### **INTERNET APPENDIX**

### REGIONAL CLUSTERS AND PRODUCT MARKET OUTCOMES DURING TURBULENT TIMES

Sandy Klasa, Hernán Ortiz-Molina, and Matthew Serfling

#### FIGURE IA1 Density of Benchmark Cluster Definitions in Largest Regions

The figure shows the number of Benchmark Cluster Definitions (BCDs) with DENSITY between 0.0-0.4, 0.4-0.8, 0.8-1.2, 1.2-1.6, 1.6-2.0, and  $\geq$ 2.0, respectively, in each of the 20 U.S. regions with the highest employment (from the County Business Patterns database). DENSITY is defined in the Appendix.



#### FIGURE IA2 Dynamic Effects of Regional Cluster Density on Firm Profitability

The figure plots the estimated impact of Ln(DENSITY) on OPERATING\_PROFIT\_MARGIN (operating income before depreciation and amortization scaled by sales) in Graph A and OPERATING\_ROA (operating income before depreciation and amortization scaled by book value of assets) in Graph B in each of the individual years within the period 2003-2014 as well as the associated 90% confidence intervals based on standard errors clustered by BCD×Region. The estimated coefficients are based on a fully dynamic version of Eq. (1) that includes interactions of Ln(DENSITY) with year dummies (year 2006 is the left-out reference period), all control variables interacted with the year dummies, and firm fixed effects. The two alternative specifications further include either BCD-year and region-year fixed effects (solid line) or NAICS6-year and county-year fixed effects (dashed line).



# TABLE IA1Benchmark Cluster Definitions

The table reports the 51 Benchmark Cluster Definitions (BCDs) and the number of six-digit NAICS industries based on the 2002 NAICS classification in each of them. Source: Delgado, Porter, and Stern (2016) and U.S. Cluster Mapping Project.

Code	BCD	# of NAICS	Code	BCD	# of NAICS
1	Aerospace Vehicles and Defense	7	27	Lighting and Electrical Equipment	15
2	Agricultural Inputs and Services	9	28	Livestock Processing	5
3	Apparel	21	29	Marketing, Design, and Publishing	22
4	Automotive	26	30	Medical Devices	5
5	Biopharmaceuticals	4	31	Metal Mining	8
6	Business Services	33	32	Metalworking Technology	17
7	Coal Mining	4	33	Music and Sound Recording	5
8	Communications Equipment and Services	8	34	Nonmetal Mining	13
9	Construction Products and Services	20	35	Oil and Gas Production and Transportation	12
10	Distribution and Electronic Commerce	62	36	Paper and Packaging	20
11	Downstream Chemical Products	13	37	Performing Arts	8
12	Downstream Metal Products	16	38	Plastics	15
13	Education and Knowledge Creation	15	39	Printing Services	13
14	Electric Power Generation and Transmission	5	40	Production Technology and Heavy Machinery	41
15	Environmental Services	7	41	Recreational and Small Electric Goods	15
16	Financial Services	26	42	Textile Manufacturing	23
17	Fishing and Fishing Products	5	43	Tobacco	3
18	Food Processing and Manufacturing	47	44	Trailers, Motor Homes, and Appliances	9
19	Footwear	6	45	Transportation and Logistics	17
20	Forestry	4	46	Upstream Chemical Products	12
21	Furniture	12	47	Upstream Metal Manufacturing	26
22	Hospitality and Tourism	31	48	Video Production and Distribution	6
23	Information Technology and Analytical Instruments	27	49	Vulcanized and Fired Materials	17
24	Insurance Services	8	50	Water Transportation	12
25	Jewelry and Precious Metals	4	51	Wood Products	13
26	Leather and Related Products	6			

# TABLE IA2 Industry Composition of Selected Benchmark Cluster Definitions

The table gives the industry breakdown of BCD #8 "Communications Equipment and Services" and BCD #35 "Oil and Gas Production and Transportation". Source: Delgado, Porter, and Stern (2016) and U.S. Cluster Mapping Project.

Communications H	Equipment and Services	Oil and Ga	as Production and Transportation
<u>NAICS</u>	NAICS Name	NAICS	NAICS Name
334210	Telephone Apparatus Manufacturing	211111	Crude Petroleum and Natural Gas Extraction
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	211112	Natural Gas Liquid Extraction
334290	Other Communications Equipment Manufacturing	213111	Drilling Oil and Gas Wells
335912	Primary Battery Manufacturing	213112	Support Activities for Oil and Gas Operations
515210	Cable and Other Subscription Programming	324110	Petroleum Refineries
517211	Paging	324199	All Other Petroleum and Coal Products Manufacturing
517212	Cellular and Other Wireless Telecommunications	333132	Oil and Gas Field Machinery and Equipment Manufacturing
517410	Satellite Telecommunications	486110	Pipeline Transportation of Crude Oil
517910	Other Telecommunications	486210	Pipeline Transportation of Natural Gas
		486910	Pipeline Transportation of Refined Petroleum Products
		486990	All Other Pipeline Transportation
		541360	Geophysical Surveying and Mapping Services

#### **TABLE IA3 Correlations of Regional Cluster Density with Predetermined Variables**

The table reports the pairwise correlations of pre-GR DENSITY with pre-GR variables using one observation per firm. The variables in Panel A are defined in the Appendix and calculated by averaging over 2005-2007. The additional variables in Panel B are calculated analogously. CASH is cash and cash equivalents scaled by book assets (*che/at*); DIVIDEND PAYER is equal to one if a firm pays a common dividend (dvc), and zero otherwise; WW INDEX is the Whited-Wu (2006) index of financial constraints; HP INDEX is the Hadlock-Pierce (2010) index of financial constraints; RATED is equal to one if a firm has a long-term credit rating (*splticrm* is not missing), and zero otherwise; INVESTMENT\_GRADE is equal to one if a firm's long-term credit rating (splticrm) is investment grade, and zero otherwise. p-values correspond to standard two-tailed t-tests of the null hypothesis that each correlation is equal to zero and are based on heteroscedasticity-robust standard errors clustered by BCD×Region.

Panel A: Correlation of Density with Predetermined Control Variables									
	Obs	Correlation	<u><i>p</i>-value</u>						
Ln(SIZE)	3,155	0.073	0.070						
TANGIBILITY	3,155	0.103	0.342						
Ln(AGE)	3,155	-0.035	0.220						
NET_LEVERAGE	3,155	-0.048	0.451						
PROFITABILITY	3,155	0.011	0.656						
TOBINS_Q	3,155	-0.011	0.326						
CR_ESTAB_GROWTH	3,155	0.098	0.309						
CR_EMP_GROWTH	3,155	0.209	0.095						
CR_BETA_EG	3,155	0.172	0.024						
CR_BETA_SG	3,155	0.026	0.707						
CR BETA RET	3,155	0.104	0.339						

Panel B: Correlation of Density with Additional Proxies for Predetermined Financial Constraints

	Obs	Correlation	<u>p-value</u>
CASH	3,155	0.043	0.562
DIVIDEND_PAYER	3,155	-0.061	0.141
WW_INDEX	3,139	-0.046	0.309
HP_INDEX	3,155	-0.031	0.296
RATED	3,155	0.048	0.226
INVESTMENT_GRADE	3,155	-0.010	0.766

#### **TABLE IA4**

#### Regional Cluster Density and Sales Growth: Controlling for the Likelihood of Government Relief

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES\_GROWTH). DENSITY is the density of a firm's BCD in its region.  $I_{2008-09}$  equals one for the years 2008 and 2009, and zero otherwise.  $I_{2010-12}$  equals one for the years 2010-2012, and zero otherwise. NAICS6\_SHARE is the fraction of employees in a county belonging to a six-digit NAICS industry in the county. GOV\_SUPPLIER\_BCD-REGION is the fraction of firms in a BCD-region that report the government as a major customer in the Compustat-Segment files. LOBBY\_BCD-REGION is the total lobbying expenditures of firms in a BCD-region (data from OpenSecrets.org). GOV\_SUPPLIER is an indicator variable equal to one if a firm reports the government as a major customer. LOBBY is the total lobbying expenditures of a firm. All variables are calculated yearly over 2005 to 2007 and averaged to create single pre-recession measures. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

		SALES (	GROWTH	
	(1)	(2) _	(3)	(4)
$Ln(DENSITY) \times I_{2008-09}$	0.018**	0.022**	0.018**	0.021**
	(2.38)	(2.06)	(2.40)	(2.06)
$Ln(DENSITY) \times I_{2010-12}$	0.020***	0.021*	0.020***	0.021**
	(2.70)	(1.96)	(2.70)	(1.99)
NAICS6_SHARE $\times$ I <sub>2008-09</sub>	-0.001	0.003	-0.001	0.003
	(-0.11)	(0.19)	(-0.18)	(0.19)
GOV_SUPPLIER_BCD-REGION $\times$ I <sub>2008-09</sub>	0.003	0.013		
	(0.45)	(1.31)		
$Ln(1+LOBBY\_BCD-REGION) \times I_{2008-09}$	-0.001	-0.002		
	(-0.16)	(-0.19)	0.004	0.010
NAICS6_SHARE $\times$ I <sub>2010-12</sub>	0.004	0.009	0.004	0.010
CON CURRIER DOD RECIONAL	(0.83)	(0.51)	(0.79)	(0.55)
$GOV\_SUPPLIER\_BCD$ -REGION × $I_{2010-12}$	-0.010	-0.002		
$I_{n}(1 \mid I \text{ ODDV} \mid DCD \mid DCC(ON)) \times I$	(-1.64)	(-0.25)		
$Ln(1+LOBBY_BCD-REGION) \times I_{2010-12}$	-0.003	-0.000		
GOV SUDDI IED X Lange of	(-0.29)	(-0.03)	0.01/**	0 025***
00V_S011LIER ~ 12008-09			(2 34)	(3.05)
$I_n(1+I_OBBV) \times I_{2000,00}$			(2.34)	-0.003
$En(1 + EODD + 1) \times 12008-09$			(-0.21)	(-0.25)
GOV SUPPLIER $\times$ I <sub>2010,12</sub>			-0 019**	-0.011
			(-2.58)	(-1, 01)
$Ln(1+LOBBY) \times I_{2010,12}$			-0.002	-0.001
2			(-0.26)	(-0.05)
	,	,	,	,
Firm FES	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
$BCD \times Year FEs$	$\checkmark$		$\checkmark$	
Region $\times$ Year FEs	$\checkmark$		$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$		$\checkmark$
County × Year FEs		$\checkmark$		$\checkmark$
Observations	18,337	15,405	18,337	15,405
Adjusted R <sup>2</sup>	0.184	0.118	0.185	0.119

## Table IA5 Robustness: Dispersed Operations and Minimum Number of Firms

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES\_GROWTH). Columns (1) and (2) exclude firms that mention an above median number of states in their 10-K filings (data from Garcia and Norli (2012)). Columns (3) and (4) exclude firms in industries with dispersed operations. These industries are Retail Trade (NAICS2 of 44 and 45), Wholesale Trade (NAICS2 of 42), and Transportation (NAICS2 of 48 and 49). Columns (5) and (6) require each BCD and region to have at least four firms in a year to enter the sample. Columns (7) and (8) exclude firms that relocated to a different region at any point between 2002 and 2007. DENSITY is the density of a firm's BCD in its region. I<sub>2008-09</sub> equals one for the years 2008 and 2009, and zero otherwise. I<sub>2010-12</sub> equals one for the years 2010-2012, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

	SALES_GROWTH							
	Below Median # of States		Non-Dispersed Industries		At Least Four Firms in a BCD and Region Each Year		Location Did Not Change Between 2002 and 2007	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Ln(DENSITY) \times I_{2008-09}$	0.037***	0.033**	0.019***	0.023**	0.023***	0.025***	0.014**	0.021**
$Ln(DENSITY) \times I_{2010-12}$	(3.16) 0.043*** (3.72)	(2.00) 0.053*** (3.13)	(2.61) 0.022*** (3.13)	(2.47) 0.025** (2.58)	(3.09) 0.022*** (3.01)	(2.63) 0.026*** (2.64)	(1.99) 0.014** (2.09)	(2.13) 0.017** (2.00)
Firm FEs	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
BCD × Year FEs	$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$	
Region × Year FEs	$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$
County × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$
Observations	8,782	6,971	17,849	15,023	17,339	14,815	18,714	15,718
Adjusted R <sup>2</sup>	0.128	0.023	0.189	0.119	0.193	0.122	0.194	0.124

## TABLE IA6 Regional Cluster Density and Sales Growth: Alternative Functional Forms

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES\_GROWTH). Density is the density of a firm's BCD in its region. DENSITY>P50, DENSITY>P66, and DENSITY>P75 are indicator variables equal to one if Density is above the median, in the top tercile, or in the top quartile of the distribution, respectively, and zero otherwise. I<sub>2008-09</sub> equals one for the years 2008 and 2009, and zero otherwise. I<sub>2010-12</sub> equals one for the years 2010-2012, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

			SALES	GROWTH		
	(1)	(2)	(3) -	(4)	(5)	(6)
DENSITY>P50 × $I_{2008-09}$	0.017	0.033**				
	(1.45)	(2.09)				
DENSITY>P50 × $I_{2010-12}$	0.029**	0.048***				
	(2.32)	(2.95)				
DENSITY>P66 × I <sub>2008-09</sub>			0.022*	0.042**		
			(1.83)	(2.45)		
$DENSITY > P66 \times I_{2010-12}$			0.025*	0.039*		
			(1.66)	(1.94)	0.00 (*	
DENSITY>P/5 $\times$ I <sub>2008-09</sub>					0.026*	0.056**
DEMOTEVA D75 VI					(1.81)	(2.32)
DENSITY > $P/5 \times I_{2010-12}$					$0.054^{***}$	$0.0/2^{***}$
					(3.21)	(3.03)
Firm FEs	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
$BCD \times Year FEs$	$\checkmark$		$\checkmark$		$\checkmark$	
Region $\times$ Year FEs	$\checkmark$		$\checkmark$		$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$
County × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$
Observations	19,501	16,395	19,501	16,395	19,501	16,395
Adjusted R <sup>2</sup>	0.191	0.123	0.190	0.123	0.191	0.123

### TABLE IA7 Regional Cluster Density and Sales Growth: Non-Linear Relation

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES GROWTH). In columns (1) and (2), DENSITY is the density of a firm's BCD in its region. In columns (3) and (4), DENSITYT2 and DENSITYT3 are indicator variables that equal one if DENSITY is in the second or third terciles of the distribution, respectively, and zero otherwise. In columns (5) and (6), DENSITYQ2, DENSITYQ3, and DENSITYQ4 are indicator variables that equal one if DENSITY is in the second, third, or fourth quartiles of the distribution, respectively, and zero otherwise.  $I_{2008-09}$  equals one for the years 2008 and 2009, and zero otherwise.  $I_{2010-12}$  equals one for the years 2010-2012, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET LEVERAGE, PROFITABILITY, TOBINS Q, CR EMP GROWTH, CR ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

			SALES_O	GROWTH		
	(1)	(2)	(3)	(4)	(5)	(6)
DENSITY $\times$ I <sub>2008-09</sub>	0.026**	0.062***				
	(2.05)	(3.37)				
DENSITY $\times$ I <sub>2010-12</sub>	0.030**	0.041**				
DENGITYTA	(2.40)	(2.55)	0.001	0.005		
DENSITY 12 $\times$ I <sub>2008-09</sub>			-0.001	0.005		
DENGITYT2 V I			(-0.07)	(0.24)		
DEINSITY 15 × 12008-09			(1.58)	(2, 20)		
DENSITYT2 × I2010 12			(1.38) 0.012	(2.29)		
DENSITI 12 ~ 12010-12			(0.96)	(0.612)		
DENSITYT3 × I2010 12			0.030*	0.044**		
			(1.85)	(2.05)		
DENSITYQ2 $\times$ I <sub>2008-09</sub>			()		0.005	0.001
					(0.28)	(0.03)
DENSITYQ3 $\times$ I <sub>2008-09</sub>					0.012	0.016
					(0.74)	(0.69)
DENSITYQ4 × $I_{2008-09}$					0.031*	0.061**
					(1.85)	(2.40)
DENSITYQ2 × $I_{2010-12}$					0.017	0.006
DENGETION					(1.10)	(0.26)
DENSITYQ3 × $I_{2010-12}$					0.019	0.031
DENGITYO4 × I					(1.28)	(1.48)
DENSITY $Q4 \times I_{2010-12}$					(2, 21)	(2, 22)
					(3.31)	(3.22)
Firm FEs	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
$BCD \times Year FEs$	$\checkmark$		$\checkmark$		$\checkmark$	
Region × Year FEs	$\checkmark$		$\checkmark$		$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$
County × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$
Observations	19,501	16,395	19,501	16,395	19,501	16,395
Adjusted R <sup>2</sup>	0.191	0.123	0.190	0.122	0.191	0.123

### TABLE IA8Regional Cluster Share and Sales Growth

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES\_GROWTH). REGSHARE is the number of employees in a BCD-region scaled by the total number of employees in a BCD nationwide. I<sub>2008-09</sub> equals one for the years 2008 and 2009, and zero otherwise. I<sub>2010-12</sub> equals one for the years 2010-2012, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

	SALES_	GROWTH
	(1)	(2)
REGSHARE $\times$ I <sub>2008-09</sub>	0.019**	0.029**
	(2.41)	(2.51)
<b>REGSHARE</b> $\times$ I <sub>2010-12</sub>	0.021***	0.028***
	(2.68)	(3.07)
Firm FEs	$\checkmark$	$\checkmark$
BCD × Year FEs	$\checkmark$	
Region × Year FEs	$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$
County × Year FEs		$\checkmark$
Observations	19,501	16,395
Adjusted R <sup>2</sup>	0.191	0.123

### TABLE IA9 Regional Cluster Density and Acquisition Activity

The table reports the results from OLS regressions relating M&A activity to regional cluster density estimated over the years 2005-2012 in columns (1)-(4) and (6)-(9) and 2003-2014 in columns (5) and (10). The dependent variable is an indicator variable equal to one if a firm makes an acquisition during the year, and zero otherwise (ACQUISITION\_DUMMY) in columns (1)-(5) and the total value of the acquisitions it makes in a year scaled by lagged market value of assets ( $VALUE_OF_ACQUISITIONS$ ) in columns (6)-(10). We obtain deal announcements of U.S. targets from the SDC database and apply standard filters following Masulis, Wang, and Xie (2007). To be included in the sample, deals must satisfy the following criteria: (i) the acquirer owns less than 50% of the target before the deal and owns 100% after the deal, (ii) the deal value is at least \$1 million, (iii) the deal amount scaled by the acquirer's market value of equity on the 11th trading day before the deal announcement is at least 1%, (iv) the deal form is "Merger", "Acq. of Assets", or "Acq. Maj. Int.", and (v) the deal is eventually completed. DENSITY is the density of a firm's BCD in its region. I<sub>2008-09</sub> equals one for the years 2008 and 2009, and zero otherwise. I<sub>2010-12</sub> equals one for the years 2010-2012, and zero otherwise. I<sub>2013-14</sub> equals one for the years 2013 and 2014, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

		ACQU	ISITION_DU	JMMY			\$VALUE OF ACQUISITIONS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I <sub>2008-09</sub>	-0.050***					-0.012***				
	(-7.59)					(-7.67)				
I <sub>2010-12</sub>	-0.032***					-0.008***				
	(-4.68)					(-4.43)				
$Ln(DENSITY) \times I_{2008-09}$		-0.002	0.002	-0.001	-0.005		0.001	0.002	0.001	-0.000
		(-0.38)	(0.31)	(-0.12)	(-0.55)		(0.62)	(0.87)	(0.41)	(-0.04)
$Ln(DENSITY) \times I_{2010-12}$		-0.008	-0.005	-0.003	-0.007		0.000	0.001	0.003	0.001
		(-1.23)	(-0.70)	(-0.31)	(-0.79)		(0.20)	(0.62)	(1.04)	(0.60)
$Ln(DENSITY) \times I_{2013-14}$					-0.024**					-0.004
					(-2.30)					(-1.13)
Firm FEs	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$						
BCD × Year FEs		$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$		
Region × Year FEs		$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$		
Controls $\times$ I <sub>2008-09</sub>			$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>			$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2013-14</sub>					$\checkmark$					$\checkmark$
NAICS6 × Year FEs				$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$
County × Year FEs				$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$
Observations	19,752	19,501	19,501	16,395	24,010	19,373	19,116	19,116	16,021	23,487
Adjusted R <sup>2</sup>	0.198	0.186	0.188	0.162	0.157	0.080	0.065	0.072	0.025	0.033

#### Variable Definitions for Table AI10

**DENSITY BREADTH**: breadth of BCD c in region r, defined as the fraction of industries in BCD c that have location quotients greater than 1.5 in region r, averaged over 2005-2007 (time invariant). As in Delgado and Porter (2021), for each NAICS6 industry *i* in BCD *c* and region *r*, using CBP data, we first calculate  $D_{i,c,r} = \left(\frac{1+emp_{i,r}}{emp_{i,N}}\right) / \left(\frac{emp_r}{emp_r}\right)$ , where  $emp_{i,r}$  is employment of industry *i* in region *r*,  $emp_{i,N}$  is employment of industry *i* in the nation,  $emp_r$  is employment in region *r*,  $emp_N$  is nationwide employment. We then calculate  $DENSITY_BREADTH_{c,r} = \frac{1}{N_c} \sum_{i \in c} I(D_{i,c,r} > 1.5)$ , where *N* is the number of industry is DCD.  $N_c$  is the number of industries in BCD c, and I is an indicator function for whether the condition inside the parenthesis is met. The variable is calculated for each year using data from CBP and then averaged over 2005-2007.

**DENSITY** CUS: density (location quotient) of related customer industries in BCD c located in region r, averaged over 2005-2007 (time invariant). As in Delgado and Porter (2021), for each NAICS6 industry i in BCD c and region r, we first calculate  $D_{CUS_{i,c,r}} = \left(\frac{1+\sum_{j \in c, j \neq i} \omega_{cus_{i,j}} \times emp_{j,r}}{\sum_{j \in c, j \neq i} \omega_{cus_{i,j}} \times emp_{j,N}}\right) / \left(\frac{emp_r}{emp_N}\right)$ , where  $emp_{j,r}$  is employment of industry *j* in region *r*,  $emp_{j,N}$  is employment of industry *j* in the nation,  $emp_r$  is employment in region *r*,  $emp_N$  is nationwide employment, and

 $\omega cus_{i,i}$  is the percentage of industry i's output sold to industry j based on the 2002 BEA Input-Output tables. Employment data from CBP. We then calculate DENSITY CUS<sub>c.r</sub> by averaging D CUS<sub>i.c.r</sub> across all industries in BCD c and region r. The variable is calculated for each year and then averaged over 2005-2007.

**DENSITY KNOW:** density (location quotient) of BCD c in region r based on the stock of knowledge, averaged over

2005-2007 (time invariant). As in Delgado and Porter (2021),  $DENSITY\_KNOW_{c,r} = \left(\frac{1+know_{c,r}}{know_{c,N}}\right) / \left(\frac{know_r}{know_r}\right)$ , where  $know_r$  is the stock of patents of BCD c in region r,  $know_{c,N}$  is the stock of patents of BCD c in the nation,  $know_r$  is the stock of patents in region r, and know<sub>N</sub> is the stock of patents in the nation. The variable is calculated for each year and then averaged over 2005-2007. The stock of patents is calculated using the perpetual inventory method with a depreciation rate of 30% (Bloom and Van Reenen, 2002) and data from the USPTO obtained through PatentsView.org. Beginning in 1976, we calculate the number of eventually granted patents in a BCD-region each year. We match patents to a region based on inventor location and attribute fractional patents to a region using equal weights when a patent has more than one inventor. We match USPC patent classifications to NAICS6 codes using the concordance file available at Nikolas Zolas' website (Goldschlag, Lybber, and Zolas, 2019). When a USPC code maps to more than one NAICS code, we attribute fractional patents to a NAICS using the provided probability weights.

**DENSITY OCC:** density (location quotient) of industries with similar occupations in BCD c located in region r, averaged over 2005-2007 (time invariant). As in Delgado and Porter (2021), for each NAICS6 industry *i* in BCD *c* and region *r*, we first calculate  $D\_OCC_{i,c,r} = \left(\frac{1+\sum_{j \in c, j \neq i} \omega_{occi,j} \times emp_{j,r}}{\sum_{j \in c, j \neq i} \omega_{occi,j} \times emp_{j,N}}\right) / \left(\frac{emp_r}{emp_N}\right)$ , where  $emp_{j,r}$  is employment of industry *j* in

region r,  $emp_{i,N}$  is employment of industry j in the nation,  $emp_r$  is employment in region r,  $emp_N$  is nationwide employment, and  $\omega$  occ<sub>i,j</sub> is the pairwise correlation between the occupation composition of industries i and j normalized to add to one within each BCD-region cell (based on 2009 OES data). We then calculate DENSITY OCC<sub>c,r</sub> by averaging D  $OCC_{i,c,r}$  across all industries in BCD c and region r. The variable is calculated for each year and then averaged over 2005-2007.

**DENSITY** SUP: density (location quotient) of related supplier industries in BCD c located in region r, averaged over 2005-2007 (time invariant). As in Delgado and Porter (2021), for each NAICS6 industry i in BCD c and region r, we first calculate  $D\_SUP_{i,c,r} = \left(\frac{1+\sum_{j \in c, j \neq i} \omega\_sup_{i,j} \times emp_{j,r}}{\sum_{j \in c, j \neq i} \omega\_sup_{i,j} \times emp_{j,N}}\right) / \left(\frac{emp_r}{emp_N}\right)$ , where  $emp_{j,r}$  is employment of industry *j* in region *r*,  $emp_{j,N}$  is employment of industry *j* in the nation,  $emp_r$  is employment in region *r*,  $emp_N$  is nationwide employment, and  $\omega sup_{i,i}$  is the percentage of industry i's intermediate purchases bought from industry j based on the 2002 BEA Input-Output tables. We then calculate DENSITY SUP<sub>c,r</sub> by averaging D SUP<sub>i,c,r</sub> across all industries in BCD c and region r. Employment data are from CBP. The variable is calculated for each year and then averaged over 2005-2007.

### TABLE IA10 Regional Cluster Density and Sales Growth: Cluster Density Channels

The table reports the results from OLS regressions relating a firm's sales growth rate to regional cluster density estimated over the years 2005-2012. The dependent variable is a firm's sales growth rate (SALES\_GROWTH). DENSITY\_\* in columns (1)-(8) is the density of a firm's BCD in its region in which weights are based on supplier links (DENSITY\_SUP), customer links (DENSITY\_CUS), occupation similarities (DENSITY\_OCC), and stock of patents (DENSITY\_KNOW), respectively. In columns (9) and (10), DENSITY\_\* is the cluster breadth in a BCD-region (DENSITY\_BREADTH). I<sub>2008-09</sub> equals one for the years 2008 and 2009, and zero otherwise. I<sub>2010-12</sub> equals one for the years 2010-2012, and zero otherwise. The pre-recession control variables include Ln(SIZE), TANGIBILITY, Ln(AGE), NET\_LEVERAGE, PROFITABILITY, TOBINS\_Q, CR\_EMP\_GROWTH, CR\_ESTAB\_GROWTH, CR\_BETA\_EG, CR\_BETA\_SG, and CR\_BETA\_RET. All variables are defined in the Appendix. The *t*-statistics in parentheses are calculated from heteroscedasticity-robust standard errors clustered by BCD×Region. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

	Alternative Measures of Regional Cluster Density									
	DENSIT	Y_SUP	DENSIT	Y_CUS	DENSITY_OCC		DENSITY_KNOW		DENSITY_BREADTH	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(DENSITY_*) × $I_{2008-09}$	0.016**	0.019**	0.018***	0.023**	0.015**	0.025**	0.017**	0.028***	0.012*	0.019**
$Ln(DENSITY_*) \times I_{2010-12}$	(2.35) 0.020*** (2.85)	(2.06) 0.021** (2.30)	(2.61) 0.020*** (2.97)	(2.49) 0.022** (2.37)	(2.15) 0.020*** (2.98)	(2.57) 0.024** (2.57)	(2.40) 0.013* (1.73)	(2.81) 0.024** (2.33)	(1.78) 0.016** (2.30)	(2.16) 0.021** (2.21)
Firm FEs	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
BCD × Year FEs	$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$	
Region × Year FEs	$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$	
Controls $\times$ I <sub>2008-09</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Controls $\times$ I <sub>2010-12</sub>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
NAICS6 × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$
County × Year FEs		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$
Observations	19,501	16,395	19,501	16,395	19,501	16,395	19,501	16,395	19,501	16,395
Adjusted R <sup>2</sup>	0.191	0.123	0.191	0.123	0.191	0.123	0.191	0.123	0.191	0.123