Online Appendix

for

"Friends during Hard Times: Evidence from the Great Depression"

In this Appendix, we report the results of additional tests to support the analysis in the main text. First, we provide additional robustness analysis of our main result that director network connections predict a significant reduction in the probability that a firm fails during the Great Depression. Next, we present additional analysis to support the instrumental variables approach that we discuss in Section 3.3 of the main text. Then, we provide more details on a number of tests that we briefly describe in the main text, including our analysis of the potential banker-director and equity infusion mechanisms from Section 4.

1. Baseline Analysis: Additional Robustness Checks

In this Section, we expand upon the robustness checks of our baseline tests that we briefly described at the end of Section 3.1 of the main text.

1.1. Cox Proportional Hazard Model

First, we re-estimate our baseline regressions within a Cox Proportional Hazard Model. This approach allows us to account for differences in the timing of failure across firms over the 1929 to 1937 window. In our dataset, the distribution of firm failures over time mirrors changes in macroeconomic conditions during the Depression period. We observe an increasing failure rate in 1929 reaching a local peak in 1930. We observe another peak in 1934, but then failure rates decline as the economy improved during the 1935-1936 period. Failures begin to increase again in 1937, corresponding with the onset of another recession period. We replicate each regression

specification from Table 3 of the main text, with no changes to the set of included independent variables. Because our independent variables do not vary with time, our estimates can be interpreted as shifting the baseline hazard function for failure up or down. We report coefficient estimates as odds ratios. Thus, factors that improve survival probabilities have coefficient estimates less than 1. We report the results in Online Appendix Table 1. The results mirror the results from the OLS specifications in Table 3 of the main text. For example, the estimates in Columns 2 and 5 imply that firms with more connections than the median firm have survival rates that are 18% to 19% higher than other firms, effects very similar in magnitude to what we observe in the OLS specifications.

1.2. Control for Firm Performance

Next, we tabulate the results of reestimating our baseline specification (Equation (1) in the main text) including 1928 net income scaled by assets as an additional control variable. Our main specification uses differential responses to a major unanticipated financial shock among connected and unconnected firms to identify the effect of connections on firm survival. Though this strategy directly addresses reverse causality concerns that would plague a simple regression of survival on network ties, it does not solve all potential endogeneity concerns. The biggest threat to identification is that connections correlate with an omitted variable that itself predicts more resilience to the financial shock. An obvious way to address the concern that connected firms could simply be better than unconnected firms is to control for ex ante profitability. We do not do so in our main regressions because we only observe usable income statement information for roughly 70% of our sample firms. However, as a robustness check, we include the ratio of net income to assets to control for ex ante differences in firm quality. While this ratio is not an ideal measure of return on assets (net income is net of interest payments to creditors), we also control directly for

leverage, which should mitigate the concern. We do not use sales as the numerator because sales information is even less reliably reported in the 1928 Manual. We tabulate the results in Online Appendix Table 2. Despite the noise in the measure, we find that ex ante net income is a strong negative predictor of failure during the Depression. The coefficient estimate on the control is statistically significant at the 1% level in all specifications. Economically, a one standard deviation increase in scaled net income is associated with a 5.8 percentage point decline in the likelihood of firm failure (or a nearly 40% reduction in the likelihood of failure from the baseline rate). These estimates validate the quality of the control, despite the measurement challenges outlined in the text. Yet, including the control does not have a major effect on our estimates of the effect of director network connections on firm survival. The point estimates are generally slightly larger in magnitude (and statistical significance) than those we report in Table 3 of the main text. An exception is the estimated effect of director connections that fall in the top quartile of the distribution. After we control for ex ante performance, we estimate an effect of top-quartile connections that is roughly double the magnitude of the estimate in Table 3 and statistically significant at the 5% level. This difference in estimates is consistent with the discussion in the text that firms in the top quartile of the connections distribution appear to be disproportionately firms whose characteristics predict low failure rates (large, public, cash-rich and, here, profitable).

1.3. Control for Firm Age

Though our control for ex ante performance addresses the possibility of an omitted factor that correlates with network connections and predicts generally better performance, it is still possible that an omitted factor that correlates with connections, but only matters for performance precisely during bad economic times could threaten the causal interpretation of our estimates. One possible confounding factor is firm age. Older firms could be more likely to employ connected

directors and also more likely to have the resources to weather a major financial shock, even if they perform similarly to other firms in normal markets. For example, they could have longer relationships with lending banks or other outside investors that make them less prone to face financing constraints during a crisis. To address this concern, we supplement the regressions in Table 3 with a control for the natural logarithm of firm age.[1] We find some evidence that older firms are indeed more likely to survive (the coefficient estimate on age is negative and marginally significant in the specifications that include industry and state fixed effects, but not significant when these fixed effects are not included). However, our estimate of the network effect is virtually unchanged. We present the results in Online Appendix Table 3. We also test the robustness of our result to a less parametric age control, including indicator variables for twenty bins of the firm age distribution, with similar results. Overall, the economic factors captured by firm age do not seem to explain the link between director connections and firm survival.

1.4. Control for Director Expertise

Another possibility that is not directly addressed by our baseline controls or, potentially, the control for ex ante firm performance is that directors on boards with more connections also have other specific skills that matter precisely for navigating the firm through a crisis. For example, director financial expertise could be irrelevant to firm performance in normal times, but help the firm to access scarce finance precisely during a major negative financial shock. Though we do not observe background information on directors in the Moody's manual, we use the information on positions that directors hold in other Moody's firms to construct proxies for director skills. Specifically, we construct firm-level controls for the percentage of directors who (1) serve as

[1] We do not include firm age in our base set of controls again because missing data results in additional sample attrition with no material changes to the estimates of interest.

executives in other firms or (2) serve as financial executives in other firms (i.e., Treasurer).[2] Since both proxies require a director to hold positions in other firms, they are by construction positively correlated with our measure of network connections. Nevertheless, neither of them have significant explanatory power for firm survival. Moreover, the effect of network connections on survival is similar if we include either proxy as an additional control in Equation (1). We present the results in Online Appendix Table 4. Though there could of course be other specific director skills that matter for survival and for which we do not directly control, it is easiest to generate concerns about financial skills given the totality of our results. Thus the fact that we find virtually no effect on our key estimates from including controls for such skills also mitigates the more general concern.

1.5. Controls for Other Local Factors that Influence Firm Survival

Though we include state fixed effects in our Table 3 specifications, it is possible that features of the economy or financial environment that vary within states could correlate with the network connections that firms form and their likelihood of surviving through a major financial crisis. One such factor is the policy response of the government within the years over which we measure firm survival. We investigate the role of the Reconstruction Finance Corporation (RFC), a government agency that was established in 1932 to provide financial assistance to financial intermediaries and businesses, among other objectives. We control for within-state variation in the intensity of aid dispensed to firms using county-by-county data on RFC spending between 1933 and 1937 compiled by Fishback, Kantor, and Wallis (2003). We report the results in Online Appendix Table 5. In Column 1, we include the natural logarithm of county RFC spending as an additional control in the specification from Column 5 of Table 3 in the main text. In Column 2, we

[2] Treasurer appears to be the 1920s analog of the modern Chief Financial Officer.

include an indicator for counties in which RFC spending is above the sample median so that we define the extra control in a way that is parallel to the definition of our connections measure. We do not observe a significant effect of RFC spending on firm survival probability in either specification. However, the estimates of the RFC effect should be treated with caution because it is likely that spending negatively correlates with economic health of the county. More importantly, including these controls has virtually no effect on the magnitude or significance of the effect of network ties (despite the loss of some observations due to a lack of a county-level match). We also find no evidence that network connections have a differential effect in counties with more or less RFC funding.

Another factor that could correlate with both network links and firm failure rates during the crisis is local agglomeration economies. Instead of attempting to measure these effects directly, we partial them out by including major city fixed effects in our baseline regression specification (Column 5 of Table 3). Agglomeration economies are likely to be the largest in the major business centers of the era. Thus, we include fixed effects for 15 cities that had local stock markets in 1928: New York, Chicago, Boston, Philadelphia, Baltimore, Cincinnati, Detroit, Cleveland, Hartford, Honolulu, Los Angeles, Louisville, Pittsburgh, San Francisco, and St. Louis. Roughly 52% of the firms in our sample have an office in at least one of these cities. By including a dummy variable for each city, we correct for city-specific differences in the prevalence of network connections and the firm failure rate during the crisis. We report the results in Column 3 of Online Appendix Table 5. Again, the added controls have virtually no effect on the estimated effect of network connections on firm survival, suggesting that network connections matter independently from city-level agglomeration economies. In unreported estimations, we also test for interactions between the two factors, but do not find any evidence of significant effects.

2. Instrumental Variable Analysis

Our IV strategy relies on exploiting differences in the local demand for directors' services across states (and industries). We begin by providing evidence to support this assumption; that is, we measure the segmentation of director markets within our 1928 sample. In Online Appendix Figure 1, we present a visual representation of the geographic distribution of the network. Each vertex represents an industrial firm from the 1928 manual. We use colors to distinguish firms that are located in different Census divisions.[3] In our data, the divisions with the most sample firms (in descending order) are the Middle Atlantic (which includes New York and is indicated in purple), East North Central (which includes Chicago and is indicated in green), New England (which includes Boston and is indicated in pink), and the Pacific (which includes California and is indicated in yellow). From the picture, it is evident that there is geographic clustering of firms within the network. Firms in the Pacific cluster in the upper right, while firms in New England cluster in the upper left. Firms in East North Central cluster towards the bottom of the graph and firms in the Middle Atlantic cluster near the center. Moreover, we observe several small, disconnected networks around the perimeter of the main network and we omit roughly a quarter of the firms from the diagram because they do not have any network connections.[4] Thus, in addition to clear variation in degree centrality across firms, there appears to be substantial network segmentation that we can use as a source of identification.

Our identification relies on differences across industries within a state in average board sizes (or, alternatively, differences across states within an industry). It is tempting to conjecture

[3] The nine Census divisions are Pacific, Mountain, West North Central, East North Central, New England, Middle Atlantic, South Atlantic, East South Central, and West South Central. See https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf for the detailed mapping of states to divisions.

[4] These features are not as prominent in more recent data. See, e.g., Fracassi (2017) for an analogous diagram of the 2005 network of firms. Some of the difference could reflect geographic clustering due to higher travel costs. Some of it could also reflect our inclusion of private firms.

that our instrument – which exploits differences in average board sizes across industries within a state (or across states within an industry) – is just a proxy for whether a state is urban or rural, or alternatively for the overall market activity in the state. This type of intuition is incorrect. For example, consider the distinction between urban and rural areas. Geographic segmentation of markets only predicts that there are constraints on the ability of directors to serve at multiple firms across large distances. However, a firm in an urban environment could still face constraints on the availability of local experts if there are few other local firms in the industry or if local firms in the industry happen to have small boards. For example, a cotton mill in New York could operate in a *Low* industry, while a cotton mill in Georgia does not. Conversely a bank in Georgia might be in a *Low* industry, while a bank in New York is not. We observe variation in *Low* both across industries within a state and across states within an industry.

To demonstrate the nature of the variation we exploit more directly, we construct a heat map of the fraction of industries in each state in which *Low* takes the value 1. We present the map in Online Appendix Figure 2. Confirming the above discussion, there is a wide distribution of *Low* industries geographically. Most states have at least one *Low* industry. Some urban states with many industries also have relatively large numbers of *Low* industries (e.g., New York), while some rural states with few industries have relatively small numbers of *Low* industries (e.g., Kansas).[5] On the other hand, some urban states have relatively few *Low* industries (e.g., Maryland) while some rural states have relative many (e.g., Colorado). Overall, the map demonstrates that there is no obvious regional pattern that could explain the variation captured by *Low* and undermine the exclusion restriction necessary to interpret the results causally.

[5] We define "urban" and "rural" states using data from the 1930 U.S. Census. See the discussion in Section 4 and footnote 21 for a list of urban states.

As we noted in the main text, the relative magnitude of our IV estimates compared to the OLS estimates of the network effect could raise concerns about the validity of the instrument. There, we discuss why endogeneity could obscure the relation between network ties and firm failure in OLS specifications. Moreover, we note the large heterogeneity in the effect of networks that we observe in our sample so that a local average treatment effect that exceeds the population effect is not altogether surprising. However, another possibility is that the inflation in our estimates is a symptom of a weak instrument, despite the sizable first stage explanatory power. Here it is noteworthy that the instrument does not produce estimates that are economically or statistically significant if we consider the probability of being acquired as the dependent variable rather than the indicator for firm failure (See also footnote 26 of the main text).

To explore these possibilities further, we experiment with a more flexible specification of the instrument. Instead of partitioning the sample into thirds using the fraction of the local director pool that works at within-industry firms, we partition the sample into sixths and define indicator variables for each partition. We then re-estimate the IV specification from Columns 4 and 5 of Table 5 using subsets of the indicator variables as instruments in place of *Low*. Specifically, we first include only the indicator for the bottom sextile, then progressively add the indicators for additional sextiles, in order, until we include indicators for all but the top sextile as instruments. When we include indicators for the bottom two sextiles, we find essentially the same result we report in Table 5 (unsurprisingly). As we continue to add additional instruments, the F statistic for the joint significance of the instruments declines. When we saturate the model with indicators for the bottom five sextiles, all five instruments are individually significant at the 5% level (the bottom two, which correspond to *Low*, each at the 1% level). However, the F statistic drops to 5.82. Thus, we have greater concern about weak instruments. Nevertheless, the second stage coefficient

estimate on the indicator for high network connections declines in magnitude to -0.296 (p-value = 0.08). This analysis is consistent with the interpretation of the IV estimates in Table 5 as a local average treatment effect on a portion of the sample in which the effect of network connections on failure is larger. Using additional variation in network connections that is predicted by a less extreme part of the distribution of local market depth results in an estimated effect that is smaller in magnitude, despite producing a weaker set of instruments. Nevertheless, the size of the differences in estimates relative to our baseline OLS specifications suggests caution and the validity of the IV estimates ultimately rests on the validity of the exclusion restriction.

3. Additional Evidence on Economic Mechanisms

In Section 4 of the main text, we present additional tests to shed light on the economic channel(s) through which network connections facilitate firm survival during the Depression. In Section 4.3, we discuss our approach to test whether network connections particularly matter among financially constrained firms because connected directors are actually banker directors (or correlate with the presence of such directors). In particular, we recompute network connections restricting attention only to directors who also serve as executives of industrial firms. And, we drop firms from the sample that had outstanding bank debt or mortgages in 1928. In Online Appendix Table 6, we present the estimates of the cross-sectional specifications from Table 6 of the main text after imposing both of these restrictions on the data. In all cases, the estimates of the effect of network connections are very similar to those we report for the corresponding specifications in Table 6.

In Section 4, we also discuss direct equity infusions via acquisition as a potential channel through which network connections could facilitate the flow of financing to constrained firms. We show in Table 13 that network connections are indeed associated with a higher likelihood of being

an acquisition target during the Depression years. We also discuss additional analysis in which we replicate the cross-sectional analysis from Table 6 in the context of acquisitions. Specifically, we test whether this acquisition effect is also more pronounced among small, private, rural, and/or cash poor firms (like the effect of networks on firm survival). We present the results of this analysis in Online Appendix Table 7. We do not find any evidence of cross-sectional differences except when we compare private to public firms. We do observe that private firms in which directors have more connections than in the median firm have a significantly higher probability of being acquired. Interestingly, we also do not observe that any of the proxies (with the exception of firm size in one specification) have significant level effects on the probability of being acquired. So, perhaps puzzlingly, firms most likely to be financially constrained are not more likely to be acquired than peers nor do connections facilitate such firms' participation in the market for corporate control.

References

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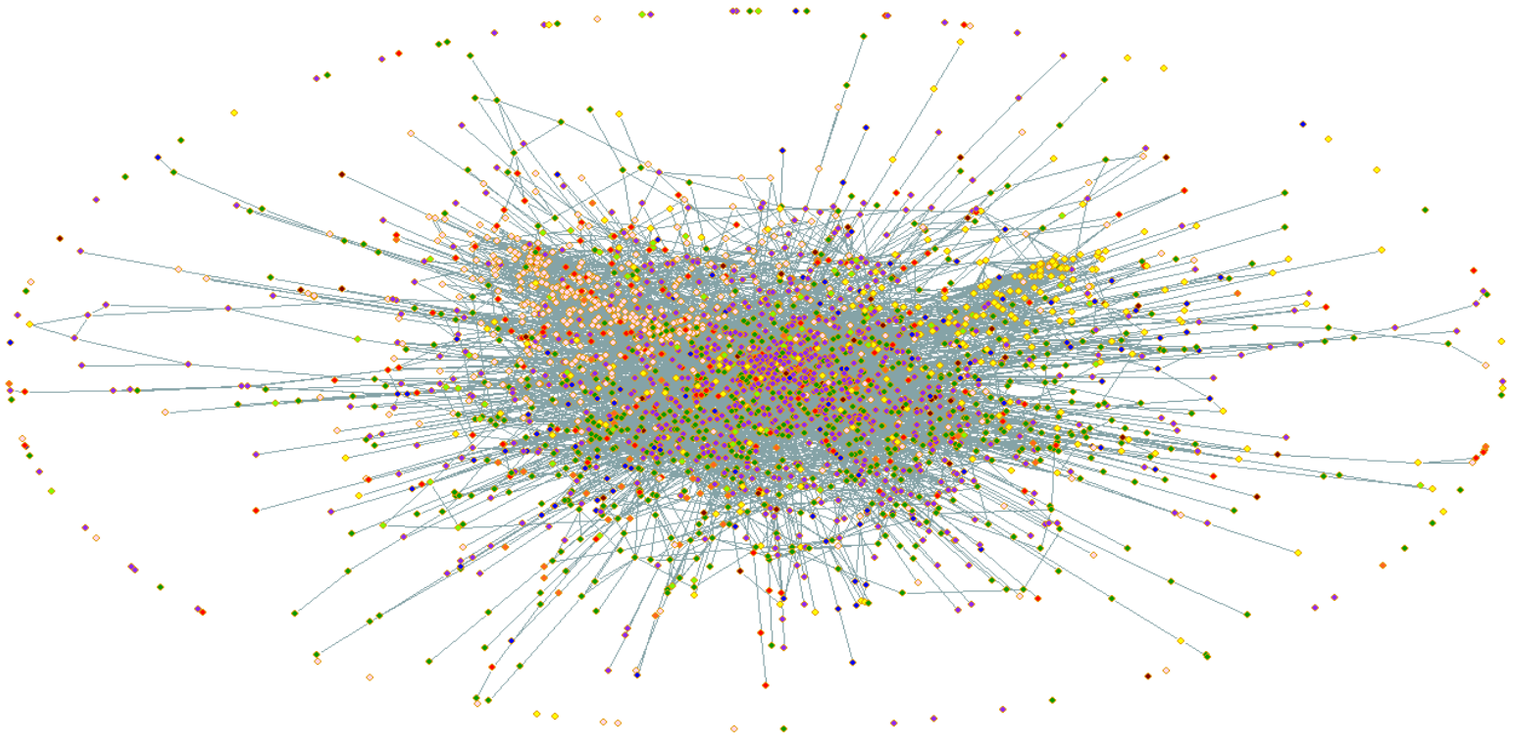
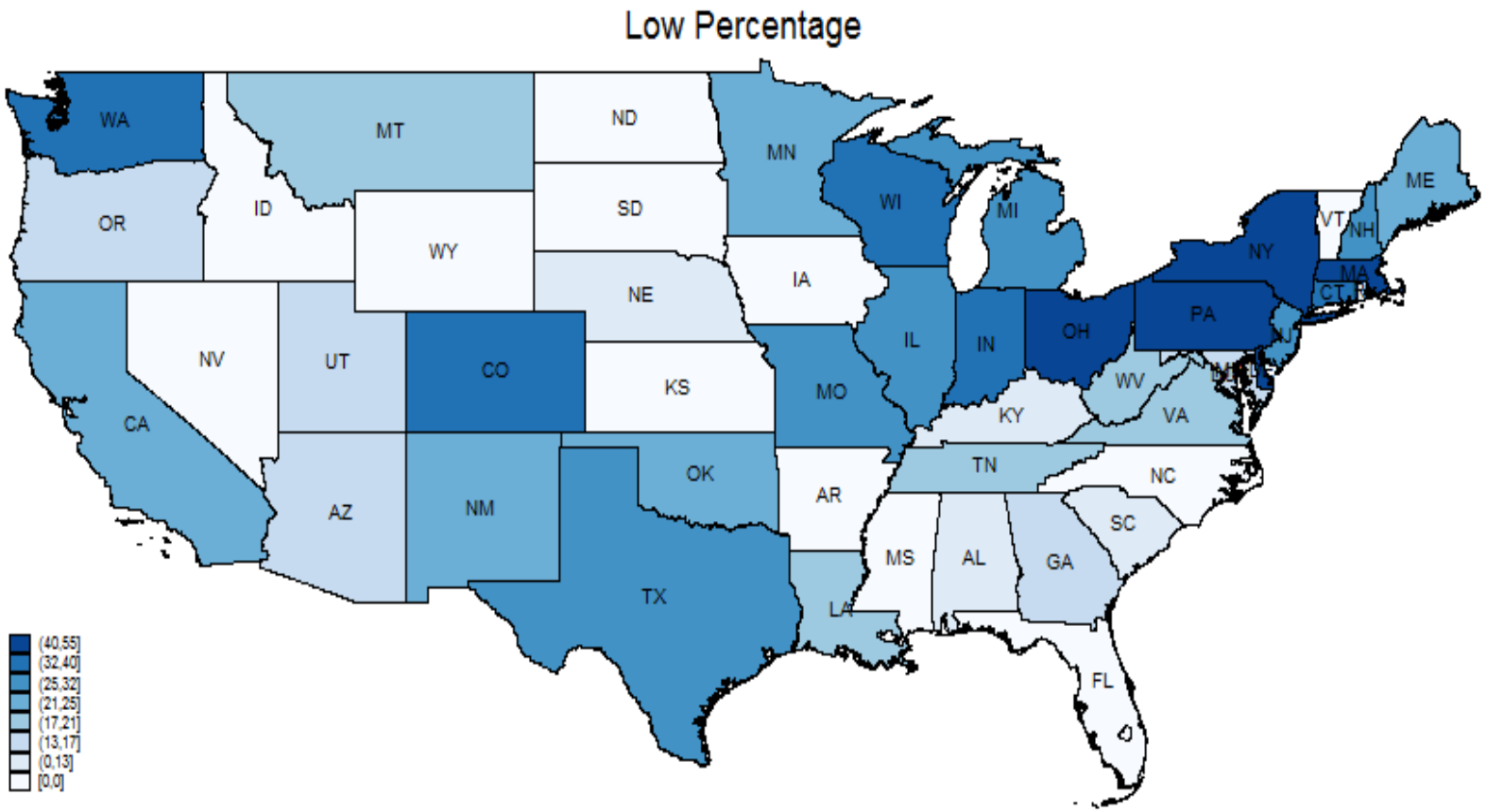
Fracassi, Cesare, 2017. Corporate finance policies and social networks. *Management Science* 63: 2420-2438.



Online Appendix Figure 1. The figure presents a graphical representation of the network of directors and executives in the sample of industrial companies from the 1928 Moody's Industrials manual. Subsidiaries and foreign companies are excluded from the network. The diagram does not include 746 firms that do not have any connections to other firms, though they are included in the analysis. The representation is an energy diagram created using the 2D Fruchterman-Reingold algorithm. Colors indicate the Census division in which the firm is located. For firms with multiple offices, we classify the firm in the region in which it has the most offices. Colors map to regions as follows: Pacific - Yellow, Mountain - Lime Green, West North Central - Blue, East North Central - Forest Green, New England - Pink, Middle Atlantic - Purple, South Atlantic - Red, East South Central - Orange, West South Central - Brown.



Online Appendix Figure 2. The figure reports the percentage of industries operating in each state for which the instrument Low is equal to one. Low is an indicator variable equal to one if the number of directors in a firm's industry-state pair as a fraction of the number of directors in the state is less than the sample 33rd percentile. Darker shades indicate a higher fraction of Low industries in the state.

Online Appendix Table 1
Network Connections and Firm Failure: Cox Proportional Hazard Model

Coefficient estimates are from Cox Proportional Hazard Model regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. Coefficient estimates are presented as odds ratios. The dependent variable is an indicator variable that takes the value one if the firm exits. The sample consists of an observation for each firm in each year between 1928 and 1937 (or the year of firm exit). Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median. Total Connections Quartile 2 (3/4) is an indicator variable equal to one for firms that have a value of Total Connections in the sample 2nd (3rd/4th) quartile. Private is an indicator variable equal to one for firms without publicly traded equity. Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
ln(Total Assets)	0.614 ***	0.615 ***	0.61 ***	0.611 ***	0.611 ***	0.608 ***
	(0.029)	(0.029)	(0.029)	(0.031)	(0.031)	(0.031)
Private	1.605 ***	1.605 ***	1.596 ***	1.665 ***	1.66 ***	1.66 ***
	(0.166)	(0.166)	(0.165)	(0.191)	(0.190)	(0.190)
Debt/Assets	1.298	1.291	1.328	1.519	1.513	1.544
	(0.348)	(0.347)	(0.357)	(0.462)	(0.461)	(0.470)
Cash/Assets	0.103 ***	0.101 ***	0.1 ***	0.118 ***	0.117 ***	0.116 ***
	(0.059)	(0.058)	(0.058)	(0.071)	(0.071)	(0.070)
ln(1+Number of Directors)	0.777 *	0.777 *	0.769 *	0.741 *	0.742 *	0.731 *
	(0.117)	(0.113)	(0.115)	(0.121)	(0.118)	(0.119)
ln(1+Total Connections)	0.923 *			0.925		
	(0.042)			(0.046)		
Total Connections > Median		0.811 **			0.808 **	
		(0.077)			(0.085)	
Total Connections Quartile 2			0.928			0.938
			(0.100)			(0.113)
Total Connections Quartile 3			0.703 ***			0.712 **
			(0.087)			(0.097)
Total Connections Quartile 4			0.915			0.903
			(0.122)			(0.129)
Industry Fixed Effects				Yes	Yes	Yes
State Fixed Effects				Yes	Yes	Yes
Pseudo R-squared	0.034	0.034	0.034	0.046	0.046	0.047
N	27531	27531	27531	25122	25122	25122

Online Appendix Table 2
Network Connections and Firm Failure: Controlling for Net Income

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The dependent variable is Disappeared by 1937, an indicator variable that takes the value one if the firm exits by 1937. Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median. Total Connections Quartile 2 (3/4) is an indicator variable equal to one for firms that have a value of Total Connections in the sample 2nd (3rd/4th) quartile. Private is an indicator variable equal to one for firms without publicly traded equity. Total Assets, Debt/Assets, Net Income/Assets and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
ln(Total Assets)	-0.053 ***	-0.054 ***	-0.054 ***	-0.053 ***	-0.054 ***	-0.054 ***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Private	0.045 ***	0.045 ***	0.043 ***	0.052 ***	0.053 ***	0.051 ***
	(0.016)	(0.017)	(0.016)	(0.018)	(0.018)	(0.018)
Debt/Assets	0.081	0.077	0.080	0.097	0.093	0.097
	(0.059)	(0.059)	(0.059)	(0.065)	(0.065)	(0.065)
Cash/Assets	0.091	0.092	0.088	0.140	0.140	0.135
	(0.090)	(0.090)	(0.090)	(0.099)	(0.099)	(0.099)
ln(1+Number of Directors)	-0.017	-0.021	-0.018	-0.026	-0.033	-0.028
	(0.026)	(0.025)	(0.026)	(0.027)	(0.027)	(0.027)
Net Income/Assets	-0.765 ***	-0.769 ***	-0.768 ***	-0.720 ***	-0.724 ***	-0.722 ***
	(0.122)	(0.123)	(0.123)	(0.134)	(0.134)	(0.134)
ln(1+Total Connections)	-0.019 ***			-0.018 **		
	(0.007)			(0.008)		
Total Connections > Median		-0.041 ***			-0.031 *	
		(0.016)			(0.017)	
Total Connections Quartile 2			-0.033			-0.046 *
			(0.023)			(0.024)
Total Connections Quartile 3			-0.061 ***			-0.055 **
			(0.022)			(0.023)
Total Connections Quartile 4			-0.051 **			-0.051 **
			(0.022)			(0.024)
Industry Fixed Effects				Yes	Yes	Yes
State Fixed Effects				Yes	Yes	Yes
R-squared	0.093	0.093	0.093	0.089	0.089	0.090
N	2144	2144	2144	1981	1981	1981

Online Appendix Table 3
Network Connections and Firm Failure: Controlling for Firm Age

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The dependent variable is Disappeared by 1937, an indicator variable that takes the value one if the firm exits by 1937. Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median. Total Connections Quartile 2 (3/4) is an indicator variable equal to one for firms that have a value of Total Connections in the sample 2nd (3rd/4th) quartile. Private is an indicator variable equal to one for firms without publicly traded equity. Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Firm age is measured as 1928 minus the year of establishment. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
ln(Total Assets)	-0.060 ***	-0.060 ***	-0.062 ***	-0.058 ***	-0.059 ***	-0.060 ***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Private	0.075 ***	0.075 ***	0.073 ***	0.077 ***	0.077 ***	0.076 ***
	(0.015)	(0.015)	(0.015)	(0.017)	(0.017)	(0.017)
Debt/Assets	0.051	0.050	0.050	0.067	0.066	0.064
	(0.054)	(0.054)	(0.054)	(0.058)	(0.058)	(0.058)
Cash/Assets	-0.311 ***	-0.311 ***	-0.317 ***	-0.271 ***	-0.271 ***	-0.277 ***
	(0.072)	(0.072)	(0.072)	(0.078)	(0.078)	(0.078)
ln(1+Number of Directors)	-0.051 **	-0.050 **	-0.054 **	-0.056 **	-0.057 **	-0.059 **
	(0.025)	(0.024)	(0.025)	(0.027)	(0.026)	(0.026)
ln(Firm Age)	-0.009	-0.009	-0.010	-0.015 *	-0.015 *	-0.016 *
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
ln(1+Total Connections)	-0.011			-0.013 *		
	(0.007)			(0.008)		
Total Connections > Median		-0.031 **			-0.032 **	
		(0.015)			(0.016)	
Total Connections Quartile 2			-0.027			-0.032
			(0.021)			(0.022)
Total Connections Quartile 3			-0.065 ***			-0.066 ***
			(0.020)			(0.022)
Total Connections Quartile 4			-0.017			-0.023
			(0.021)			(0.023)
Industry Fixed Effects				Yes	Yes	Yes
State Fixed Effects				Yes	Yes	Yes
R-squared	0.089	0.089	0.091	0.098	0.099	0.100
N	2924	2924	2924	2672	2672	2672

Online Appendix Table 4
Network Connections and Firm Failure: Controlling for Board Characteristics

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The dependent variable is Disappeared by 1937, an indicator variable that takes the value one if the firm exits by 1937. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median, where Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Private is an indicator variable equal to one for firms without publicly traded equity. % Outside Executives (Outside Treasurers) is the percentage of directors on the firm's board who serve in other industrial companies as executives (Treasurers). Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
ln(Total Assets)	-0.063 ***	-0.063 ***	-0.062 ***	-0.062 ***
	(0.006)	(0.007)	(0.006)	(0.007)
Private	0.070 ***	0.074 ***	0.070 ***	0.073 ***
	(0.015)	(0.016)	(0.015)	(0.016)
Debt/Assets	0.064	0.084	0.063	0.084
	(0.052)	(0.056)	(0.052)	(0.056)
Cash/Assets	-0.307 ***	-0.270 ***	-0.306 ***	-0.270 ***
	(0.071)	(0.077)	(0.071)	(0.077)
ln(1+Number of Directors)	-0.039	-0.051 *	-0.039	-0.047 *
	(0.025)	(0.026)	(0.024)	(0.026)
% Outside Executives	0.022	-0.005		
	(0.030)	(0.033)		
% Outside Treasurers			0.064	0.046
			(0.069)	(0.074)
Total Connections > Median	-0.040 **	-0.033 *	-0.040 **	-0.038 **
	(0.017)	(0.018)	(0.016)	(0.017)
Industry Fixed Effects		Yes		Yes
State Fixed Effects		Yes		Yes
R-squared	0.088	0.098	0.087	0.098
N	2992	2729	2744	2729

Online Appendix Table 5
Network Connections and Firm Failure with Controls for RFC Funding and City Effects

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The dependent variable is Disappeared by 1937, an indicator variable that takes the value one if the firm exits by 1937. Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median. Total Connections Quartile 2 (3/4) is an indicator variable equal to one for firms that have a value of Total Connections in the sample 2nd (3rd/4th) quartile. Private is an indicator variable equal to one for firms without publicly traded equity. RFC Funding is dollars spent in counties in which the firms has offices by the Reconstruction Finance Corporation between 1933 and 1937. Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
ln(Total Assets)	-0.067 ***	-0.067 ***	-0.065 ***
	(0.007)	(0.007)	(0.007)
Private	0.073 ***	0.073 ***	0.072 ***
	(0.017)	(0.017)	(0.017)
Debt/Assets	0.078	0.077	0.065
	(0.058)	(0.058)	(0.057)
Cash/Assets	-0.291 ***	-0.291 ***	-0.278 ***
	(0.080)	(0.080)	(0.079)
ln(1+Number of Directors)	-0.055 **	-0.055 **	-0.056 **
	(0.027)	(0.027)	(0.026)
Total Connections > Median	-0.034 **	-0.033 *	-0.031 *
	(0.017)	(0.017)	(0.017)
ln(RFC Funding)	0.004		
	(0.004)		
RFC Funding > Median		0.014	
		(0.020)	
Industry Fixed Effects	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes
Major City Fixed Effects	No	No	Yes
R-squared	0.096	0.096	0.102
N	2554	2554	2665

Online Appendix Table 6
Network Connections and Firm Failure by Firm Characteristics: Only Executives and No Bank Loans or Mortgages

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The sample also excludes all firms with outstanding bank loans or mortgages in 1928. The dependent variable is Disappeared by 1937, an indicator variable that takes the value one if the firm exits by 1937. Total Executive Connections > Median is an indicator variable equal to one for firms that have a value of Total Executive Connections greater than the sample median, where Total Executive Connections is the sum of connections to other firms in the sample via shared directors or managers. To form a connection a director must appear in a management position in a firm in the 1928 Moody's Industrials manual; shared directors who do not hold a managerial position in an industrial company do not count as connections. Private is an indicator variable equal to one for firms without publicly traded equity. Rural is an indicator variable equal to one for firms that have offices only in counties in which the rural population in 1930 is greater than 60%. Low Cash (Small Firm) is an indicator variable equal to one for firms that have Cash/Assets (Total Assets) less than the sample median. Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(Total Assets)	-0.065 ***	-0.065 ***	-0.062 ***	-0.046 ***	-0.066 ***	-0.068 ***	-0.064 ***	-0.048 ***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.007)	(0.008)	(0.007)	(0.010)
Private	0.110 ***	0.068 ***	0.064 ***	0.068 ***	0.111 ***	0.072 ***	0.070 ***	0.072 ***
	(0.021)	(0.017)	(0.016)	(0.016)	(0.022)	(0.018)	(0.017)	(0.018)
Debt/Assets	-0.027	-0.024	-0.028	-0.017	-0.009	-0.003	-0.009	0.001
	(0.055)	(0.058)	(0.056)	(0.055)	(0.060)	(0.063)	(0.060)	(0.060)
Cash/Assets	-0.336 ***	-0.345 ***	-0.164 *	-0.337 ***	-0.313 ***	-0.324 ***	-0.157 *	-0.314 ***
	(0.073)	(0.076)	(0.088)	(0.073)	(0.079)	(0.082)	(0.095)	(0.079)
ln(1+Number of Directors)	-0.050 **	-0.058 **	-0.049 **	-0.048 *	-0.044	-0.049 *	-0.044	-0.043
	(0.025)	(0.027)	(0.025)	(0.025)	(0.027)	(0.029)	(0.027)	(0.027)
Total Executive Connections > Median	0.046 **	0.005	0.023	0.029 *	0.034 *	-0.001	0.019	0.027
	(0.019)	(0.017)	(0.019)	(0.017)	(0.021)	(0.018)	(0.021)	(0.019)
Total Executive Connections > Median * Private	-0.094 ***				-0.085 ***			
	(0.028)				(0.031)			
Total Executive Connections > Median * Rural		-0.093				-0.089		
		(0.065)				(0.069)		
Rural		0.017				0.024		
		(0.045)				(0.051)		
Total Executive Connections > Median * Low Cash			-0.066 **				-0.068 **	
			(0.029)				(0.031)	
Low Cash			0.086 ***				0.082 ***	
			(0.024)				(0.026)	
Total Executive Connections > Median * Small Firm				-0.075 **				-0.084 **
				(0.030)				(0.033)
Small Firm				0.091 ***				0.093 ***
				(0.025)				(0.027)
Industry Fixed Effects					Yes	Yes	Yes	Yes
State Fixed Effects					Yes	Yes	Yes	Yes
R-squared	0.085	0.084	0.086	0.085	0.099	0.091	0.100	0.100
N	2578	2414	2578	2578	2345	2203	2345	2345

Online Appendix Table 7
Network Connections and the Likelihood of Being Acquired by Firm Type

Coefficient estimates are from ordinary least squares regressions on the sample of firms from the 1928 Moody's Industrials manual, excluding foreign firms and subsidiaries. The dependent variable is Acquired by 1937, an indicator variable that takes the value one if the firm is acquired by 1937. Total Connections > Median is an indicator variable equal to one for firms that have a value of Total Connections greater than the sample median, where Total Connections is the sum of connections to other firms in the sample via shared directors or managers. Private is an indicator variable equal to one for firms without publicly traded equity. Rural is an indicator variable equal to one for firms that have offices only in counties in which the rural population in 1930 is greater than 60%. Low Cash (Small Firm) is an indicator variable equal to one for firms that have Cash/Assets (Total Assets) less than the sample median. Total Assets, Debt/Assets, and Cash/Assets are winsorized at the 1% level. Standard errors that are robust to heteroskedasticity are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(Total Assets)	-0.015 ***	-0.017 ***	-0.016 ***	-0.004	-0.018 ***	-0.018 ***	-0.019 ***	-0.006
	(0.005)	(0.006)	(0.005)	(0.008)	(0.006)	(0.006)	(0.006)	(0.008)
Private	-0.017	0.003	0.003	0.001	-0.026	0.004	0.002	0.000
	(0.017)	(0.013)	(0.013)	(0.013)	(0.019)	(0.015)	(0.014)	(0.014)
Debt/Assets	0.038	0.030	0.037	0.037	0.027	0.018	0.024	0.024
	(0.039)	(0.041)	(0.039)	(0.039)	(0.043)	(0.044)	(0.043)	(0.043)
Cash/Assets	-0.041	-0.053	-0.103	-0.046	-0.025	-0.037	-0.115	-0.033
	(0.057)	(0.058)	(0.075)	(0.057)	(0.061)	(0.062)	(0.082)	(0.061)
ln(1+Number of Directors)	-0.029	-0.020	-0.030	-0.028	-0.031	-0.022	-0.033	-0.030
	(0.019)	(0.020)	(0.019)	(0.019)	(0.021)	(0.022)	(0.021)	(0.021)
Total Connections > Median	0.002	0.027 *	0.021	0.022	-0.004	0.026 *	0.024	0.015
	(0.018)	(0.014)	(0.017)	(0.016)	(0.020)	(0.015)	(0.019)	(0.017)
Total Connections > Median * Private	0.040 *				0.058 **			
	(0.024)				(0.026)			
Total Connections > Median * Rural		0.049				0.074		
		(0.052)				(0.054)		
Rural		-0.036				-0.049		
		(0.026)				(0.032)		
Total Connections > Median * Low Cash			0.007				0.009	
			(0.023)				(0.024)	
Low Cash			-0.022				-0.032	
			(0.019)				(0.020)	
Total Connections > Median * Small Firm				0.005				0.030
				(0.024)				(0.026)
Small Firm				0.035 *				0.029
				(0.020)				(0.021)
Industry Fixed Effects					Yes	Yes	Yes	Yes
State Fixed Effects					Yes	Yes	Yes	Yes
R-squared	0.005	0.004	0.005	0.005	0.019	0.022	0.019	0.019
N	2992	2792	2992	2992	2729	2554	2729	2729