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

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Abstract

We provide evidence that financial distress induces firms to sell their technology to foreign competitors. To do so, we construct a novel, spatial panel dataset that locates U.S. firms who signed Technology Transfer Agreements (TTAs) with the Soviet Union during the 1920s and 1930s in various U.S. counties. By relating the number of TTAs signed in each county to the number of bank failures, we establish a significant, positive relationship between financial distress and the number of firms signing TTAs with the Soviet Union. This suggests a novel potential cost of banking panics when the customers of a failed bank include firms with valuable proprietary technology: financial distress induced by bank failures makes it easier for foreign governments to acquire valuable domestic technology.

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1 Introduction

We provide evidence that financial distress induces domestic firms to sell their technology to foreigners. To do so, we construct a novel, spatial panel dataset on the locations of U.S. firms who signed Technology Transfer Agreements (TTAs) with the Soviet Union during the 1920s and 1930s. We construct the dataset from lists of U.S. partner firms published by the Soviet Union, researching each individual contract to determine when it was likely signed and which U.S. city the signing firm was located in. By relating our county-level measures of the number of TTAs signed to county-level measures the number of bank failures, we establish a significant, positive relationship between bank failures and the number of firms signing TTAs with the Soviet Union.

The results help explain why U.S. firms signed these contracts in the first place. Despite the fact that these agreements were arguably critical to Soviet development (Sutton, 1968, 1971), promised Soviet payments were small and often unrealized (Link, 2020) with no guarantees that the newly-established or improved Soviet plants and factories would not become competitors.[1] While historians have hypothesized that financial distress during the interwar period may have induced firms to sign TTAs with the Soviet Union (e.g., Hutchings, 1974), this explanation is complicated by the fact that many firms signed these contracts prior to the U.S. stock market crash in late 1929 and the banking panics of the Great Depression. By bringing new, cross-sectional panel data to this old question, we provide the first empirical test of this hypothesis and show that financial distress does indeed induce firms to sign such contracts. Across specifications estimated with all U.S. counties, we find that hitting 1,000 U.S. counties with a one-standard deviation increase in bank failures results in between 6 and 13 additional TTAs signed nationwide (for reference, our sample of TTAs includes 173 signed by the Soviet Union during the interwar period).

Our results have important implications for policymakers in both developing and developed economies today. While existing empirical work demonstrates that technology

[1] Though signing firms did try to limit future competition: Ford Motor Company, when re-negotiating their technology transfer agreement with the Soviet Union in 1935, stipulated that the Soviet Union must refrain from exporting their home-made vehicles (Link, 2020).

transfer benefits *recieving* firms, no prior study quantitatively investigates the incentives of *sending* firms to help set up foreign competitors. In general, studies using direct measures of technology transfer are rare, as noted by Yueh and Van Reenen (2012) who establish that technology transfer agreements benefit recieving firms using survey data to construct a panel of Chinese foreign joint ventures from 2000 to 2005 (which included 29 TTAs). Most other studies are historical: see Giorcelli (2019), which studies the impact of U.S. technology transfers to Italy as part of the Marshall Plan, and Giorcelli and Li (2023) for Soviet transfers to China during the 1950s. For the case of U.S. transfers to the Soviet Union, Sutton (1968, 1971) argues from qualitative evidence and correlations that the TTAs we study were critical to Soviet development in the 1920s and 1930s. Thus, despite the desirability of such contracts, there is no formal, empirical guidance for policymakers in developing countries searching for partners in developed countries. We provide a historical case study to help fill this gap, showing economic incentives (financial distress), along with cultural affinity, affect firms' willingness to transfer technology and do business with a foreign government—even across significant ideological divides.[2]

For policymakers in developed economies, our results point to a novel and overlooked potential cost of allowing banks to fail when the customers of those banks are innovative firms and individuals (as in the case of the recent failure of Silicon Valley Bank in the United States in March of 2023). We provide the first evidence that bank failures make it easier for foreign governments to acquire valuable domestic technology from affected firms. To the extent that this is viewed as undesirable, for national security or other reasons, this finding provides a novel rationale for rescuing banks that serve firms and workers who have access to valuable proprietary technology, and potentially for subjecting such banks to greater regulatory oversight. [3]

The rest of the paper procedes as follows: Section 2 describes the historical context, and Section 3 describes the construction of our dataset from historical lists of TTAs.

[2]The United States broke of diplomatic relations with Russia in 1917 and would not formally recognize the Soviet Union until 1933.

[3]See Daniels and Krige (2022) for a discussion and comprehensive historical account of the evolution of the U.S. Federal government's attempts to control the export of non-classified industrial technology to foreign powers, from World War I to the present.

Section 4 demonstrates both that financial distress matters for firms' willingness to sign TTAs, and also that cultural affinity matters as well. Section 5 concludes.

2 Historical Context

In 1917, shortly after the Bolshevik Party came to power in the "October Revolution," the United States broke off diplomatic relations with Russia. The United States would not formally recognize the Soviet Union diplomatically until November of 1933, when Roosevelt sought to stimulate trade and serve U.S. commercial interests in the Soviet Union, which were—by that point—substantial.

U.S. firms conducted business with the Soviet Union during this time despite considerable risk. After World War I, the Soviet leadership determined that foreign equipment and expertise were needed to stabilize their teetering postwar economy and industrialize. Concession agreements of the early 1920s, in which foreign firms were invited to establish factories or other facilities in the Soviet Union, frequently ended in expropriation. Once this unfortunate tendency became apparent to foreigners, the Soviet Union began a more direct, transactional approach to acquiring technology, in which they paid outright for help copying production processes already used in the United States (Sutton, 1968). It is these "Technology Transfer Agreements" (TTAs) to which we restrict attention.

These agreements were concluded by the Soviet government directly with firms, and they were signed primarily, though not exclusively, with firms in the United States.[4] TTAs typically involved an exchange of personnel (foremen and engineers to supervise and train Soviet workers, and training trips for Soviet engineers in the United States), help acquiring any necessary equipment or other inputs to production, and complete access to any and all patents, blueprints, and other proprietary "intangible assets." The Soviets paid directly for these services, which were arguably critical to its industrial development; see Sutton (1968) for a general overview of early Soviet attempts to acquire Western technology, and Link (2020) for a thorough discussion of the case of Ford Motor

[4]German firms were also an important source of these agreements early on, though over the course of the 1920s the Soviet Union began to turn increasingly towards American firms (Sutton, 1968).

Company.

Even with these agreements, U.S. firms took on considerable risk both that the Soviet Union would renege on promised payments, as Ford discovered in the 1930s (Link, 2020), and that workers sent abroad would be arrested.[5] Moreover, these firms risked negative press and public image at home, given the U.S. public's fear of the Soviet Union, manifested most clearly in the Red Scare of 1919-1920. However, they did not take on political or regulatory risk: while World War I was widely understood by contemporaries to be a watershed moment demonstrating the importance of a technologically advanced industrial sector for war potential, measures taken during the war to prevent the transfer of technology abroad were allowed to lapse afterwards—in contrast to World War II, after which export controls designed to restrict the transfer of technology abroad became a fixture of U.S. foreign policy (Daniels and Krige, 2022). Accordingly, the Soviet Union took considerable pains to burnish its image among U.S. industrialists, and published lists of U.S. firms who had entered into agreements in various promotional periodicals. Thus, although many countries were signing TTAs and attempting to adopt U.S. technology at this time (Germany, Japan, etc.), the Soviet Union presents a unique opportunity to study TTAs at scale due to its uniquely bad public image problem in the United States, as it is these lists that allows us to create our dataset.

3 Constructing the TTA Dataset

We compile a list of all U.S. firms which signed TTAs by combining individual lists published by the Soviet Union to advertise its business with U.S. firms.[6] Our primary sources include publications of the *Economic Review of the Soviet Union* by the Amtorg Trading Corporation (1929, 1930); Bron (1930); the *Economic Handbook of the Soviet Union* published by the American-Russian Chamber of Commerce (1931); and the "Bogdanov

[5]Consider, e.g., the Shakhta affair of 1929 in which five German engineers were jailed and accused of "counter revolutionary" activities; Sutton (1968) relates that the U.S. State Department archives contain a number of foreign government reports establishing the arrests as politically motivated by a fear that the dominant place achieved by the Germans in Russian industry threatened the hold of the Party.

[6]Our list is almost certainly not exhaustive, but in practice the Soviet Union publicized most agreements; though it often worked to hide subsequent negative news coverage, going so far as to criminalize any negative report regarding agreements with foreign firms in 1925 (Sutton, 1968)

Papers" provided by the Soviet Union and made public as part of proceedings from an anti-communist Congressional investigation (US House of Representatives, 71st Cong., 1930). We also use lists provided by Sutton (1968, 1971), which provides useful coverage of the 1930s and includes some additional TTAs that were not as widely publicized. These lists collectively name 173 firms and usually describe the technology being transferred. While some firms may have signed multiple agreements at different points in time, these lists only indicate which firms have signed at least one agreement; as they name firms, and not individual unique contracts, they do not provide the date each TTA was signed or any details on the firm besides the name. Appendix Table A1 provides the final list of all the firms, along with a brief description taken from the original list, when one is provided (the entry is blank otherwise). We then individually research each agreement to augment this list with information on the location of the firm and the year the TTA was likely signed.

This is no small task. While some firms are large and well-studied (e.g. Ford Motor Company) most are not. For small firms, we use industry or trade publications, patent records, the Bogdanov Papers (US House of Representatives, 71st Cong., 1930), and other sources to establish locations. For multi-establishment firms, we associate the firm's location with the location of its headquarters (e.g. Detroit, for Ford Motor Company). In this way, we are able to successfully locate 135 of the 173 firms that signed TTAs in 65 US counties, plotted in Figure 1. The following sources account for the majority of our locations, with the precise share of the 135 firms given in each case:

- Location from the Bogdanov Papers (US House of Representatives, 71st Cong., 1930) or *Economic Handbook of the Soviet Union* (American-Russian Chamber of Commerce, 1931): 26%
- Location mentioned in a secondary source:
  - Sutton (1968, 1971): 15%
  - Ropes (1944): 7%
- Location taken from a patent: 15%
- Location taken from an object (trade catalogs) in the Smithsonian's online collection: 12%

This covers approximately 75% of our locations; for the remainder, we used a wide array of trade publications and news articles, often taking advantage of the journalistic convention of referring to individuals or firms as "ABC corp, of Chicago," to locate firms. In this case, it is not possible to locate the TTA in one county, because Chicago contains multiple counties, and so we equally divide the TTA agreement among them (so that it is possible for some counties to have only one half a TTA, in our sample, though in practice this is not common).

3.1 Building a County by Year Panel: Dating Each TTA

We also attempt to date each TTA. The Bogdanov Papers (US House of Representatives, 71st Cong., 1930) are extremely useful for this, providing the exact date of many TTAs signed before the summer of 1930, which covers most of the five-year plan period in which a great many TTAs were signed. We do additional research, and are ultimately able to use Sutton's historical account (Sutton, 1968, 1971) or another source to provide dates for 129 TTAs (or 116, for which we have dates and locations). In all, just over 50% of these dates were obtained or inferred from Sutton's historical account and 41% from the Bogdanov Papers. Appendix Table A1 provides the source used for dating each TTA.

We also bring in county-level data on bank failures using FDIC data on bank suspensions from ICPSR, following prior work which treats this as a shock to local financial distress (e.g., Nanda and Nicholas, 2014). Note that bank suspensions are not technically bank failures, as some banks that suspend operations may eventually reopen; however, Calomiris and Mason (2003) argue that this distinction does not make a substantive difference when identifying bank distress empirically, and we abstract from it in discussion for simplicity. This and other demographic information from the 1930 U.S. Census were downloaded from IPUMS NHGIS.

As this FDIC data extends from 1920-1936, we limit our analysis of the effects of financial distress to these years (restricting to a narrower time frame, such as the period of the first Soviet Five Year plan alone, does not qualitatively change the results; see Appendix B). However, most of the interwar TTAs were signed during this time: see

Figure 2. During this period of 1920 to 1936, we have 104 TTAs for which we have both the location and the year. We also drop counties in Hawaii, Alaska, Wyoming, and Washington D.C. which are not covered by the FDIC dataset.

3.2 Limitations

There are several limitations with our dataset. The first is that we introduce noise whenever we make errors in assigning firms to locations or TTAs to years. In particular, with locations, we assume in what follows that firms do not change their location or the location of their headquarters: if we find a patent assigned to a firm located in Chicago in 1927, we assume that they remain located in Chicago for the entire interwar period absent evidence to the contrary. To the extent that this isn't true, this will introduce noise into our measure of TTAs in each county and biases us away from finding any effect of financial distress.

Relatedly, we may also have measurement error in the assignation of TTAs to dates. While the Bogdanov Papers provide precise dates, to the exact day, for many TTAs, we rely on the narrative record in Sutton (1968, 1971) or other secondary sources for dating the remainder of our TTAs. Even restricting to the level of year, it is sometimes not possible to precisely date a TTA, and any errors in judgement on our part could potentially introduce measurement error.

A final limitation worth noting is the small sample size: 104 TTAs provide the data underlying our headline panel regressions in Section 4 below. However, the fact that many counties did not sign these agreements, despite having bank failures, is also data, and our headline regressions exploit these "zeros" which explains the large samples in our panel regression; restricting the analysis to only include counties which sign at least one TTA, and dropping these "zeros", does not qualitatively change the analysis, as we will discuss below.

4 Quantitatively Exploring Where TTAs Were Signed

This section explores the determinants of TTA agreements using county level data. From Figure 1, we can see that many counties never sign a TTA. To investigate the county-specific features that are associated with a propensity to sign any TTAs at all with the Soviet Union, we begin by estimating the following regression:

$$\mathbf{1}\left(\text{County } i \text{ has a TTA}\right) = \beta X_{i,1930} + \epsilon_i. \tag{1}$$

Equation (1) describes a linear probability model wherein the left hand side is a dummy variable taking on the value of 1 if County i has at least one TTA, where $X_{i,1930}$ is a vector of county-specific demographic variables computed from the 1930 census.[7] Table 1 displays the resulting estimates for β, demonstrating that populous, literate counties with a high share of Russian nationals were more likely to have TTAs. While the controls investigated in Table 1 are not an exhaustive list of the determinants of TTA agreements, the results suggest that there are important (and perhaps unobservable) county-specific features that make some places more likely to sign TTAs with the Soviet Union than others. This motivates our construction of a county panel dataset with a time dimension, permiting estimation of county fixed effects, when investigating the role played by financial distress in inducing firms to sign TTAs.

For the period of $t \in [1920, 1936]$ for which we have FDIC bank failure data, we estimate the following regression: for each county i,

$$\text{TTAs}_{i,t} = \gamma_i + \mu_t + \beta_0 \text{Bank Failures}_{i,t} + \epsilon_{i,t}, \tag{2}$$

where γ_i and μ_t are county and year fixed effects, respectively. In Table 2, we show that estimates of β_0 are positive and significant, consistent with the idea that bank failures and the pursuant financial distress lead more firms to sign TTAs with the Soviet Union.

[7] Note that this means, for this regression, we are able to use TTAs for which we have the location but not the year in Appendix Table A1.

By providing estimates with and without fixed effects, Table 2 demonstrates that adding county fixed effects reduces the point estimate of β_0, and that adding year fixed effects does not change much once county fixed effects are included.

We also consider several robustness checks. Table 3 estimates equation (2) dropping each of the six major cities labeled on Figure 1, to show that the results are not driven by one particular outlier with many TTAs and bank failures. Dropping Chicago has the largest effect on the point estimate, but the results remain positive and significant and well within the order of magnitude of the other estimates.

We also estimate equation (2) over the small subsample of counties which have at least one TTA, to highlight that the large number of "zeros" in the data is not responsible for the small standard errors and statistical significance in Table 4. Note that dropping the zeros raises the point estimates and the statistical significance, consistent with the idea that including the counties which never sign a TTA introduces considerable noise. Intuitively, presumably there are many counties which would never produce a TTA, no matter how many banks fail, because they have no technology the Soviet Union is interested in acquiring.

Finally, although Figure 2 demonstrates that most of our TTAs come from the period of the first Soviet Five Year Plan, we check whether the results are driven by the early TTAs which tend to be more agricultural in nature (recall the later TTAs, which are related to World War II, are not used in the panel regressions because the FDIC data on bank failures ends in 1936). Appendix B estimates these panel regressions on a subsample of the years 1926 to 1933 (inclusive) to show that the results are qualitatively unchanged.

Across these specifications, the size of the estimated effects are small, but this is to be expected; beyond the fact that measurement error is biasing our estimates towards zero, as discussed above, the decision to work with the Soviet Union may have been highly idiosyncratic. It is thus not surprising that our results, with their low R-squared values, leave room for other explanations, especially given the results on Russian Share of the Population presented in Table 1 which suggest a role for cultural affinity and other non-economic factors. We conclude that financial distress played a role in inducing U.S.

firms to sell technology to the Soviet Union, but that it was likely not the only important factor.

5 Conclusion

This paper provides the first quantitative evidence that U.S. firms were induced to sell their technology to the Soviet Union by local financial distress during the interwar period, as historians have suggested. Specifically, by building a novel dataset on the locations of the various firms which signed Technology Transfer Agreements with the Soviet Union, we showed that counties with a large share of banks failing also saw more firms signing such agreements. These results controlled for county fixed effects, as we also found that county specific features like population size, literacy rates, and the share of Russian nationals were important determinants of where Technology Transfer Agreements were signed.

To the extent that developing economies continue to make use of similar agreements, our results have important implications for modern policymakers. For policymakers in developing countries, we provide the first empirical guidance on where to look for private sector partners when importing technology from other countries. For policymakers in developed countries, our results point to a novel potential cost of banking panics when the customers of a failed bank include firms with valuable proprietary technology: financial distress induced by bank failures makes it easier for foreign governments to acquire valuable domestic technology. To the extent that a policymaker may wish to avoid this, the results here suggest an additional motivation for rescuing such banks or subjecting them to greater regulatory oversight.

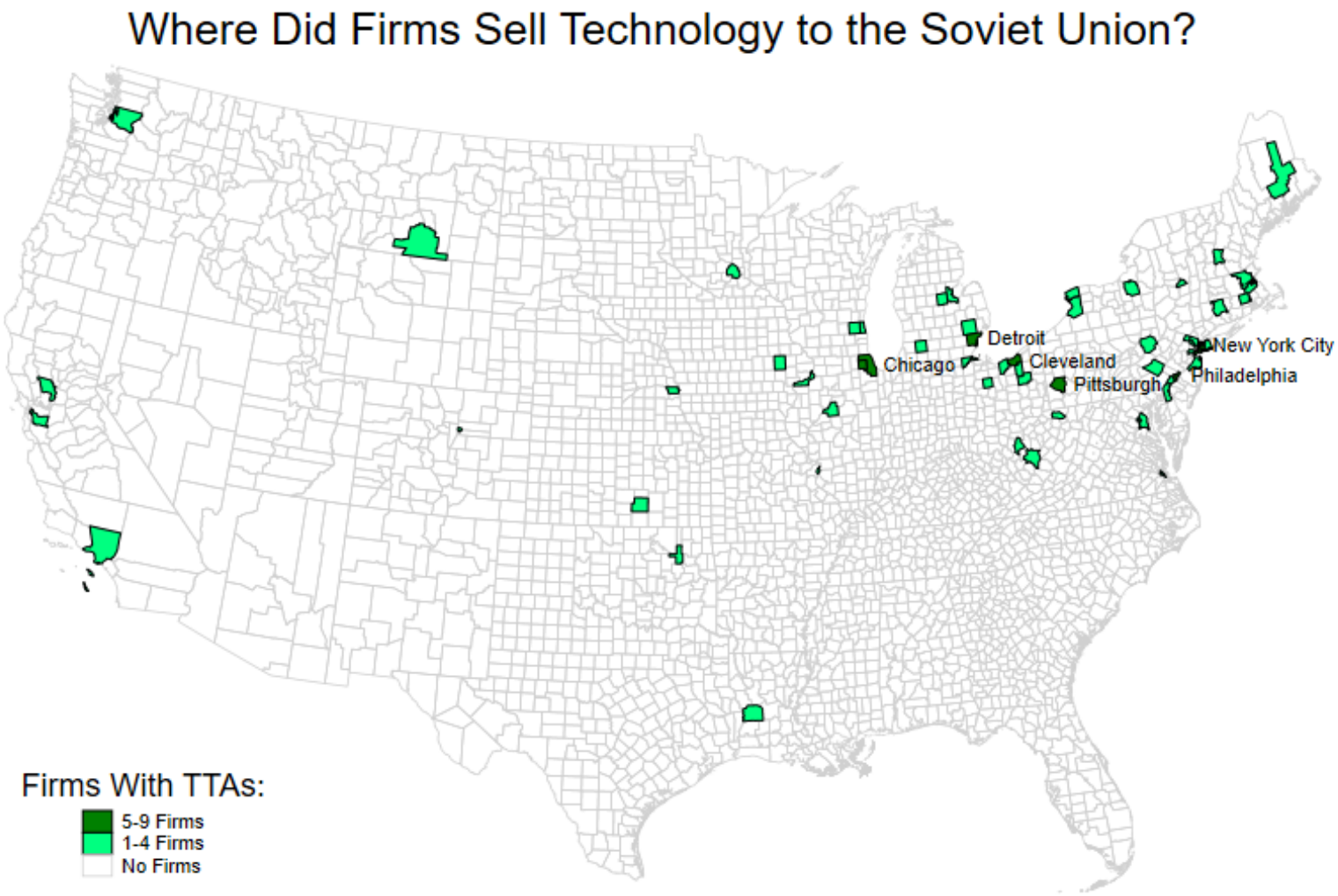

Figure 1: Spatial Distribution of Technology Transfer Agreements (TTAs) signed with the Soviet Union in the interwar period. Note that the counties with the most TTAs (five or more, shaded dark green) are all associated with one of six cities: Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh and New York City. One TTA in Alaska is not shown or included in the analysis.

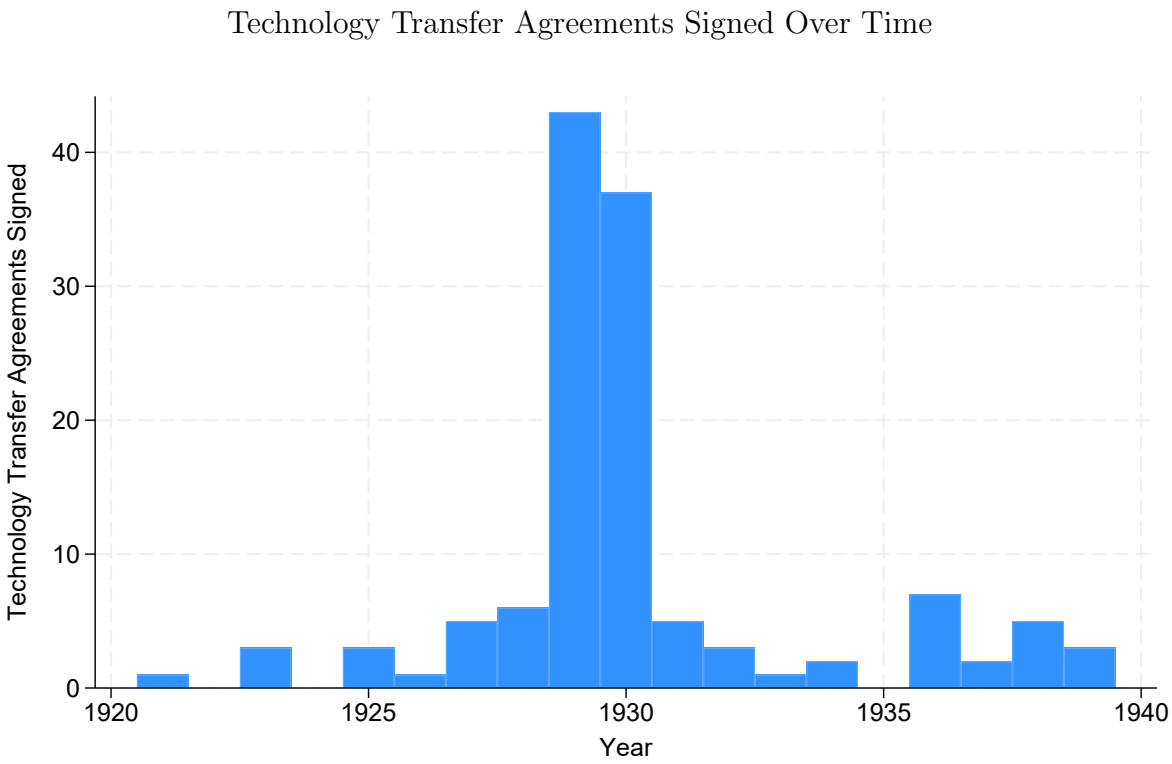

Figure 2: Technology Transfer Agreements signed with the Soviet Union by U.S. Firms, over time. Plots 127 of the 129 agreements for which we determined the year signed (one in 1913 and one in 1944 are not shown) demonstrating that the majority were signed during the sample period of 1920 to 1936 for which we have county-level bank failure data, and in particular during the first Soviet Five Year Plan, 1927-1932.

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***
	(0.011)
Log Manufacturing Establishments	0.004
	(0.006)
Russian Share of Population	0.033*
	(0.015)
Urbanization Rate	-0.002
	(0.004)
Manufacturing Employment Share	0.012
	(0.008)
Literacy Rate	0.006**
	(0.002)
Observations	2470
R^2	0.189

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 3.3%. 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 [1920-1936]

	(1) TTAs	(2) TTAs	(3) TTAs
Bank Failures	0.008**	0.006*	0.007*
	(0.003)	(0.002)	(0.003)
Observations	51833	51833	51833
R^2	0.024	0.148	0.151
County Fixed Effects		X	X
Year Fixed Effects			X

Notes: Standard errors in parentheses, clustered by U.S. State. The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.

Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Table 3: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union [1920-1936]: Dropping the Six Cities With the Most TTAs in Figure 1

	(1) No NYC	(2) No Chicago	(3) No Detroit	(4) No Cleveland	(5) No Pittsburgh	(6) No Philadelphia
Bank Failures	0.007*	0.004*	0.006*	0.006*	0.006*	0.006*
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	51748	51799	51816	51816	51816	51816
R^2	0.140	0.132	0.150	0.149	0.147	0.152
County Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X

Notes: Standard errors in parentheses, clustered by U.S. State. This table explores robustness of the main results in Table 2 to dropping the counties with the most TTAs in Figure 1 one at a time (for counties which are part of large cities like NYC and Chicago, we drop all associated counties). The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.

Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Table 4: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union [1920-1936]: Only Counties Which Sign at Least One TTA

	(1) TTAs	(2) TTAs	(3) TTAs
Bank Failures	0.087***	0.080***	0.065***
	(0.013)	(0.012)	(0.010)
Observations	1054	1054	1054
R^2	0.057	0.117	0.301
County Fixed Effects		X	X
Year Fixed Effects			X

Notes: Standard errors in parentheses, clustered by U.S. State. This table explores robustness of the main results in Table 2 to dropping all counties which never sign a TTA with the Soviet Union. The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.
Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

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A Dating and Locating TTA Agreements

Appendix Table A1 provides an alphabetical list of all U.S. firms which signed TTAs. It combines individual lists published by the Soviet Union to advertise its business with U.S. firms. Our primary sources include the *Economic Review of the Soviet Union* published by the Amtorg Trading Corporation (1929, 1930); Bron (1930); the *Economic Handbook of the Soviet Union* published by the American-Russian Chamber of Commerce (1931); and the "Bogdanov Papers" provided by the Soviet Union and made public as part of proceedings from an anti-communist Congressional investigation (US House of Representatives, 71st Cong., 1930). We also use lists provided by Sutton (1968, 1971), which provides useful coverage of the 1930s and includes some additional TTAs that were not as widely publicized (Sutton had access to archival evidence which we do not have).

These lists collectively name 173 firms and usually describe the technology being transferred. We present the names and descriptions verbatim, using brackets ("[]") to denote when we have inferred text which was illegible in a particular scan. If descriptions of the technology transferred have slightly different wording in two different lists, we provide the earlier description, though this rarely happens. "TTA Description" is left empty if a particular TTA appears only in lists which do not provide a description.

To determine locations for all firms, we use industry or trade publications, patent records, the Bogdanov Papers (US House of Representatives, 71st Cong., 1930), and other sources. For multi-establishment firms, we associate the firm's location with the location of its headquarters (e.g. Detroit, for Ford Motor Company). In this way, we are able to successfully locate 135 of the 173 firms that signed TTAs in cities spread across 65 US counties, plotted in Figure 1. The following sources account for the majority (about 75%) of our locations, with the precise share of the 135 firms given in each case:

- Location from the Bogdanov Papers (US House of Representatives, 71st Cong., 1930) or *Economic Handbook of the Soviet Union*(American-Russian Chamber of Commerce, 1931): 26%
- Location mentioned in a secondary source:
  - Sutton (1968, 1971): 15%
  - Ropes (1944): 7%
- Location taken from a patent: 15%
- Location taken from an object (trade catalogs) in the Smithsonian's online collection: 12%

For the remaining 25% of TTAs, we used a wide array of trade publications and news articles, often taking advantage of the journalistic convention of referring to individuals or firms as "ABC corp, of Chicago," to locate firms. Appendix Table A1 below gives the exact source used for each TTA's location.

We also attempt to determine the year each firm first signed a TTA. The Bogdanov Papers are extremely useful for this, providing the exact date (to the day) of many TTAs signed before the summer of 1930, which covers most of the Soviet First Five-Year Plan period in which a great many TTAs were signed. We do additional research, and are ultimately able to use Sutton's historical account (Sutton, 1968, 1971) or another source to provide dates for 129 TTAs (or 116, for which we have dates and locations). In all,

just over 50% of these dates were obtained or inferred from Sutton's historical account and 41% from the Bogdanov Papers. Appendix Table A1 below gives the exact source used for each TTA's date.

Table A1: Dating and Locating US-USSR Technology Transfer Agreements

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
1	Accounting and Tabulating Machine Co.	Power Machines	1930	Kingston, PA	Sutton (1971)	US House of Representatives, 71st Cong. (1930)
2	Akron Rubber Reclaiming Company	Technical Assistance to the Soviet Rubber Trust in the construction of a reclamation plant	1929	Baberton, OH	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
3	Alco Products, Inc.	Petroleum Refineries	1933	Schenectady, NY	Sutton (1971)	Syracuse University (2022)
4	Allen and Garcia Company	Technical Asssistance in the designing and opening of new coal mines for the Donugol Coal Trust.	1927	Chicago, IL	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
5	Allen, J.I., and Co.					
6	Allis-Chalmers Manufacturing Co.		1923	Milwaukee, WI	Sutton (1968)	National Museum of American History (n.d.a)
7	American Can Co.	Canning Processes				
8	Robert J. Anderson	Consulting engineer in aluminum-producing plant	1928	Fairmont, WV	US House of Representatives, 71st Cong. (1930)	Patents
9	Ansonia Clock Co.	Clocks and Watches	1929	Brooklyn, NY	US Department of State (1980)	National Museum of American History (n.d.b)
10	Audio-Cinema Inc	Sound film technology				
11	Austin Company	Technical Assistance in the desgning and opening of new coal mines for the Donugol Coal Trust	1929	Cleveland, OH	Sutton (1968)	US House of Representatives, 71st Cong. (1930)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
12	Arthur J. Brandt	Reconstruction of the Amo (Moscow) automobile plant for the Avtotrest (Auto Trust)	1930	Dearborn, MI	US House of Representatives, 71st Cong. (1930)	US House of Representatives, 71st Cong. (1930)
13	Babcock & Wilcox, Inc.	Newsprint Manufacture				
14	Badger, E. B., & Sons	Wood distillation, oil refineries	1929	Boston, MA	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
15	Badger & Sewell Co.	Newsprint Manufacture				
16	Baldwin Locomotive Works	Locomotive repair shops	1929	Eddystone, PA	US House of Representatives, 71st Cong. (1930)	Baldwin Locomotive Works (1923)
17	Baltimore & Ohio Railroad	Railroad operations				
18	Birdsboro Steel Foundry & Machine Co,	Hydraulic presses	1938	Birdsboro, PA	Sutton (1971)	The Historical Society of Pennsylvania (2005)
19	Bliss, E. W., Co.	Powert-plant design	1938	Brooklyn, NY	Sutton (1971)	National Museum of American History (n.d.f)
20	Blom and Kamroth	Meat-packing plants				
21	Boeing Aircraft Co.	Aircraft	1939	Seattle, WA	Sutton (1971)	National Museum of American History (n.d.c)
22	Brown Instrument Co.	Electrical recording Instrument	1936	Philadelphia, PA	Sutton (1971)	National Museum of American History (n.d.d)
23	Brown Lipe Gear Company	Technical Assistance to Avtotrest	1930	Syracuse, NY	Sutton (1968)	American-Russian Chamber of Commerce (1931)
24	Bucyrus-Erie Co	Excavating equipment	1923	Milwaukee, WI	Sutton (1968)	National Museum of American History (n.d.e)
25	Budd Manufacturing Co	1934 auto model change	1936	Philadelphia, PA	Sutton (1971)	Sutton (1971)
26	Burd Piston Ring Co	Tractors	1930	Minneapolis, MN	Sutton (1971)	Office of the Minnesota Secretary of State (1915)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
27	Burrell-Mase Engineering Company	Rationalization and Expansion of gas and gasoline industry for Grozneft		Pittsburgh, PA		American-Russian Chamber of Commerce (1931)
28	J. K. Calder	Chief Superintendent of construction of tractor plants	1929	Detroit, MI	US House of Representatives, 71st Cong. (1930)	Dalrymple (1964)
29	Campbell, Thomas			Crow Agency, MT		Dalrymple (1964)
30	Caterpillar Tractor Co.	Training Soviet Nationals	1929	East Peoria, WI	Sutton (1968)	Leffingwell (1996)
31	Chain Belt Co.	Conveyors	1930	Milwaukee, WI	Sutton (1971)	Surface (2016)
32	Chase, Frank D., Inc.	Design of foundry projects	1929	Chicago, IL	US House of Representatives, 71st Cong. (1930)	
33	Chicago Kitchen Co.	Design of community kitchens				
34	Clark, Wallace, & Co.	Gantt methods	1934	New York, NY	Sutton (1971)	Clark (1922)
35	Cleveland Tractor Co.	Training Soviet Nationals	1929	Cleveland, OH	Dalrymple (1964)	Case Western Reserve University (n.d.a)
36	Hugh Lincoln Cooper	Consulting engineers on the construction of the Dnieper River hydro-electic power plant in Ukraine	1927	New York, NY	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
37	Curtiss-Wright Corp.	Aircraft engine manufacturing license	1934	Buffalo, NY	Sutton (1971)	Curtiss-Wright (n.d.)
38	Arthur P. Davis, Lyman Bishop	Consulting engineers on the irrigation projects of the "Sredazvodkhoz"	1913	Oakland, CA	Sutton (1971)	American-Russian Chamber of Commerce (1931)
39	Deere & Co.	Agricultural equipment	1930	Moline, IL	Sutton (1971)	John Deere & Co. (n.d.)
40	Dewey & Almy Chemical Co.	Crab meat containers	1938	Cambridge, MA	Sutton (1971)	Sutton (1971)
41	Frank E. Dickie	Technical Assistance for Aluminstroy		Detroit, MI		American-Russian Chamber of Commerce (1931)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
42	Diebold Safe & Lock Co.	Watch factory		Canton, OH		
43	Douglas Aircraft Co., Inc.	Aircraft: DC-3	1936	Santa Monica, CA	Sutton (1971)	
44	Dow Chemical Co.	Styrene	1939	Midland, MI	Sutton (1971)	
45	Dueber-Hampden Watch Co.	Construction and equipment of watch plant	1929	Canton, OH	US Department of State (1980)	
46	DuPont de Nemours and Company	Technical Assistance in erecting fertilizer factories	1929	Wilmington, DE	US House of Representatives, 71st Cong. (1930)	
47	Eastman Construction Engineering	Construction		Philadelphia, PA		American-Russian Chamber of Commerce (1931)
48	Electric Auto-Lite Co.	Electrical equipment in autos and tractors	1930	Toledo, OH	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
49	Ex-Cell-O Aircraft and Tool Corp.	Stated by Soviets as agricultural implements	1931	Highland Park, MI	Sutton (1971)	Vartabedian (1986)
50	Fairbank Aviation Corp.	Aircraft manufacture				
51	Farrel-Birmingham Co., Inc.	Sykes machines	1936	Buffalo, NY	Sutton (1971)	Sutton (1971)
52	Albert H. Fay	Consulting Mining Engineer	1929	Washington, D.C.,	US House of Representatives, 71st Cong. (1930)	
53	Hardy S. Ferguson and Company	Technical Assistance to Severoles		Millinocket, ME		Patents
54	Ford Motor Company	Technical Assistance in the operation of the Nizhni Novgorod automobile factory	1929	Dearborn, MI	US House of Representatives, 71st Cong. (1930)	US House of Representatives, 71st Cong. (1930)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
55	Foster-Wheeler Corp	Petroleum refineries		New York, NY		National Museum of American History (n.d.g)
56	Freyn Engineering Company	Consulting engineers for the Gipromez	1929	Chicago, IL	Santalov and Segal (1929)	American-Russian Chamber of Commerce (1931)
57	General Engineering Co., Inc			Denver, CO		Sutton (1968)
58	Harry D. Gibbs	Technical Assistance in the construction of the Soviet aniline industry	1929	Hyattsville, MD	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
59	Julius H. Gillis	construction engineer	1930	Elizabeth, NJ	US House of Representatives, 71st Cong. (1930)	Patents
60	Gogan Machine Co.	Automobile Bumper	1932	Cleveland, OH	Sutton (1971)	Sutton (1971)
61	Goodman manufacturing company	Factory to produce coal cutters	1929	Chicago, IL	US House of Representatives, 71st Cong. (1930)	Sutton (1968)
62	Graver Corp.	Refineries	1928	Chicago, IL	Sutton (1968)	Sutton (1968)
63	Hahn, A. W.	Aluminium Powder	1930	Bronx, NY	US House of Representatives, 71st Cong. (1930)	Patents
64	T. G. Hawkins, Jr.			New York, NY		American-Russian Chamber of Commerce (1931)
65	H. Henrichsen	Construction of tractors	1930		US House of Representatives, 71st Cong. (1930)	
66	Henshien and Co., Inc.	Meat Packing Plants	1930	Chicago, IL	Sutton (1968)	Sutton (1968)
67	Hercules Motor Company	Production of engines for trucks in the Amo automobile plant of the Avtotrest	1929	Canton, OH	Sutton (1971)	Sutton (1971)
68	Hercules Powder Co.	Nitroceullulose; cotton linters		Wilmington, DE		Sutton (1971)
69	Houdry Process Corp.	Catalysts				

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
70	William M. Hibbs	Construction engineer of mechanical plants	1930		US House of Representatives, 71st Cong. (1930)	
71	John J. Higgins	G.E.T (State Electrotechnical Trust)	1929	East Orange, NJ	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
72	International General Electric Company	Exchange of patients with the state Electro-technical trust	1929	New York, NY	US House of Representatives, 71st Cong. (1930)	US House of Representatives, 71st Cong. (1930)
73	International Harvester Co.	Training Soviet Nationals	1930	Chicago, IL	Sutton (1971)	National Museum of American History (n.d.h)
74	Irving Airchute	Assistance in aviation industry	1930	Buffalo, NY	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
75	Jenkins Co.	Petroleum refineries				
76	Albert Kahn Inc	Design of buildings for the Stalingrad tractor factory	1929	Detroit, MI	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
77	Kallitt Products, Inc.	Electrical equipment				
78	Charles F. Kamrath	Meat-packing plants	1929	Omaha, NE	US House of Representatives, 71st Cong. (1930)	Patents
79	Koppers Construction Co.	Coke ovens and by-products	1930	Pittsburgh, PA	Sutton (1971)	Sutton (1971)
80	M. W. Krejci	[non-ferrous] metal industry	1930		US House of Representatives, 71st Cong. (1930)	
81	Lockwood Greene and Company	Reorganization and reconstruction of the of existing textile mills and in the design and construction of new plants.	1929	New York, NY	Sutton (1968)	Lincoln (1960)
82	Longacre Engineering and Construction Company	Apartment Buildings	1929	New York, NY	US House of Representatives, 71st Cong. (1930)	The New York Times (1921)
83	Lucas & Luick	Gas plants and pipelines		Chicago, IL		American-Russian Chamber of Commerce (1931)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
84	Lummus Co.	Refinery Construction	1936	New York, NY	Sutton (1971)	Sutton (1971)
85	Manganexport	Manganese Ore	1928		US House of Representatives, 71st Cong. (1930)	
86	Marietta Manufacturing Co.	Carbon-black paint units	1930	Point Pleasant, WV	Sutton (1971)	Stone (2006)
87	F. W. Marlow	construction of meat-packing plant	1929	St. Louis, MO	US House of Representatives, 71st Cong. (1930)	Engineers' Club of St. Louis (1947)
88	Martin, Glenn L., Co.	Bomber design	1937	Cleveland, OH	Sutton (1971)	Case Western Reserve University (n.d.b)
89	McClintock & Marshall Const. Co.	Building erection for Stalingrad tractor Plant	1930	Pittsburgh, PA	Sutton (1971)	TIME (1931)
90	McCormick Company	Designing of Baking Plants	1929	Pittsburgh, PA	Sutton (1968)	Sutton (1968)
91	J. K. McElroy	Cheliabinsk Tractor plant	1930	Detroit, MI	US House of Representatives, 71st Cong. (1930)	Dalrymple (1964)
92	Arthur G. McKee & Co.	Assistance on the project to develop Magnitogorsk as a steel center	1930	Cleveland, OH	US House of Representatives, 71st Cong. (1930)	US House of Representatives, 71st Cong. (1930)
93	McDonald Engineering	Construction of industrial plants	1929	Chicago, IL	Sutton (1968)	Ropes (1944)
94	Mechanical Manufacuring Company	meat-packing industry	1930	Chicago, IL	Sutton (1968)	Ropes (1944)
95	Merritt Engineering & Sales Co., Inc.	Manufacture of rolled-steel railroad-car wheels	1928	Lockport, NY	US House of Representatives, 71st Cong. (1930)	Patents
96	Midwest Rubber Reclaiming Co.	Assistance in rubber-plant construction: Training Soviet Nationals		St. Louis, MO		*Shapiro v. Midwest Rubber Reclaiming Co.* (1980)
97	E. F. Miller	Donugol in the coal industry	1926	Boston, MA	US House of Representatives, 71st Cong. (1930)	MIT Museum (1933)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
98	J. K. Miller	Manufacture of [watches]	1929		US House of Representatives, 71st Cong. (1930)	
99	Miller, Max B., and Co.	Petroleum refineries				
100	Moisseiff, Leon S.	Bridge Construction	1929	Belmar, NJ	Sutton (1971)	PBS (n.d.)
101	B. W. Mullen	Construction of [blast] furnaces	1930		US House of Representatives, 71st Cong. (1930)	
102	Multibestos Co.	Creating an asbestos plant in Yaroslavl	1929	Walpole, MA	US House of Representatives, 71st Cong. (1930)	Sutton (1971)
103	National Rubber Machinery Co.	Tire-building Machines	1944	Akron, OH	Sutton (1971)	
104	Newport News Shipbuilding & Drydock Co.	Construction of turbines	1927	Newport News, VA	Sutton (1968)	Ropes (1944)
105	Nickel, Arthur Co.	Iron-ore mining	1930	Waukensha, WI	Sutton (1971)	
106	Nitrogen Engineering Co.	Construction and operating a large ammonia fertilizer factory	1921	New York, NY	Sutton (1968)	American-Russian Chamber of Commerce (1931)
107	Nordberg Manufacturing Co.	Railroad equipment		Milwaukee, WI		
108	Oglebay Norton Company	Yurt (Southern Ore Trust)	1929	Cleveland, OH	US House of Representatives, 71st Cong. (1930)	Ropes (1944)
109	Ohio Locomotive Crane Co.	Operation and servicing of cranes	1931	Bucyrus, OH	Sutton (1971)	National Museum of American History (n.d.i)
110	C. R. Olberg	Engineer for irrigation	1929		US House of Representatives, 71st Cong. (1930)	
111	Oliver Farm Equipment Co.	Tractor Plows				
112	Orgametall	Manufacture of rolled-steel railroad-car wheels	1930		US House of Representatives, 71st Cong. (1930)	
113	Otis Elevator Co.	Moscow Subway Elevators		New York, NY	Sutton (1971)	National Museum of American History (n.d.j)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
114	Owens Bottle Co.	Bottle-closing plant and machinery for silicate industries	1925	Toledo, OH	US House of Representatives, 71st Cong. (1930)	Patents
115	Parke, Davis & Co.	Pharmaceutical Products	1929	Detroit , MI	Sutton (1971)	Patents
116	Penick and Ford, Inc.	Construction of corn production and refining plants	1930	Cedar Rapids, IA	US House of Representatives, 71st Cong. (1930)	Sutton (1968)
117	Pennsylvania Railroad	Railroad Operating Methods				
118	Petroleum Engineerin Corp.	Petroleum refineries	1936	Tulsa, OK	Sutton (1971)	Sutton (1971)
119	Pierce, Charles and Co.			Kalamazoo, MI		Patents
120	Polakov, W. N.	Management Consultants				
121	Pontiac Engineering Corp.	Smelter Construction	1930	Pontiac, MI	Sutton (1971)	Patents
122	Pratt & Whitney Aircraft Co.	Stated by Soviets as agricultural implements	1939	West Hartford, CT	Sutton (1971)	National Museum of American History (n.d.k)
123	H. W. Prommel	Geologist in nonferrous metal industry of USSR	1930	Denver, CO	US House of Representatives, 71st Cong. (1930)	Patents
124	Radio Corporation of America	Exchange of patents and technical information with the Soviet Weak Current Trust	1927	New York, NY	Santalov and Segal (1929)	American-Russian Chamber of Commerce (1931)
125	Radiore Co	Assistance to United Non ferrous Metals Industries in location of ore deposits	1930	Los Angeles, CA	US House of Representatives, 71st Cong. (1930)	Ropes (1944)
126	Remington Rand, Inc.	Office Equipment				
127	Republic Aviation Corp.	Aircraft	1932	Farmingdale, NY	Sutton (1971)	
128	Richard Bros.	Tractor manufacture				

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
129	Roberts & Schaefer Co	Donetz Coal Trust	1929	Chicago, IL	Sutton (1968)	Ropes (1944)
130	Rockwell, W. S., Co.	Furnace technology at Stalingrad	1930	New York, NY	Sutton (1971)	National Museum of American History (n.d.o)
131	Rosoff Subway Construction Co.	Subway Construction	1929	New York, NY	Sutton (1971)	Sutton (1971)
132	Rust Brothers	Rust cotton-picking machines	1936	New Llano, LA	Sutton (1971)	Patents
133	Safety Mining Co.	Manufacture of CARDOX		Chicago, IL	Sutton (1971)	Sutton (1971)
134	Sauerman Bros., Inc.	Equipment Operation	1931	Chicago, IL	Sutton (1971)	Sutton (1971)
135	Sayer, E. Y., Engineering Corp.	Steam electric plant	1929		US House of Representatives, 71st Cong. (1930)	
136	C. A. Schnieder	Engineer for construction machinery	1930		US House of Representatives, 71st Cong. (1930)	
137	C.F. Seabrook Co	Advisers for road building		New York, NY		Ropes (1944)
138	Seiberling Rubber Co	Constructing of a rubber tire plant for Rezinotrest (Soviet Rubber Trust)	1929	Akron, OH	US House of Representatives, 71st Cong. (1930)	Ropes (1944)
139	Seversky Aircraft Corp	Aircraft	1937	New York, NY	Sutton (1971)	Sutton (1971)
140	Sharples Specialty Co.	Petroleum centrifuge equipment	1930	Philadelphia, PA	Sutton (1971)	Patents
141	Frank Smith Co., Inc.		1929	Brooklyn, NY	Sutton (1968)	Patents
142	Southwestern Engineering Corporation	United Non-ferrous Metals Industries in the design, construction and operation of concentration plants	1930	Los Angeles, CA	Sutton (1968)	American-Russian Chamber of Commerce (1931)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
143	Sperry Gryoscopic Engineering Corporation	Manufacture of marine instruments	1928	Brooklyn, NY	US House of Representatives, 71st Cong. (1930)	US House of Representatives, 71st Cong. (1930)
144	Standard alcohol Co.	Rubber technology		Wilmington, DE		Patents
145	Standard oil Co. of New York	Operation of Batum refinery	1927	New York, NY	Sutton (1968)	National Museum of American History (n.d.l)
146	W. Stevenson	Engineer for forge plants	1929		US House of Representatives, 71st Cong. (1930)	
147	E. J. Stirniman	Specialist in [scientific] farming	1929	Davis, CA	US House of Representatives, 71st Cong. (1930)	Online Archive of California (2015)
148	C. H. Strath	Engineer for construction of heat-treating department of tractor plant	1929		US House of Representatives, 71st Cong. (1930)	
149	Stuart, James, & Cooke.	coal industry in the Donetz and Kuznets Basins	1929	New York, NY	Santalov and Segal (1929)	Ropes (1944)
150	Sullivan Co.	Mining Equipment	1923	Claremont, NH	Sutton (1968)	Library of Congress (n.d.)
151	Swasey, Warner P.	Tractor manufacture	1932	Cleveland, OH	Sutton (1971)	US House of Representatives, 71st Cong. (1930)
152	Szepesi, Eugene, Consulting Management Engineers	Accounting system in textile mills	1931	New York, NY	US Department of State (1980)	American-Russian Chamber of Commerce (1931)
153	Taft Pierce Co.	Technical Assistance in consruction of sewing machine factory	1929	Woonsocket, RI	US House of Representatives, 71st Cong. (1930)	Syracuse University (2016)
154	Thew Shovel Co.	Dragline Operation	1931	Lorain, OH	Sutton (1971)	Sutton (1971)
155	Timken-Detroit Axle Co	Technical Assistance in the Avtotrest		Detroit , MI		American-Russian Chamber of Commerce (1931)
156	Tube Reducing Co	Tube Mills Instillation	1938	Wallington, NJ	Sutton (1971)	Patents

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
157	Underwood Typewriter Co.		1929	New York, NY	Sutton (1968)	National Museum of American History (n.d.m)
158	Union Construction Co.	Drawings and specifications for dredges	1925	Oakland, CA	US House of Representatives, 71st Cong. (1930)	Hines (1919)
159	Union Switch and Signal Co.	Railroad automatic block signals	1928	Swissvale, PA	Sutton (1971)	Levinson (1996)
160	United Engineering and Foundry Co.	Hot and Cold wide-strip mills in steel and aluminum industries	1938	Pittsburgh, PA	Sutton (1971)	Naleszkiewicz (1966)
161	Universal Oil Products Inc.	Refinery Construction				
162	U.S. Wheel Track Layer Corp.	Christie Tank				
163	Warren, G. W., Co.					
164	Webber and Wells Inc.	Food processing	1930	Chicago , IL	Sutton (1968)	American-Russian Chamber of Commerce (1931)
165	Westinghouse Co.	Powert-plant design, aviation test equipment	1925	Pittsburgh, PA	Sutton (1968)	National Museum of American History (n.d.n)
166	Westvaco Chlorine Products	Aid in production of chlorine for United Chemical Industries	1930	Charleston, WV	US House of Representatives, 71st Cong. (1930)	Ropes (1944)
167	Archer E. Wheeler & Associates	Assistance to the United Non-Ferrous Metal Industries	1930	New York, NY	US House of Representatives, 71st Cong. (1930)	American-Russian Chamber of Commerce (1931)
168	J. G. White Engineering Co.	Consulting Services for Svir hydroelectric plant		New York, NY		Patents
169	Wilson, M. L.					
170	Norman L. Wimmer Co.	United Non-Ferrous Metals Industries for mines near Irkutsk	1930		US House of Representatives, 71st Cong. (1930)	
171	Winklerr-Koch Engineering Co.	Cracking Technology		Wichita, KS		American-Russian Chamber of Commerce (1931)

Table A1: Dating and Locating US-USSR Technology Transfer Agreements (continued)

No.	Firm	TTA Description	Year	Location	Source for Year	Source for Location
172	W. A. Woods	United Non-Ferrous Metals Industries for mines near Leningrad		Philadelphia, PA		American-Russian Chamber of Commerce (1931)
173	Yukon Fur Farms, Inc.	Organization of animal farms	1930	Petersburg, AK	Sutton (1971)	US House of Representatives, 71st Cong. (1930)

B Estimating Regressions On Years [1926-1933] Only

Table B1: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union [1926-1933]

	(1) TTAs	(2) TTAs	(3) TTAs
Bank Failures	0.013**	0.007**	0.007**
	(0.004)	(0.002)	(0.002)
Observations	24392	24392	24392
R^2	0.031	0.270	0.274
County Fixed Effects		X	X
Year Fixed Effects			X

Notes: Standard errors in parentheses, clustered by U.S. State. The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.
Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Table B2: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union [1926-1933]: Only Counties Which Sign at Least One TTA

	(1) TTAs	(2) TTAs	(3) TTAs
Bank Failures	0.110***	0.080***	0.072***
	(0.017)	(0.014)	(0.015)
Observations	496	496	496
R^2	0.052	0.192	0.375
County Fixed Effects		X	X
Year Fixed Effects			X

Notes: Standard errors in parentheses, clustered by U.S. State. This table explores robustness of the main results in Table 2 to dropping all counties which never sign a TTA with the Soviet Union. The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.
Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Table B3: Local Financial Distress Induces U.S. Firms to Sign Technology Transfer Agreements (TTAs) with the Soviet Union [1926-1933]: Dropping the Six Cities With the Most TTAs in Figure 1

	(1) No NYC	(2) No Chicago	(3) No Detroit	(4) No Cleveland	(5) No Pittsburgh	(6) No Philadelphia
Bank Failures	0.007**	0.004*	0.006*	0.006*	0.007*	0.006*
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	24352	24376	24384	24384	24384	24384
R^2	0.261	0.241	0.268	0.267	0.270	0.274
County Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X

Notes: Standard errors in parentheses, clustered by U.S. State. This table explores robustness of the main results in Table 2 to dropping the counties with the most TTAs in Figure 1 one at a time (for counties which are part of large cities like NYC and Chicago, we drop all associated counties). The dependent variable is the total number of TTAs signed. This table estimates the total number of TTAs signed by US Firms in county i at time t as a linear function of county-level bank failures measured as bank suspensions. All regressors are standardized and interpetable as the marginal effects of increasing the regressor in question by one standard deviation.

Stars indicate: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$