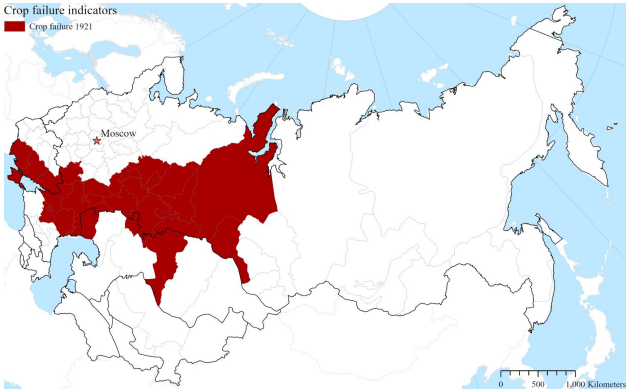
Figure A.3: Additional Maps

(a) Northern Grain-Consuming Region

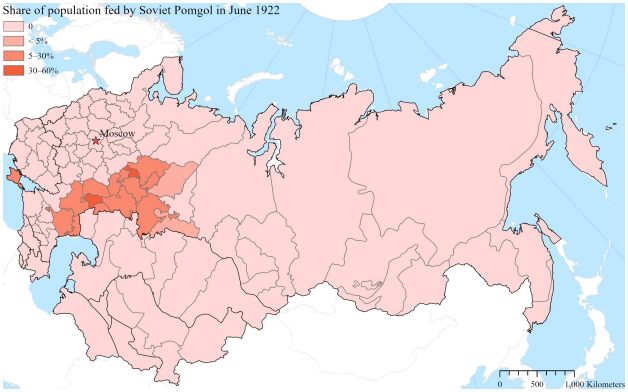


(b) Crop Failure 1920

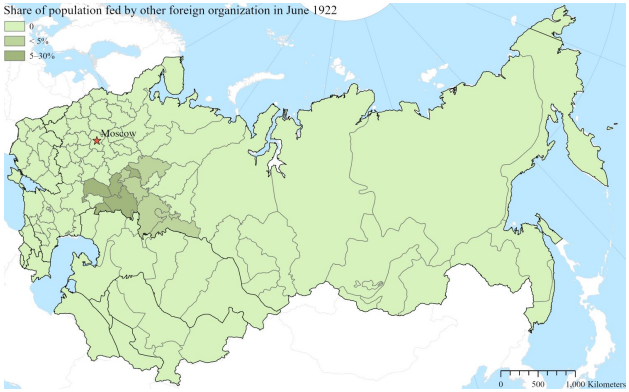
(c) Crop Failure 1921



(d) Soviet Feeding in June 1922



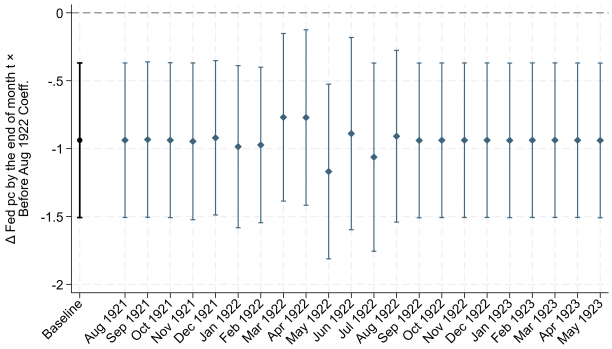
(e) Other Foreign Feeding in June 1922



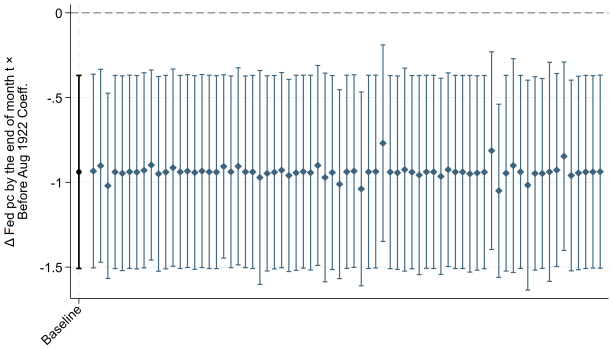
Notes: Figure (a): The Northern grain-consuming region includes provinces where the urban population relies on grain imports from the more productive South, which (except Central Asia provinces and Astrakhan province) were grain-exporting. The main sample line highlights all provinces in our sample. Figures (b) and (c): Highlighted are provinces that were marked as having experienced crop failure in 1920 and 1921, respectively. Figures (d) and (e): Feeding by the end of the month. *Source:* see the Data Appendix.

Figure A.4: Robustness to Dropping Individual Months or Provinces

(a) Drop Individual Months



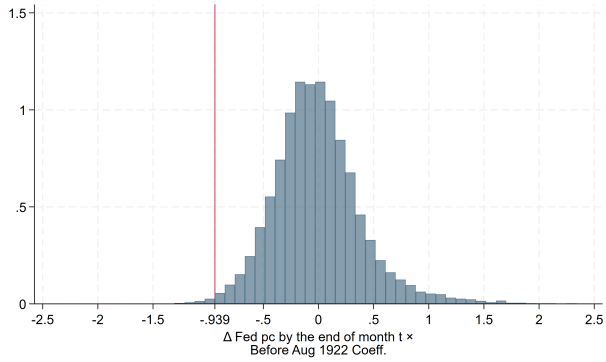
(b) Drop Individual Provinces



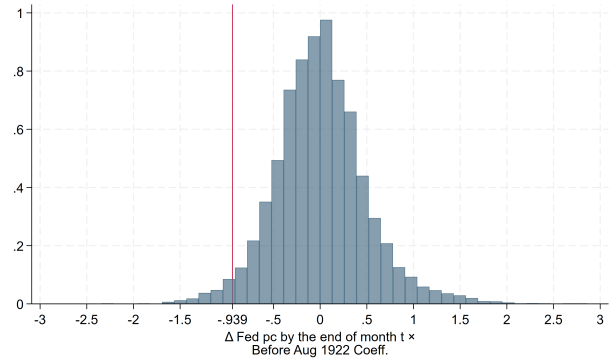
Notes: The figures show the coefficients of Δ Fed pc × Before Aug 1922 and their 95% confidence intervals estimated using the full sample (baseline) and using samples where individual months (Figure a) or provinces (Figure b) were dropped.

Figure A.5: Random Permutation Tests

(a) Permute Feeding, p-val = .005



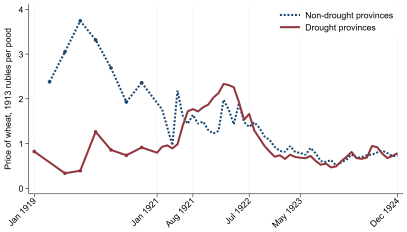
(b) Permute Prices, p-val = .025



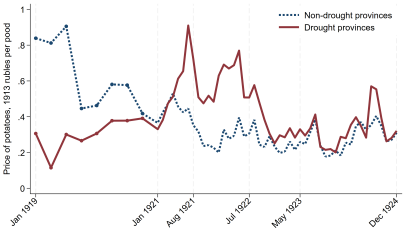
The figures show histograms of the coefficients of Δ Fed pc × Before Aug 1922 estimated from 10,000 iterations using samples where the full feeding path (feeding per capita from August 1921 to May 1923) was randomly permuted across provinces (Figure a) or the full price path (prices from January 1919 to December 1924) was randomly permuted across provinces (Figure b). The red vertical lines indicate the baseline estimates. The p-value is the share of coefficients below the baseline estimate.

Figure A.6: Additional Prices

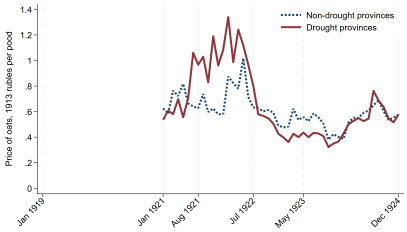
(a) Wheat



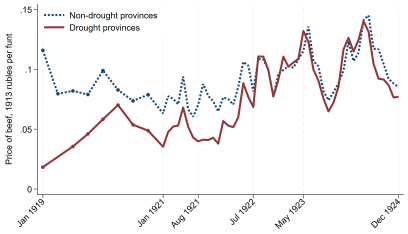
(b) Potatoes



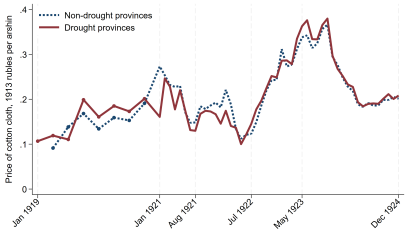
(c) Oats



(d) Beef



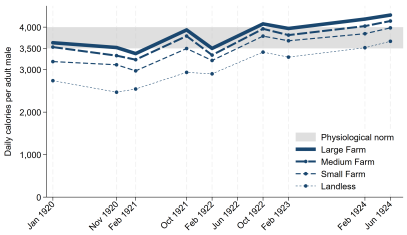
(e) Cotton Cloth



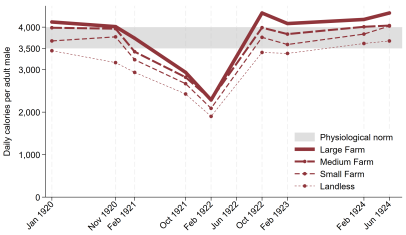
Notes: The figures shows the average prices in drought and non-drought provinces. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. Prices of wheat, potatoes, and oats are measured in 1913 rubles per pood. Price of beef is measured in 1913 rubles per funt. Price of cotton cloth is measured in 1913 rubles per arshin.

Figure A.7: Additional Calories Statistics

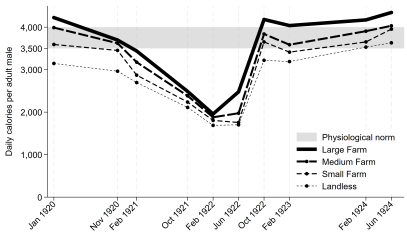
(a) Non-Drought Region



(b) Drought Region



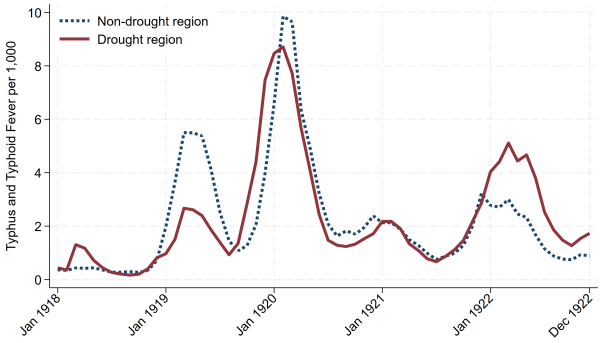
(c) Drought Region with June 1922 Data



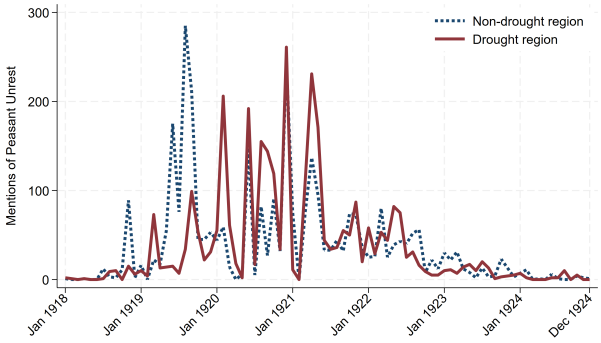
Notes: The figures show the average calories consumed by an adult male peasant in landless households and households with small, medium, and large land holdings, as reported by direct nutrition surveys. Figure (a) plots the data for the non-drought region; Figure (b) plots the data for the drought region; Figure (c) plots the data for the subset of the drought region where an additional June 1922 survey was done. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. The physiological norm is suggested by direct nutrition surveys (Lositskiy, 1928).

Figure A.8: Additional Summary Statistics

(a) Infectious Diseases



(b) Reports of Peasant Unrest



Notes: Figure (a) shows the average number of cases per capita of typhus, typhoid fever, relapsing fever, and uncategorized typhus and typhoid fever in drought and non-drought provinces. Figure (b) shows the average number of mentions of peasant unrest in drought and non-drought provinces. The drought region includes provinces where the share of crops killed by the 1921 drought is greater than zero; the non-drought region includes all other provinces. *Source:* see the Data Appendix.

Data Sources

The sample includes 82 provinces within the Soviet republics of Belarus, Russia (including the Kirghiz ASSR, the future Kazakhstan), and Ukraine (map A.3). The sample omits the territories for which no data are available: the Russian Far East (Amur, Kamchatka, Priamurskaya, Pribaikalskaya, Primorskaya, Sakhalin, and Zabaikalskaya provinces) and the Soviet Republics of Armenia, Azerbaijan, Bukhara, Georgia, Khorezm, and Turkestan. We digitized province-level administrative maps of the Soviet Union for January 1, 1923 (European part) and for May 1, 1923 (the rest) from the Library of Congress. The monthly dataset spans January 1919 to December 1924; the yearly dataset spans 1920 to 1924.

ARA Feeding. The number of people receiving food assistance from ARA by the end of each month. All Russian and Belarusian provinces except Moscow and Petrograd: Hoover Institution Archives, American Relief Administration Russian operational records, box 14, reel 24. Moscow and Petrograd: Fisher (1927), Appendix B. Ukrainian provinces: Hoover Institution Archives, American Relief Administration Russian operational records, box 14, reel 25.

Soviet Feeding. The number of people receiving food assistance from the Soviet Pomgol (Committee to Aid the Starving, *Komitet Pomoshchi Golodayushchim*) by the end of June 1922 is from TsK Pomgol VTsIK (1922).

Other Foreign Feeding. The total number of people receiving food assistance from all foreign organizations (including ARA) by the end of June 1922 is from TsK Pomgol VTsIK (1922). We subtract the number of people receiving food aid from ARA from this total to calculate the number of people receiving food aid from other foreign organizations.

Total, Rural, and Urban Population. 1897: We use uezd-level population from Demoscope Weekly (2001) and recalculate it into the 1923 administrative borders using the 1897 map from Kessler and Markevich (2020). 1920: Avilov (1924).

Prices. Sources for the price of rye flour, wheat, potatoes, oats, beef, and cotton cloth not adjusted for inflation are as follows. 1913–1916 (used for illustration only): Castañeda Dower and Markevich (2018). 1917 (used for illustration only): Kondratyev (1922). January 1919 – December 1920: Avilov (1921); January 1921 – December 1922: Avilov (1923). January 1923 – December 1924: TsSU (1923–1925), Issues 1 to 7. Sources for the consumer price index are as follows. 1913 – January 1923: Avilov (1924); 1913 – December 1924: Avilov (1926).

Livestock. The number of horses and cattle according to the 1920 Agricultural Census is from Avilov (1922).

Refugees. The number of people evacuated from the starving provinces is from TsK Pomgol VTsIK (1922).

Calories. Direct nutrition surveys report the provincial average of the daily number of calo-

ries consumed by an adult male peasant and the averages for each of the four groups: landless peasants, peasants with small farms, peasants with medium farms, and peasants with large farms. Nutrition surveys were conducted twice a year—once in the fall (after the harvest) and again in winter. Coverage expanded over time, with 30 provinces surveyed in January 1920 and 73 provinces in June 1924. During the 1922 famine, an additional survey was carried out in June in the twenty-two provinces affected by the drought. Source: Lositskiy (1928).

Infectious Diseases. In Russian, typhus, typhoid fever, and relapsing fever are all called '*tif.*' There was a '*tif*' epidemic during the famine. The sources for the number of cases of typhus, typhoid fever, relapsing fever, and uncategorized typhus or typhoid fever are as follows. January – December 1919: Avilov (1921). January – December 1920: Avilov (1923). January 1921 – December 1922: Avilov (1925).

Birth Cohorts. Okrug-level birth cohorts and population are from the 1926 Population Census available at Demoscope Weekly (2001). We use the 1926 map from Markevich et al. (2024) to calculate cohorts within the 1923 administrative borders.

Share of Crops Killed by the 1921 Drought. Avilov (1922).

Grain Harvest. Since grain is harvested during July–August, the year y harvest applies to the months from September in year y to August in year $y+1$. 1920–1921: Oganovskiy (1923). 1922: Belarus and Russia are from Avilov (1923); Ukraine is from Alterman (1923). 1923: Avilov (1924). 1924: Avilov (1926).

Grain Procurement. Since grain is harvested during July–August, the year y procurement applies to the months from September in year y to August in year $y+1$. 1919–1921: Avilov (1923). 1922–1923: Avilov (1925).

Rye Yield. Since grain is harvested during July–August, the year y rye yield applies to the months from September in year y to August in year $y+1$. 1919–1921: Oganovskiy (1923). 1922: Belarus and Russia are from Avilov (1923); Ukraine is from Alterman (1923). 1923: Avilov (1924). 1924: Avilov (1926).

Crop Failure Indicators. Indicators that a province experienced a crop failure in 1920 or 1921 are from Lositskiy (1928).

Grain-Consuming Region Indicator. An indicator that the province's urban population relies on grain imports from the South is from Lositskiy (1928).

Weather. Monthly temperature and precipitation are from Matsuura and Willmott (2014). The drought indicator from May 1921 weather is equal to one if May 1921 rainfall is more than one standard deviation below the 1910–1950 average.

Elections 1917. Election turnout (imputed) and Bolshevik and Nationalist vote shares are from Protasov et al. (2014).

Communists 1922. Communist Party members and candidates to become members are from Strumilin (1922).

Ethnic Composition. The 1897 Population Census did not report ethnic composition; we use mother tongue to assign ethnicity. Uezd-level population by mother tongue is from Demoscope Weekly (2001); we recalculate it into the 1923 administrative borders using the 1897 map from Kessler and Markevich (2020). 1920: Avilov (1924).

Transportation. To calculate the length of rail lines, we digitized a railroad map from the Hoover Institution Archives, American Relief Administration Russian operational records, box 32, reel 46. The length of waterways is from Otdel statistiki i kartografii Ministerstva Putey Soobshcheniya (1914). The number of railway stations and waterway docks is the number of cities and towns with a station or dock from Tsentral'nyy Statisticheskiy Komitet M.V.D. (1914). Province area is calculated from the GIS maps we have created.

Distance to Kazan, Latitude, Longitude. Calculated from the GIS maps we have created.

Natality and Mortality 1913. Available only for the European provinces of Russia, the data are from Markevich et al. (2024).

Peasant Unrest. We use the secret police reports about the state of the countryside from Berelowitch and Danilov (2000–2012). The reports are dated and are typically divided into paragraphs, with each paragraph concentrating on a situation in a specific province. We manually linked each paragraph of each report to a province and then calculated how often the following words are mentioned: повст (rebel), восст (uprising), дезертир (deserter), банд (bandits, gang), недовол (discontent). An example of a report is below, underlines are ours (Berelowitch and Danilov, 2000–2012, Volume 1, Document 192, January 3, 1921):

> Тамбовская губ. Инжавинский район. Банда из с. Козловка (8 верст южнее ст-и Умет), пройдя через с. Ивановку (7 верст южнее ст-и Умет) и забрав там 100 лошадей, перешла в с. Березовку (12 верст южнее ст-и Умет). Численность банды до 1 тыс. человек. По сведениям, банда намеревается сжечь ст-ю Умет. Меры приняты. Село Паревка занято бандой до 800 человек. Высланная бандитами разведка на Земляное была обстреляна нашими частями и отошла обратно в Паревку. Тамбовский район. Банда в 1500 конных с пулеметами в с. Лукиловка окружила отряд т. Ефимова (340 штыков, три пулемета, одно орудие). После продолжительного боя на улицах деревни отряд был захвачен бандитами в плен. Выясняются подробности боя и приняты меры к освобождению отряда. Жердевский район. Села Большие и Малые Алабухи заняты бандой, имеющей целью произвести налет на Грибановский сахзавод. Отмечается группировка крупных конных сил бандитов, имеющая целью разоружение наших отрядов.
>
> Tambov province, Inzhavinsky district. A gang from the village of Kozlovka (8 verst south of the Umet station), having passed through the village of Ivanovka

(7 verst south of the Umet station) and having taken 100 horses there, crossed into the village of Berezovka (12 verst south of the Umet station). The gang numbers up to 1,000 people. According to information, the gang intends to burn down the Umet station. Measures have been taken. The village of Parevka has been occupied by a gang of up to 800 people. A reconnaissance force sent by the bandits to Zemlyanoye was fired upon by our units and retreated back to Parevka. Tambov district. A gang of 1,500 mounted men with machine guns in the village of Lukilovka surrounded Comrade Efimov's detachment (340 bayonets, three machine guns, one [artillery] weapon). After a long battle in the streets of the village, the detachment was captured by bandits. The details of the battle are being clarified and measures have been taken to free the detachment. Zherdevskiy district. The villages of Bolshiye and Malye Alabukhi are occupied by a gang with the goal of raiding the Gribanovsky sugar factory. A large group of mounted bandits is noted with the goal of disarming our detachments.