How Does Labor Market Size Affect Firm Capital Structure? Evidence from Large Plant Openings

Online Appendix (Not for Publication)*

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May 2020

* Any opinions and conclusions expressed herein are those of the author and do not necessarily represent the views of the US Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed. This research uses data from the Census Bureau's Longitudinal Employer Household Dynamics Program, which was partially supported by the following: National Science Foundation Grants SES-9978093, SES-0339191 and ITR-0427889; National Institute on Aging Grant AG018854; and grants from the Alfred P. Sloan Foundation.
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Online Appendices

Online Appendix A – External Validity: Analysis of Panel Data

A.1. Empirical approach and sample construction

The empirical analysis in the main text provides the first evidence on the relation between labor market size and firm capital structure decisions. However, the external validity of the results is not warranted, given that the analysis is based on a selected sample of large plant opening events. In this appendix, I examine whether the relation holds in a more general setting using a broad panel of Compustat firms. To this end, I first construct a measure of local labor market size following a similar approach to the previous analysis. Specifically, for each two-digit SIC industry and county cell, I measure its labor market size using the number of workers from the LBD data.[1] Then, I compute a firm-level measure of labor market size as the log of one plus the value-weighted average of the number of workers in the industry and county in which the firm operates (e.g., Tate and Yang, 2015):

$$Labor\ market\ size_{it} = \log(1 + \sum_j \sum_c w_{ijct} \times\ num.\ of\ workers_{ijct}), \qquad \text{(A1)}$$

where Labor market size$_{it}$ is the measure of labor market size of firm i in year t, w_{ijct} is the fraction of firm i's workers, and num. of workers$_{ijct}$ is the number of workers employed in industry j, county c, and year t. I use the log of the measure in empirical analysis, given that the raw measure is highly right-skewed.

To avoid biases in the estimate due to the firm-specific permanent component in leverage ratios as well as the measure of labor market size, I estimate the following leverage equation with firm and year fixed effects (e.g., Lemmon, Roberts, and Zender, 2008):

$$Leverage_{ijt} = \alpha_i + \alpha_{jt} + \beta_1 Labor\ market\ size_{it-1} + \gamma' X_{it-1} + \varepsilon_{ijt}, \qquad \text{(A2)}$$

where α_i is firm fixed effects, α_{jt} is industry-by-year fixed effects, Leverage$_{ijt}$ is the debt-to-capital ratio defined as total debt (long-term plus short-term debt) divided by the sum of book value of equity and total debt, Labor market size$_{it-1}$ is a lagged firm-level measure of market size computed in Eq. (A1), X_{it-1} is a set of one-year lagged firm-level control variables described in Eq. (5), and ε_{ijt} is the residual for firm i in industry j and year t. Standard errors are adjusted

[1]This approach is also consistent with the asset redeployability literature, which measures the size (or thickness) of asset markets using the number of assets used in the market (e.g., Benmelech, 2009; Gavazza, 2011).

for sample clustering at the firm level. Consistent with the main analysis, my identification relies on within-firm variation in labor market size and leverage, given the firm fixed effects included.

Consistent with the sample construction in the main text, I focus on firm-year observations in the manufacturing industries from Compustat (SIC codes 2000-3999). Further, I obtain plant-level data on location and industry classification from the LBD. I link these plant observations to firm observations from Compustat using a bridge file created by the Census Bureau. Given that the LBD data are available from 1976 to 2009 and I lag the measure of market size computed using the LBD by one year relative to firm-level variables, the sample period is from 1977 to 2010. Last, following the approach to the displaced worker analysis in Section 5.6, which uses relatively small labor markets, I focus on firm-year observations with a measure of labor market size below the median. The resulting sample includes approximately 23,000 firm-year observations from 1977 to 2010.

Online Appendix Table 1 shows descriptive statistics on the firm-year observations used in the panel analysis. Notably, a typical firm in the sample has approximately 2,540 (= exp(7.84)) workers in its local labor markets. Statistics for leverage and financial control variables are generally similar with corresponding values reported in Table 2.

A.2. Empirical results

Online Appendix Table 2 presents the estimation results for the model in Eq. (A2). The specification in column 1 includes firm and year fixed effects but excludes other firm-level control variables. The coefficient on "Market size" is 1.04 and statistically significant at the 5% level, suggesting that the size of labor markets is positively associated with firm leverage ratios. Column 2 further includes the firm-level control variables to the baseline regression and shows a qualitatively similar result. Column 3 further includes two-digit SIC industry-by-year fixed effects to control for time-varying industry shocks and finds a qualitatively similar result. In terms of economic magnitude, the coefficient estimate in column 2 suggests that a one-standard deviation increase in market size leads to a 1.17 (= 0.865 × 1.35) percentage point increase in leverage ratio.

Overall, the results based on a large panel of firms are consistent with the results based on plant opening events, showing that firms operating in a large labor market use more debt compared to equity. Moreover, if variation in the firm-level measure of labor market size is exogenous after controlling for firm and year fixed effects and firm-level characteristics, these estimates could have a causal interpretation (which is plausible, given that the measure is driven in part by the opening and closing of plants owned by other firms in a given industry and county). However, I interpret these results with caution, given the potential endogeneity of firm location.

Online Appendix B – Discussion of Value Impact of Leverage Increase

Table 5 shows that an average manufacturing plant opening in the sample leads existing manufacturing firms in the winner county to increase their debt-to-capital ratio by 3.74 percentage points in a year after the opening. In this appendix, I discuss the value implications of this leverage increase. First, to be consistent with existing research on capital structure, which commonly uses the debt-to-assets ratio as a measure of leverage (e.g., Almeida and Philippon, 2007), I use an estimate for the increase in the debt-to-assets ratio in a year after the plant opening, which is 2.17 percentage points, as the effect of the plant opening.

Next, I attempt to quantify the economic magnitude of the effect of additional debt usage on firm value. I focus on interest tax deduction as the source of benefits. The marginal corporate tax rate for an average firm in the sample obtained from Graham (1996) is 31.0%. To estimate tax benefits adjusted for personal tax penalty of debt, I use Graham's (2000) estimates that the tax benefits before and after adjusting for personal taxes are 9.7% and 4.3% of firm value, respectively. Thus, my estimate for the marginal tax rate adjusted for personal tax penalty is 31.0% × 0.44 (= 4.3%/9.7%) = 13.8%. Then, a 2.17 percentage point perpetual increase in leverage ratio implies an incremental gross tax benefit equal to 0.30% (= 13.8% × 2.17%) of book assets. However, this estimate does not account for an additional cost of financial distress due to increased leverage, and so it should be interpreted as an upper bound for the net benefit of the leverage increase. If I apply the recent finding that net benefits of debt are approximately one-third of gross benefits of leverage (e.g., van Binsbergen, Graham, and Yang, 2010), the net benefits due to the incremental leverage would be about 0.10% of book assets. Given that there are on average about seven public firms in the winner county with average book assets of $2.18 billion (thus the aggregate book value of these firms is about $15.3 billion), this estimate implies an aggregate value impact of the leverage increase ranging from $15.2 (net) to $45.5 million (gross). These values are 0.06% to 0.18% of the aggregate market value of incumbent firms in the average winner county ($25.3 billion).

To put these magnitudes in perspective, I benchmark them with firm value changes due to one-standard deviation changes in common determinants of corporate leverage (i.e., asset size, tangibility, market-to-book, and ROA). I find that a one-standard deviation change in most of the determinants leads to a similar magnitude change in the net (0.01% to 0.20% of market value) and gross tax benefits of debt (0.03% to 0.59%).

While this magnitude of incremental firm value appears large at first glance given the local nature of the shocks, it is reasonable in the following sense. First, workers in the winner or runner-up county account for 25% of the total workforce of parent firms on average, implying that the large plant opening would significantly increase the size of labor markets that the parent firms face. Second, the estimate represents a "general equilibrium" effect of an expansion in local labor market size triggered by the introduction of a large plant. As Greenstone, Hornbeck, and Moretti (2010, GHM hereafter) document using a similar sample, the winner county experiences a significant increase in market size (proxied by the number of manufacturing plants) even several years after the plant opening. Thus, the magnitude should incorporate the effect of the expected future (as well as realized) increase in labor market size.

Online Appendix C – Reconciling Estimates for Wage Effects with GHM

To reconcile this paper's estimates for the effect of large plant openings on wages with GHM's (2010), I first mimic their analysis of wages using plant-level data. Note that GHM use repeated cross-sections of individuals from the decennial Public Use Micro Sample (PUMS) Census data, which do not have firm or plant identifiers. Therefore, it is not possible to exclude workers employed by the new plant in that empirical approach. To mimic the individual-level wage regression in GHM, I re-estimate the wage regression using the Census plant-level data in which each plant observation is weighted by its employment, and including year and plant-opening event fixed effects but excluding plant fixed effects.[2] Using this specification, I find that including the MDP observations in my plant-level wage regression increases the coefficient on "After × Winner" by 0.018 (log average annual pay) to 0.045 (log per-hour wage), relative to the case that excludes the MDP observations post-event. This result suggests that employees of MDPs are paid considerably higher wages than those of existing plants in the winner county, which makes sense, given the large size of the new plant relative to existing plants and the large firm wage premium documented in the literature (e.g., Brown and Medoff, 1989). It thus appears that the difference in estimates for wage changes between the two papers [i.e., a 2.7% increase in GHM (2010, Table 9) versus -0.1% to 0.3% changes in this paper, Table 8] is largely explained by the fact that GHM's worker-level sample from the PUMS data includes the employees of MDPs (who apparently earn higher wages than those of existing plants) for the winner counties post-event.

Online Appendix D – Linking Response of Leverage to Changes in Labor Market Size and Earnings Loss Risk

I use the estimates of the impact of labor market size on workers' earnings loss after a job loss (in Table 9) to examine whether the economic magnitudes of the effect of plant openings on firm leverage are consistent with the following mechanism: a reduction in earnings loss risk (that might occur if labor market size increases) encourages firms to take on more financial leverage. In this appendix, I explore this issue in several steps.

First, I estimate how much the introduction of a typical million dollar plant (MDP) would increase the labor market size for the average firm in the market using the following sub-steps. (a) For each of the winner and runner-up counties in the sample, I compute the percentage change in local labor market size, measured by total manufacturing employment in a given county from the Census of Manufactures (CMF) data, from before to after a plant opening. (b) In cases where there are multiple winners or runners-up in a given event (see Table 1), I take the average of the percentage change in labor market size within the winner

[2] An alternative is to estimate a wage regression using the LEHD data. However, the sample period for the LEHD data (1985–2008, but MD is the only state covered until 1989) does not overlap much with the MDP event sample period (1980–1995).

group and separately within the runner-up group. (c) Then I take the difference in average percentage change between the winner and runner-up counties of a given MDP event. (d) I average this difference in average percentage change in market size between the winner and runner-up across the 40 MDP events. This calculation produces an average percentage increase in labor market size of 22.4% for the winner relative to the runner-up counties. This magnitude suggests that a typical MDP leads to a considerable expansion of the winner county's manufacturing labor market relative to the runner-up county's.

Second, I estimate how much a typical MDP would reduce earnings losses of displaced workers using the following sub-steps. (a) To impute the magnitude of the increase in labor market size due to a typical MDP into the estimates of earnings loss for displaced workers from Table 9, which uses variation in market size in logs, I transform the 22.4% increase in labor market size into a log change of 0.202 (= log(1+0.224)). (b) To obtain an estimate for the effect of a typical MDP on earnings losses, I multiply 0.202 by the coefficients on "d[t+j] × DS × Market Size" ($0 \leq j \leq 5$) in Table 9, which uses county-level log manufacturing employment as a measure of labor market size.[3] (c) Transforming these log changes back to percentage changes in earnings (e.g., exp(0.038) – 1 = 3.92% for year t+1) and summing the present values of earnings changes from years t to t+5, I find that a typical MDP is associated with a 13.8% smaller (relative to pre-displacement annual earnings) PV earnings loss. (d) Comparing this magnitude with the PV earnings losses for displaced workers in the average local labor market (47.3% of pre-displacement annual earnings) gives a 29.1% (= 13.8%/47.3%) reduction in PV job displacement cost that is tied to a typical MDP opening.[4]

Third, I benchmark the effect of a typical MDP opening on leverage (a 0.96 percentage point increase in debt-to-assets ratio). Thus, assuming that a reduction in costs of displacement drives the increase in leverage and given that a typical winner firm has 25% of their workforce in the county (Table 2), the implied semi-elasticity of leverage to earnings loss costs is -0.132

[3] For example, for year t+1, 0.202 × 0.190 ("d[t+1] × DS × Market Size") = 0.038 represents a change in log real earnings of displaced workers in year t+1 due to a typical MDP opening.
[4] To maintain consistency with the fourth step, in which I compute the reduction in unemployment costs due to a 100-log point increase in UI benefits relative to the case with a no UI-benefits assumption, the PV earnings losses here are also not adjusted for unemployment insurance (UI) payments to displaced workers. Adjusting for UI benefits both in this step and the fourth step leads to similar relative magnitudes of the semi-elasticities from my estimates and those of Agrawal and Matsa (2013) (-0.089 versus -0.054).

(= 0.96%/(-29.1% × 0.25)). This -0.132 is similar to the -0.145 semi-elasticity implicit in Agarwal and Matsa (2013), which is derived as described in the next three paragraphs.

In the fourth and final step, I compare this -0.132 semi-elasticity to other estimates of how corporate leverage responds to changes in earnings loss risk. In particular, Agrawal and Matsa (2013, Table 3, Panel B) find that a 100-log point increase in UI benefits is associated with up to a 4.0 percentage point increase in leverage, defined as debt-to-assets ratio. In addition, they show that a 100-log point increase in UI benefits from the status quo (i.e., with actual UI benefits) will decrease workers' required wage premium (for each percentage point of unemployment risk) from 0.93% to 0.24%.

From these estimates of wage premia, I back out the cost of unemployment by assuming that the size of wage premia (i.e., compensating wage differentials) is proportional to the expected costs of unemployment for workers (see Graham et al. (2019) for a similar approach). To this end, I first use the wage premium of 2.5% under a no-UI benefits assumption (Topel, 1984) to gauge the "gross" cost of unemployment as a benchmark. I then compute changes in wage premia relative to this benchmark as a measure of the reduction in unemployment costs due to UI benefits. Specifically, the 0.93% wage premium under actual UI benefits relative to the benchmark premium of 2.5% implies that average UI benefits reduce the expected unemployment cost to 0.372 (= 0.93%/2.5%) of the gross cost. Similarly, the 0.24% wage premium relative to the benchmark of 2.5% implies that UI benefits that are 100-log point higher than the average reduce the expected unemployment cost to 0.096 (= 0.24%/2.5%) of the gross cost. This calculation implies that when UI benefits increase by 100 log points from the average, unemployment costs decrease by 0.276 (= 0.372 - 0.096) of the total, "gross" unemployment costs. This comparison to the gross costs is consistent with my calculation of the effect of a typical MDP on PV earnings losses after job displacement (second step above), in which the PV earnings losses are not adjusted for UI payments to displaced workers.

These estimates from Agrawal and Matsa (2013) imply a semi-elasticity of leverage to unemployment costs of -0.145 (= 4.0%/-27.6%). Thus, the semi-elasticities from my estimates and those of Agrawal and Matsa (2013), -0.132 versus -0.145, are similar in order of magnitudes. Despite being reliant on a number of assumptions and thus speculative, the comparable magnitudes suggest that a considerable portion of the leverage increase may be ascribed to an enlarged labor market size.

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Online Appendix Tables

ATable 1: Descriptive statistics for panel data analysis

This table presents descriptive statistics on firm-year observations in the manufacturing industries (SIC codes 2000–3999) from Compustat used in the panel data analysis from 1977 to 2010. "Market size" is the log number of workers in the two-digit SIC industry and county and used as a measure of local labor market size. All other variables are defined in Table 2 in the main text. The number of observations is rounded to the nearest thousand per Census Bureau disclosure rules.

	(1)	(2)
Variable	Mean	SD
Leverage	0.33	0.27
Cash holdings	0.13	0.17
Log assets	4.66	2.09
Tangibility	0.30	0.17
Market-to-book	1.98	1.85
Return on assets	0.11	0.19
Labor intensity	9.32	36.19
Capex	0.29	0.33
R&D	0.05	0.08
Sales growth	0.09	0.26
Market size	7.84	1.35
Observations	23,000	-

ATable 2: Panel estimates for relation between labor market size and leverage

This table presents estimation results for the panel regression of leverage ratios on a measure of the size of local labor markets, firm and year fixed effects, and firm-level control variables using firm-years in the manufacturing industries (SIC codes 2000–3999) from Compustat from 1977 to 2010. "Market size" is the log number of workers in the two-digit SIC industry and county and used as a measure of local labor market size. All other variables are defined in Table 2 in the main text. Standard errors adjusted for sample clustering at the firm level are reported below coefficient estimates in parentheses. Numbers of observations are rounded to the nearest thousand per Census Bureau disclosure rules.

	(1)	(2)	(3)
Dependent variable:	Leverage (%)		
Market size	1.043	0.865	0.967
	(0.431)	(0.417)	(0.392)
log(assets)	-	0.472	0.247
	-	(0.562)	(0.525)
Tangibility	-	21.660	21.380
	-	(3.450)	(3.150)
Market-to-book	-	–0.558	–0.541
	-	(0.148)	(0.138)
ROA	-	–16.510	–15.970
	-	(1.700)	(1.597)
Firm fixed effects	Y	Y	Y
Year fixed effects	Y	Y	
Industry × year fixed effects			Y
Observations	23,000	23,000	23,000
R^2	0.6723	0.6837	0.6991

ATable 3: Plant characteristics for winner and Runner-up counties

This table presents means of plant-level characteristics for those in the winner and runner-up counties (measured one year before the large plant opening) as well as plants in all other US counties. Column 4 (5) shows *t*-statistics for the difference in each variable between the winner and runner-up (all other US) counties. The sample is restricted to plants that had existed for the seven consecutive years before the opening of the new manufacturing plant but excludes the new plant itself and any plants owned by the opening firm. "Output" is total value of shipments and a measure of sales from plants in thousand dollars; "% change, over last 5 years" is the annualized growth rate of plant output over the five years before the plant opening; "Total employees" is the number of total employees; "Total hours" is the number of production and nonproduction worker hours; "Capital" is the sum of real net stock of equipment and structures in thousand dollars, constructed using a perpetual inventory formula.

	(1) Winner	(2) Runner-up	(3) All Other US	(4) *t*-statistic (1) – (2)	(5) *t*-statistic (1) – (3)
Num. of counties	39	52	1929	-	-
Num. of incumbent plants	23.5	19.6	6.9	0.78	3.27
Output ($1,000s)	109,949	110,315	60,801	–0.02	2.89
% change, over last 5 years	0.070	0.074	0.031	–0.28	3.47
Total employees	507	595	374	–1.35	3.46
Total hours	626	770	549	–1.57	2.62
Capital ($1,000s)	102,080	123,994	99,405	–0.84	1.12

ATable 4: Effect of new manufacturing plants on leverage of existing manufacturing firms using extended sample including non-event firms

This table presents the effect of the opening of a manufacturing plant on the leverage of existing manufacturing firms (Compustat SIC codes 2000–3999) that operate (i.e., have plant(s) and at least 3% of employees) in the winner county compared to those in the runner-up county from 1976 to 1999. Firms that are owners of the new plants are excluded from both the winner and runner-up groups. The sample includes manufacturing firm-years that are in the winner or runner-up counties, as well as those not affected by plant opening events. "Leverage (%)" is defined as total debt (long-term plus short-term debt) divided by the sum of total debt and book value of equity in percentage; "Winner" is an indicator variable equal to one if the firm operates in the winner county, and zero otherwise; "After" is an indicator variable equal to one if the firm operates in the winner or runner-up counties after the opening of a manufacturing plant, and zero otherwise. Other control variables are defined in Table 2 in the main text. Standard errors adjusted for sample clustering at the plant opening event level are reported below coefficient estimates in parentheses. Numbers of observations are rounded to the nearest thousand per Census Bureau disclosure rules.

	(1)	(2)	(3)
Dependent variable:		Leverage (%)	
After × Winner	3.008	2.607	2.692
	(1.094)	(1.093)	(1.073)
After	–0.640	–0.667	–0.738
	(1.515)	(1.529)	(1.586)
Winner	–3.354	–3.087	–2.975
	(1.226)	(1.231)	(1.150)
log(assets)	-	1.930	1.885
	-	(10.788)	(10.188)
Tangibility	-	22.345	21.965
	-	(1.974)	(2.029)
Market-to-book	-	–0.332	–0.352
	-	(16.015)	(14.957)
ROA	-	–14.742	–14.860
	-	(1.226)	(1.359)
Firm fixed effects	Y	Y	Y
Year fixed effects	Y	Y	
Event fixed effects		Y	Y
Industry × year fixed effects			Y
Observations	52,000	52,000	52,000
R^2	0.6338	0.6457	0.6523

ATable 5: Economic significance of determinants of leverage

This table compares the economic significance of the determinants of corporate leverage based on the coefficient estimates in Table 3, Panel A, column 2 in the main text. For the first four determinants, the columns "Std. Dev." and "Change in leverage" show the standard deviation of the variables and the change in leverage ratio associated with a change in each of the determinants by one standard deviation, respectively. For "Plant opening," the column "Change in leverage" shows the change in leverage ratio in response to the opening of a typical plant in the sample over the year of the plant opening to four years afterward.

Determinant	Std. Dev.	Change in leverage
Log assets	2.16	3.05%
Tangibility	0.17	3.87%
Market-to-book	2.25	1.83%
Return on assets	0.23	–6.74%
Plant opening	-	2.85%

ATable 6: Effect of new manufacturing plants on debt-to-assets ratio of existing manufacturing firms

This table presents the effect of the opening of a manufacturing plant on the debt-to-assets ratio of existing manufacturing firms (Compustat SIC codes 2000–3999) that operate (i.e., have plant(s) and at least 3% of employees) in the winner county compared to those in the runner-up county from 1976 to 1999. The firms that own the new plants are excluded from both of the winner and runner-up groups. The table presents estimates using a sample of firm-years that are in either the winner or runner-up counties. “Debt-to-assets (%)” is defined as total debt (long-term plus short-term debt) divided by book value of assets in percentage; “Winner” is an indicator variable equal to one if the firm operates in the winner county, and zero otherwise; “After” is an indicator variable equal to one if the firm operates in the winner or runner-up counties after the opening of a manufacturing plant, and zero otherwise. Panel A presents baseline estimates. In Panel B, “Large” (“Small”) is an indicator variable equal to one if the fraction of employees in the affected (i.e., winner or runner-up) counties is larger than (smaller than or equal to) the top 40%, and zero otherwise. In Panel C, “d[t + k]”, $-4 \leq k \leq 4$, is an indicator variable equal to one if the firm is in either the winner or runner-up counties from four years before and after the new plant opening, and zero otherwise. “d[t – 1]” is zero by construction. Column 1 (2) shows the coefficients on “d[t + k] × Winner” (“d[t + k] × Runner-up”), $-4 \leq k \leq 4$, and column 3 shows the difference between columns 1 and 2. Panel D presents heterogeneous effects of plant openings on the leverage ratios of existing manufacturing firms that operate plants in the winner versus runner-up counties, conditional on how the industries of the new and existing plants in the affected (i.e., winner or runner-up) counties are related. Columns 1 and 2 present the effect conditional on the frequency of worker flows from the two-digit SIC manufacturing industries of the existing to new plants in the affected counties, measured using the Census LEHD data. Columns 3 and 4 present the effect conditional on the extent to which the three-digit SIC industries of the new and existing plants in the affected counties buy (input) or sell (output) goods with each other. Columns 5 and 6 present the effect conditional on the extent to which the three-digit SIC industries of the new and existing plants in the affected counties cite patents of each other. Columns 7 and 8 present the effect conditional on whether the Bureau of Economic Analysis (BEA) industries of the new and existing plants in the affected counties use similar assets with each other, measured using the BEA capital flow table. Groups are sorted at the top 40% of each variable. Other control variables are defined in Table 2 in the main text. “NR” represents estimates that are not reported due to Census Bureau disclosure rules concerning sample size. Standard errors adjusted for sample clustering at the plant opening event level are reported below coefficient estimates in parentheses. Numbers of observations are rounded to the nearest hundred per Census Bureau disclosure rules.

Panel A: Baseline results

	(1)	(2)
Dependent variable:	Debt-to-assets (%)	
After × Winner	0.960	1.310
	(0.744)	(0.743)
After	NR	NR
	NR	NR
Winner	–1.514	–1.752
	(0.648)	(0.702)
log(assets)	3.266	2.721
	(0.866)	(0.790)
Tangibility	17.310	15.550
	(4.818)	(5.035)
Market-to-book	0.150	0.063
	(0.236)	(0.241)
ROA	–17.320	–14.650
	(2.989)	(2.544)
Firm fixed effects	Y	Y
Year fixed effects	Y	
Event fixed effects	Y	Y
Industry × year fixed effects		Y
Observations	5,900	5,900
R^2	0.7306	0.7687

Panel B: Fraction of firm employees in affected counties and effect of new manufacturing plants on leverage of existing manufacturing firms

	(1)	(2)
Fraction of employees:	Large	Small
Dependent variable:	Debt-to-assets (%)	
After × Winner	2.469	–1.252
	(1.232)	(1.014)
After	–1.150	0.562
	(0.870)	(0.752)
Winner	–0.959	–1.838
	(0.977)	(0.881)
Firm-level controls	Y	
Firm fixed effect	Y	
Year fixed effects	Y	
Event fixed effects	Y	
Observations	5,900	
R^2	0.7316	
After × Winner × (Large – Small)	3.721	
t-statistic	2.13	

Panel C: Dynamic effect of new plants on leverage of existing manufacturing firms

	(1)	(2)	(3)
Dependent Variable:		Debt-to-assets (%)	
Coefficient:	Winner	Runner-up	[Winner – Runner-up]
d[t–4]	0.623	0.472	0.151
	(0.720)	(0.630)	(0.827)
d[t–3]	0.593	–0.132	0.725
	(0.849)	(0.574)	(1.001)
d[t–2]	0.345	–0.327	0.672
	(0.538)	(0.461)	(0.649)
d[t–1]	0.000	0.000	0.000
	-	-	-
d[t]	0.004	–0.655	0.659
	(0.385)	(0.473)	(0.521)
d[t+1]	0.336	–1.830	2.166
	(0.683)	(0.499)	(0.833)
d[t+2]	0.056	–1.280	1.337
	(0.809)	(0.556)	(0.944)
d[t+3]	-0.839	–1.606	0.767
	(0.745)	(0.776)	(1.081)
d[t+4]	-0.574	–2.389	1.815
	(0.933)	(0.720)	(1.198)
Firm-level controls	Y		
Firm fixed effect	Y		
Year fixed effects	Y		
Event fixed effects	Y		
Observations	5,900		
R^2	0.7309		

Panel D: Labor market size versus other mechanisms of agglomeration spillovers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group:	High labor flow	Low labor flow	High input-output	Low input-output	High citation	Low citation	High asset similarity	Low asset similarity
Dependent variable:				Debt-to-assets (%)				
After × Winner	2.362	-0.023	0.826	1.031	1.051	0.917	1.184	0.792
	(1.265)	(0.855)	(1.202)	(0.848)	(1.438)	(0.804)	(1.136)	(1.004)
Firm-level controls	Y		Y		Y		Y	
Firm fixed effect	Y		Y		Y		Y	
Year fixed effects	Y		Y		Y		Y	
Event fixed effects	Y		Y		Y		Y	
Observations	5,900		5,900		5,900		5,900	
R^2	0.731		0.7315		0.7307		0.7307	
After × Winner × (High – Low)	2.385		-0.205		0.134		0.392	
t-statistic	1.65		0.14		0.08		0.26	

ATable 7: Uneven geographical distribution of winners and runners-up

This table examines the robustness of the baseline results to the uneven distribution of the winner and runner-up counties among geographic regions. Columns 1 and 2 separately estimate the effect of manufacturing plant opening for events in which both the winner and runner-up counties are in the same Census region, and for the other events. Columns 3 and 4 separately estimate the effect of manufacturing plant opening for events in which both the winner and runner-up counties are in the (1) Northeast or Midwest regions, or (2) South or West regions, and for the other events. All other variables are defined in Table 3 in the main text. Standard errors adjusted for sample clustering at the plant opening event level are reported below coefficient estimates in parentheses. The number of observations is rounded to the nearest hundred per Census Bureau disclosure rules.

	(1)	(2)	(3)	(4)
Dependent variable:	Leverage (%)			
Sample:	Same Census Region	Different Census Region	Same NE/MW or S/W	Different NE/MW or S/W
After × Winner	2.194	3.504	2.664	2.478
	(1.972)	(1.441)	(1.320)	(1.674)
Firm-level controls	Y		Y	
Firm fixed effect	Y		Y	
Year fixed effects	Y		Y	
Event fixed effects	Y		Y	
Observations	5,900		5,900	
R^2	0.7439		0.7439	
After × Winner × (Same – Diff)	–1.310		0.186	
t-statistic	0.54		0.09	

ATable 8: Manufacturing versus nonmanufacturing establishments openings

This table examines the robustness of the baseline results to alternative explanations concerning countywide shocks. It presents the effect of a large manufacturing plant opening on the leverage ratios of existing nonmanufacturing firms (column 1) and vice versa (column 2). All variables are defined in Table 3 in the main text. "NR" represents estimates that are not reported due to Census Bureau disclosure rules concerning sample size. Standard errors adjusted for sample clustering at the plant opening event level are reported below coefficient estimates in parentheses. Numbers of observations are rounded to the nearest hundred per Census Bureau disclosure rules.

	(1)	(2)
Dependent variable:	Leverage (%)	
New plant:	Manufacturing	Nonmanufacturing
Sample:	Nonmanufacturing	Manufacturing
After × Winner	–1.777	–0.533
	(1.580)	(0.982)
After	NR	0.694
	NR	(1.049)
Winner	4.030	2.478
	(1.255)	(1.565)
Firm-level controls	Y	Y
Firm fixed effects	Y	Y
Year fixed effects	Y	Y
Event fixed effects	Y	Y
Observations	4,400	4,500
R^2	0.7982	0.7499