Who Collaborates with the Soviets? Financial Distress and Technology Transfer during the Great Depression

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During the 1920s and 1930s the Soviet Union attempted to catch up to the technological frontier by signing Technology Transfer Agreements (TTAs) with foreign firms. Many U.S. firms signed these contracts, particularly during the Soviet Union's first Five Year Plan (1928 to 1932). However, it is not clear why. Promised payments were small and often unrealized (Link, 2020), with no guarantee that the newly-established or improved Soviet plants and factories would not become competitors. Historians have hypothesized that financial distress during the Great Depression and banking panics of the early 1930s drove desperate firms to sell their technology cheaply to foreigners, including the Soviet Union. However, this explanation is complicated by the fact that many firms signed TTAs prior to the U.S. stock market crash in late 1929.

We *quantitatively* investigate the motivations of U.S. firms to sell their technology to the Soviet Union for the first time by building a spatial dataset in which we locate the firms who signed these agreements in various U.S. counties. To do so, we use lists of TTAs published by the Soviet Union to advertise its business with U.S. firms.[1] These lists name each firm and describe the technology being transferred. While some firms are large and well-studied (e.g. Ford Motor Company, which we associate with its headquarters in Detroit) most are not. For small firms, we use industry publications, patent records, the proceedings of anti-communist congressional investigations and other sources to establish locations for 128 firms that signed TTAs in 64 US counties, plotted in Figure 1. Table 1 demonstrates that populous, literate counties with a high share of Russian Nationals were more likely to have TTAs.

To investigate whether financial distress led firms to sell their technology, we use TTA lists published at different dates to determine whether a particular firm signed its first TTA before or after the stock market crash. We then build a panel dataset with two periods: before and after the crash, where we have for each county a measure of TTAs signed and financial distress in each period, measured using bank failures following Nanda and Nicholas (2014). This allows us to establish that counties with relatively more financial distress did sign more TTAs, though the effects are small: hitting 1000 US counties with a one-standard deviation increase in financial distress results in between one and eight additional TTAs (see Table 2's estimates). This preliminary analysis suggests a role both for "cultural affinity" as proxied by the share of Russians in the population, and for financial distress, with potentially informative implications for the many developing countries today who continue to pursue such agreements.

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[1]Our sources include Bron (1930); publications of the *Economic Review of the Soviet Union* in 1929 and 1930; and proceedings from anti-communist congressional hearings ("the Bogdanov Papers") in 1930 as well as some secondary sources (e.g. Sutton's *Western Technology and Soviet Economic Development*).

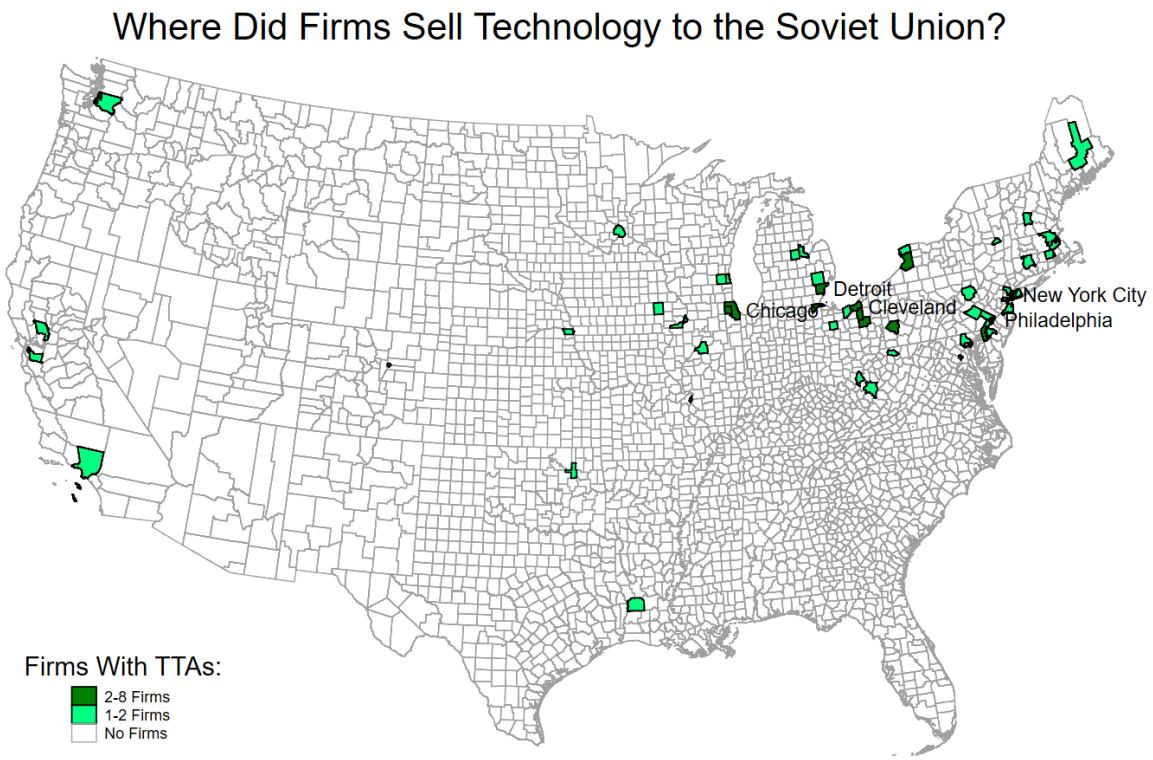

Figure 1: Spatial Distribution of Technology Transfer Agreements (TTAs) Signed with the Soviet Union in the Interwar Period.

Table 1: Populous, Literate Counties with Many Russian Nationals Were More Likely to Have Technology Transfer Agreements (TTAs) with the Soviet Union

	(1) Probability A County Has a TTA
Log Population	0.058***
	(0.012)
Log Manufacturing Establishments	0.006
	(0.007)
Russian Share of Population	0.032*
	(0.015)
Urbanization Rate	-0.002
	(0.003)
Manufacturing Employment Share	0.004
	(0.005)
Literacy Rate	0.006*
	(0.002)
Observations	2470

Notes: Point estimates of a linear probability model which estimates the probability that a given county has at least one firm with a TTA as a function of county characteristics taken from the 1930 US Census, revealing that counties with TTAs are larger in population, have a higher share of Russian Nationals, and are generally more literate. Coefficients are normalized by each variable's standard deviation, so that e.g. a one standard deviation increase in the Russian population share raises the odds that a county has a firm with a TTA by 3.2%. Standard errors in parentheses, clustered by U.S. State.
Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Table 2: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union

This table estimates the total number of TTAs signed during the First Soviet Five Year Plan (1928-1932) by US Firms in county i at time t as a linear function of county-level banking distress measured following Nanda and Nicholas (2014). Lacking specific dates that contracts were signed, t is measured coarsely as the period 1927-1929 (pre stock market crash) or 1930-1932 (post crash); two time periods permits estimation of county fixed effects γ_i. The regression specifications for each column are:

$$\text{TTAs}_{i,t} = \gamma_i + \beta_0 \text{Share of Banks Failing}_{i,t} + \epsilon_{i,t} \quad (1)$$

$$\text{TTAs}_{i,t} = \gamma_i + \beta_1 \mathbf{1}(t = \text{pre-Crash}) \text{Share of Banks Failing}_{i,t} + \beta_2 \mathbf{1}(t = \text{post-Crash}) \text{Share of Banks Failing}_{i,t} + \epsilon_{i,t} \quad (2)$$

$$\text{TTAs}_{i,t} = \gamma_i + \beta_1 \mathbf{1}(t = \text{pre-Crash}) \text{Share of Banks Failing}_{i,t} + \beta_2 \mathbf{1}(t = \text{post-Crash}) \text{Share of Banks Failing}_{i,t} + \tau_t + \epsilon_{i,t} \quad (3)$$

All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.

Columns (2) and (3) allow banking distress to have different marginal effects (β_2 and β_3) during the two different periods. Column (3) demonstrates that, conditional on all counties being hammered by the mass banking failures in the early 1930s, marginal differences accross counties do not matter at all for determining where TTAs are signed, but that differences in financial distress across counties did matter in the pre-period before the crash. These estimated effects are economically modest: a coefficient of .005 would imply that hitting 1000 US counties with a one-standard deviation shock to financial distress generates 5 additional TTAs nationwide (i.e. .005 per county, on average).

	(1) Total TTAs Signed	(2) Total TTAs Signed	(3) Total TTAs Signed
Share of Banks Failing	0.007*		
	(0.003)		
Share of Banks Failing 1927-1929		0.001	0.006*
		(0.001)	(0.002)
Share of Banks Failing 1930-1933		0.008**	-0.000
		(0.003)	(0.003)
Post Crash Dummy (Time Fixed Effect)			0.019*
			(0.008)
Observations	5940	5940	5940

Notes: Standard errors in parentheses, clustered by U.S. State. Dependent variable is the total number of TTAs signed. All regressions include county fixed effects. Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$