Table A1. Social connections and relationship duration: robustness checks

Panel A: Industry-level R&D intensity is below sample median

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Duration Analysis				Relationship Termination (1/0)	
Regression	Cox	Cox	Weibull	Weibull	OLS	OLS
Connected	0.879**		0.864**		-0.018	
	(0.033)		(0.036)		(0.130)	
Log(pairwise connections)		0.915		0.870**		-0.008
		(0.108)		(0.027)		(0.419)
Control variables	Y	Y	Y	Y	Y	Y
Year FE					Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Observations	1,938	1,938	1,938	1,938	6,146	6,146

Panel B: Industry-level R&D intensity is above sample median

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Duration Analysis				Relationship Termination (1/0)	
Regression	Cox	Cox	Weibull	Weibull	OLS	OLS
Connected	0.873**		0.854**		-0.021*	
	(0.026)		(0.028)		(0.087)	
Log(pairwise connections)		0.917		0.892*		-0.015
		(0.126)		(0.083)		(0.146)
Control variables	Y	Y	Y	Y	Y	Y
Year FE					Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Observations	1,539	1,539	1,539	1,539	5,576	5,576

Panel C. Controlling for supplier R&D

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Duration Analysis				Relationship Termination (1/0)	
Regression	Cox	Cox	Weibull	Weibull	OLS	OLS
Connected	0.878***		0.863***		-0.020**	
	(0.002)		(0.003)		(0.016)	
Log(pairwise connections)		0.922**		0.888***		-0.012*
		(0.037)		(0.009)		(0.094)
Supplier R&D	0.790	0.779	0.787	0.776	-0.067*	-0.067*
	(0.238)	(0.209)	(0.304)	(0.275)	(0.080)	(0.080)
Control variables	Y	Y	Y	Y	Y	Y
Year FE					Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Observations	3,477	3,477	3,477	3,477	11,722	11,722

Notes: The table presents the robustness checks for regressions of supplier-customer relationship duration on the social connections between suppliers and customers. Panel A (B) reports the results for the subsample where the industry average R&D-to-assets ratio is below (above) sample median. Panel C adds Supplier R&D as an additional control variable. The coefficients of other control variables are suppressed for brevity.

Table A2. Social connections weighted by third-party common connections

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
Log(weighted pairwise connections)	0.003*	0.095**	0.123***	0.033***
	(0.084)	(0.033)	(0.000)	(0.000)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Supplier FE			Y	Y
Pair FE	Y	Y		
Observations	12,568	8,748	8,748	8,748
Adjusted R-squared	0.853	0.854	0.614	0.558

Notes: The table presents the robustness checks where we weigh the direct connections between the members (executives and directors) at the supplier and customer based on the common third-party connections the connected members have. Specifically, we compute the weight as the scaled decile rank (ranging from 0.1 to 1) of third-party common connections between any two members (one from the supplier and the other from the customer). We then aggregate the weighted connections across all members at the supplier and take the log form of the detrended measure (*Log(weighted pairwise connections)*). The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A3. Senior managers (SM) vs Non-executive directors (NED)

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Supplier R&D		Log(patents)		Log(supplier cross-citations)		Technological proximity	
Connected (SM)	0.005**		0.078**		0.081***		0.022***	
	(0.025)		(0.019)		(0.000)		(0.000)	
Connected (NED only)	0.001		0.033		0.043*		0.007	
	(0.481)		(0.471)		(0.069)		(0.338)	
Log(pairwise SM connections)		0.006**		0.089**		0.099***		0.027***
		(0.020)		(0.025)		(0.000)		(0.000)
Log(pairwise NED connections only)		0.002		-0.003		0.054*		0.010
		(0.435)		(0.960)		(0.066)		(0.218)
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Supplier FE					Y	Y	Y	Y
Pair FE	Y	Y	Y	Y				
Observations	12,568	12,568	8,748	8,748	8,748	8,748	8,748	8,748
Adjusted R-squared	0.853	0.853	0.854	0.854	0.613	0.614	0.557	0.558

Note: The table presents the robustness checks where we decompose the aggregate pairwise social connections based on the positions the connected individuals hold at the supplier and customer. *Connected (SM)* is a dummy variable which equals 1 if at least one social connection involving senior managers of either side exists, and 0 otherwise. *Connected (NED only)* is a dummy variable which equals 1 if at least one social connection exists between the non-executive directors of supplier and those of customer, and 0 otherwise. *Log(pairwise SM connections)* is the natural logarithm of one plus the detrended number of social connections that involve the senior managers of supplier or customer. *Log(pairwise NED connections only)* is the natural logarithm of one plus the detrended number of social connections between the non-executive directors of supplier and those of customer. The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A4. Education connections

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Supplier R&D	Supplier R&D	Log(patents)		Log(supplier cross-citations)		Technological proximity	
Connected (education)	0.005*		0.042*		0.128***		0.020***	
	(0.082)		(0.065)		(0.000)		(0.007)	
Log(pairwise education connections)		0.006*		0.063**		0.238***		0.035***
		(0.056)		(0.031)		(0.000)		(0.002)
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Supplier FE					Y	Y	Y	Y
Pair FE	Y	Y	Y	Y				
Observations	12,568	12,568	8,748	8,748	8,748	8,748	8,748	8,748
Adjusted R-squared	0.853	0.853	0.861	0.861	0.614	0.618	0.556	0.557

Notes: The table presents the robustness checks with detrended pairwise education connections between the supplier and customer. The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A5. Social connections and supplier innovation: Prior business relationship

Panel A: First-time business relationship

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
Log(pairwise connections)	0.004**	0.077**	0.106***	0.031***
	(0.047)	(0.050)	(0.000)	(0.000)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Supplier FE			Y	Y
Pair FE	Y	Y		
Observations	9,708	6,810	6,810	6,810
Adjusted R-squared	0.854	0.859	0.612	0.554

Panel B: Subsequent business relationship

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
Log(pairwise connections)	-0.002	0.038	0.093*	0.008
	(0.420)	(0.562)	(0.077)	(0.568)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Supplier FE			Y	Y
Pair FE	Y	Y		
Observations	2,860	1,938	1,938	1,938
Adjusted R-squared	0.865	0.860	0.730	0.634

Notes: The table presents the subsample regression results of supplier innovation on the pairwise social connections between suppliers and customers. Panel A (B) reports the results for first-time business relationship (subsequent business relationship) according to the entire Segment File. The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A6. Social connections and supplier R&D: Manufacturing vs. Non-manufacturing suppliers

Panel A: Manufacturing suppliers

	(1)	(2)	(3)	(4)
Dependent variable	Supplier R&D	Supplier R&D	Supplier R&D	Supplier R&D
Connected	0.002	-0.003		
	(0.206)	(0.246)		
Connected*Customer R&D		0.177***		
		(0.010)		
Log(pairwise connections)			0.005**	-0.001
			(0.037)	(0.801)
Log(pairwise connections)*Customer R&D				0.157**
				(0.026)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	9,443	9,443	9,443	9,443
Adjusted R-squared	0.852	0.852	0.852	0.852

Panel B: Non-manufacturing suppliers

	(1)	(2)	(3)	(4)
Dependent variable	Supplier R&D	Supplier R&D	Supplier R&D	Supplier R&D
Connected	0.001	0.000		
	(0.671)	(0.933)		
Connected*Customer R&D		0.047		
		(0.546)		
Log(pairwise connections)			-0.000	-0.000
			(0.859)	(0.967)
Log(pairwise connections)*Customer R&D				-0.019
				(0.826)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	3,125	3,125	3,125	3,125
Adjusted R-squared	0.893	0.892	0.892	0.892

Notes: The table presents the robustness checks for regressions of supplier R&D on the pairwise social connections between suppliers and customers. The dependent variable is suppliers' R&D expenses (XRD) over book value of total assets (AT). Other variable definitions are in Appendix A. Panel A presents the results on subsamples where suppliers come from manufacturing industries (SIC between 2000 and 3999) and Panel B on subsamples where suppliers come from non-manufacturing industries. The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A7. Social connections and supplier innovation: robustness checks

Panel A: Exclude firm-years with zero patents

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Log(patents)		Log(supplier cross-citations)		Technological proximity	
Connected	0.122***		0.180***		0.033***	
	(0.010)		(0.000)		(0.006)	
Log(pairwise connections)		0.086*		0.205***		0.039***
		(0.070)		(0.000)		(0.001)
Control variables	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Supplier FE			Y	Y	Y	Y
Pair FE	Y	Y				
Observations	3,653	3,653	3,653	3,653	3,653	3,653
Adjusted R-squared	0.855	0.855	0.616	0.619	0.521	0.523

Panel B: Negative binomial regressions

Dependent variable	(1)	(2)	(3)	(4)
	# of patents		# of supplier cross-citations	
Connected	0.217***		0.706***	
	(0.004)		(0.000)	
Log(pairwise connections)		0.177***		0.527***
		(0.012)		(0.000)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Observations	8,748	8,748	8,748	8,748

Panel C: Control for customer patents in the regressions

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Log(patents)		Log(supplier cross-citations)		Technological proximity	
Connected	0.063*		0.048***		0.009*	
	(0.056)		(0.007)		(0.099)	
Log(pairwise connections)		0.077**		0.069***		0.018***
		(0.025)		(0.004)		(0.003)
Log(customer patents)	0.061***	0.061***	0.098***	0.097***	0.022***	0.021***
	(0.010)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)
Control variables	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Supplier FE			Y	Y	Y	Y
Pair FE	Y	Y				
Observations	8,748	8,748	8,748	8,748	8,748	8,748
Adjusted R-squared	0.854	0.854	0.642	0.643	0.570	0.570

Notes: The table presents the robustness checks for regressions of supplier's innovation on the social connections between the supplier and customer. The dependent variables are indicated in the table header. Panel A reports the results on subsamples of firm-years with non-zero patents. Panel B reports the results from negative binomial regressions where the dependent variable is the number of patents or supplier cross-citations. Panel C adds customer patents in the regressions. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A8. Supplier-industry × Customer-industry × Year fixed effects

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Supplier R&D		Log(patents)		Log(supplier cross-citations)		Technological proximity	
Connected	0.004**		0.049*		0.065***		0.011*	
	(0.028)		(0.086)		(0.001)		(0.054)	
Log(pairwise connections)		0.004**		0.058*		0.089***		0.019***
		(0.031)		(0.065)		(0.001)		(0.003)
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Supplier FE					Y	Y	Y	Y
Pair FE	Y	Y	Y	Y				
Observations	12,568	12,568	8,748	8,748	8,748	8,748	8,748	8,748
Adjusted R-squared	0.854	0.854	0.871	0.871	0.641	0.642	0.579	0.580

Notes: The table presents the robustness checks controlling for supplier-industry × customer-industry × year fixed effects. The dependent variables are indicated in the table header. In parentheses are p-values based on robust standard errors (White, 1980) clustered by supplier-firm if the dependent variable is measured at the supplier firm-level or by supplier-customer pair if the dependent variable is at the pair-level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of variables as before and the coefficients of these control variables are suppressed for brevity.

Table A9. DID analysis using departures of customer's members: the role of relationship length

Panel A: Relationship length is below sample median

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
After	-0.004	0.031	0.022	-0.002
	(0.469)	(0.169)	(0.491)	(0.892)
After*Connected departure	-0.028***	-0.295*	-0.466*	-0.056*
	(0.004)	(0.065)	(0.070)	(0.069)
Connected departure	0.008	0.114**	0.147	0.002
	(0.574)	(0.048)	(0.101)	(0.961)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	2,134	1,712	1,712	1,712
Adjusted R-squared	0.818	0.800	0.791	0.785

Panel B: Relationship length is above sample median

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
After	0.010**	0.002	0.007	0.005
	(0.040)	(0.904)	(0.768)	(0.689)
After*Connected departure	-0.020	-0.099	-0.162	-0.052
	(0.163)	(0.573)	(0.488)	(0.350)
Connected departure	-0.008	0.047	0.139	0.061
	(0.418)	(0.408)	(0.230)	(0.293)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	2,091	1,593	1,593	1,593
Adjusted R-squared	0.820	0.702	0.690	0.653

Notes: The table presents the subsample regression results for DID analysis that exploits variations in social connections due to the retirements or deaths of directors and senior managers at the *customer* firm. Panel A (B) reports the results for the subsample where business relationship length at the time of customer member departure is below (above) sample median. We control for the same set of variables as those used in Table VIII of the paper and the coefficients of these control variables are suppressed for brevity.

Table A10. DID analysis using departures of supplier's members: the role of relationship length

Panel A: Relationship length is below sample median

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
After	0.001	0.160***	0.099**	0.018
	(0.660)	(0.001)	(0.014)	(0.194)
After*Connected departure	-0.005	-0.268**	-0.169*	-0.113***
	(0.273)	(0.022)	(0.060)	(0.010)
Connected departure	0.002	0.155	0.023	0.034
	(0.782)	(0.299)	(0.778)	(0.587)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	1,706	1,224	1,224	1,224
Adjusted R-squared	0.921	0.873	0.850	0.662

Panel B: Relationship length is above sample median

Dependent variable	(1) Supplier R&D	(2) Log(patents)	(3) Log(supplier cross-citations)	(4) Technological proximity
After	-0.000	-0.009	-0.014	-0.015
	(0.722)	(0.790)	(0.419)	(0.131)
After*Connected departure	-0.002	0.036	-0.097	0.011
	(0.578)	(0.751)	(0.331)	(0.728)
Connected departure	-0.009**	0.015	0.141	-0.053
	(0.020)	(0.932)	(0.483)	(0.293)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pair FE	Y	Y	Y	Y
Observations	1,469	1,143	1,143	1,143
Adjusted R-squared	0.941	0.911	0.867	0.501

Notes: The table presents the subsample regression results for DID analysis that exploits variations in social connections due to the retirements or deaths of directors and senior managers at the *supplier* firm. Panel A (B) reports the results for the subsample where business relationship length at the time of supplier member departure is below (above) sample median. We control for the same set of variables as those used in Table VIII of the paper and the coefficients of these control variables are suppressed for brevity.