Internet Appendix for

"Vertical Acquisitions, Integration and the Boundaries of the Firm"

(*Not for publication*)

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September 14, 2017

This appendix contains material briefly discussed in the paper, but reported here to conserve space. Section I presents the details and proofs of the simple dynamic incomplete contracting model of vertical acquisitions that we present in the paper to illustrate the contrasting predictions for realized and unrealized innovation on firm integration decisions. Section II lists words from the BEA commodity vocabulary that we exclude because they are used in a large number of commodities. Section III lists the phrase exclusions from firm 10-Ks that we apply to construct vertical links between firms. Section IV provides validation tests for our text-based measure of firm-level vertical integration and firm-pair vertical relatedness. Finally, Section V reports additional tests that assess the robustness of our main results.

I Model Details and Proofs

In this section of the appendix, we first show how the integration decision can be viewed as a real option. We then present the proofs of the three propositions from the text, along with a lemma needed for the proofs.

A Optimal Timing of Integration As A Real Option

First, we give the price sequence and how it is affected by the R&D outcome and integration. The base price P_t^b takes a value in the set $\{P_0, P_1, \ldots P_N\}$, with $P_s < P_{s+1}$ $(0 \leq s \leq N-1)$ and $P_{s+1} - P_s < P_s - P_{s-1}$ $(0 \leq s \leq N-1)$. Note that the base price is a contingent variable given the last-period R&D outcome X_{t-1}. Since we make the assumption that X_t is realized at the end of each period, the final price charged on consumers is equal to $P_t = P_t^b(1 + y_t)$ under separation and $P_t = P_t^b(1 + \rho(y_t))$ under integration, with the base price $P_t^b = P_N$ if the last period base price is $P_{t-1}^b = P_N$ or $P_t^b = P_s + (P_{s+1} - P_s)X_{t-1}$ if the last period base price is $P_{t-1}^b = P_s < P_N$.

Note that after integration $I_t^* = 1$, firms remain integrated ($I_{t+\tau}^* = 1$ for any $\tau > 0$). Here, the R&D investment by the supplier $x_{t+\tau}^* = 0$ for any $\tau >= 0$ since it is non-contractible. For the producer's investment in integration, we have $y_t^* = \text{argmax}_{y_t}[P_s(1 + \rho(y_t)) - Ry_t^h]$ in each period if the base price in integration has been improved to P_s. Denote the maximized value and the perpetuity value by:

$$
\begin{aligned}
v(P_s; I = 1) &= P_s(1 + \rho(y_t^*)) - Ry_t^{*h} \\
V(P_s; I = 1) &= \max_{y_t}[P_s(1 + \rho(y_t)) - Ry_t^h] + \frac{V(P_s; I = 1)}{1 + r} \\
&= v(P_s; I = 1)[1 + \frac{1}{1 + r} + \frac{1}{(1 + r)^2} + \ldots] = \frac{1 + r}{r} v(P_s; I = 1)
\end{aligned}
$$

The optimal y_t^* thus depends on P_s in the following way

$$
P_s \rho'(y_t^*) = Rhy_t^{*h-1}
$$

A second observation is that the only state variable for the value function is the base price P_t^b, which is assumed to be equal to P_s $(s < N)$ at time t. Therefore, we can define continuation value of separation and the value function $V(P_s)$ recursively as follows for

Table A1:

$P_t^b = P_s$ $(s < N)$	$V(P_s)$	x^*	y^*
Integration $I = 1$	$V(P_s; I = 1) > V(P_s; I = 0)$	0	$P_s\rho'(y^*) = Rhy^{*h-1}$
Separation $I = 0$	$V(P_s; I = 1) < V(P_s; I = 0)$	$\frac{V(P_{s+1})-V(P_s)}{1+r} = Sgx^{*g-1}$	$P_s = Rhy^{*h-1}$

$s < N$

$$V(P_s; I = 0) = \max_{\{x_t,y_t\}} \underbrace{[P_s(1 + y_t) - Ry_t^h - Sx_t^g]}_{\text{time } t \text{ profit}} + \underbrace{\frac{1}{1+r}[x_t V(P_{s+1}) + (1 - x_t)V(P_s)]}_{\text{expected future profit}}$$

For $s = N$ any additional R&D expenditures thus cannot increase the base price anymore so:

$$V(P_N; I = 0) = \max_{y_t} P_N(1 + y_t) - Ry_t^h + \frac{V(P_N)}{1+r}$$

The optimal y_t^* and x_t^* also depend on P_s:

$$P_s = Rhy_t^{*h-1}$$
$$\frac{V(P_{s+1}) - V(P_s)}{1+r} = Sgx_t^{*g-1}$$

The value function is thus:

$$V(P_s) = \max\{V(P_s; I = 1), V(P_s; I = 0)\}$$

The optimal decisions in each state can be summarized in Table A1 (above). We now prove the propositions that we gave earlier in the paper.

B Propositions

Proposition 1 *R&D expenditures are higher under separation, while commercialization and product integration expenditures are higher under integration.*

Proof:

In integration we have $x^* = 0$. In separation we must have $x^* > 0$, otherwise assuming $x^* = 0$, by definition $V(P_s) = V(P_s; I = 0) = \max_y P_s(1 + y) - Ry^h + \frac{V(P_s)}{1+r}$. So we solve that $V(P_s) = \frac{1+r}{r}[\max_y P_s(1 + y) - Ry^h] < \frac{1+r}{r}v(P_s; I = 1) = V(P_s; I = 1)$, which gives a contradiction. So as long as separation is chosen, $x^* > 0$, which from the FOC, we can derive that $V(P_{s+1}) > V(P_s) = V(P_s; I = 0)$ (if separation is chosen when the base price last period is P_s).

Proposition 2 *If $P_t^b = P_N$, then both firms prefer to integrate so $V(P_N) = V(P_N; I = 1) > V(P_N; I = 0)$.*

Proof:

Assuming separation is chosen, then $V(P_N) = V(P_N; I = 0) = \max_y [P_s(1+y) - Ry^h] + \frac{V(P_N)}{1+r}$. So we can solve that $V(P_N) = V(P_N; I = 0) = \frac{1+r}{r} \max_y [P_N(1 + y) - Ry^h] < \frac{1+r}{r} \max_y [P_N(1 + \rho(y)) - Ry^h] = V(P_N; I = 1)$, which is a contradiction. Therefore, we must have $V(P_N) = V(P_N; I = 1) > V(P_N; I = 0)$.

Lemma 1 *Value function $V(P_s)$ is increasing in P_s.*

Proof:

First note that the value of integration $V(P_s; I = 1)$ is always increasing in P_s. By the Envelope theorem, we have that $\frac{\partial V}{\partial P_s}(P_s; I = 1) = \frac{1+r}{r}(1 + \rho(y^*)) > 0$. Now just analyze by cases, if separation is chosen, given base price P_s, by the proof in Proposition 1 we know that $V(P_{s+1}) > V(P_s)$; otherwise integration is chosen, then $V(P_s) = V(P_s; I = 1) < V(P_{s+1}; I = 1) \leq V(P_{s+1})$. So in both cases, value function is increasing in base price. Also, we could see directly that $V(P_s; I = 0) < V(P_{s+1}; I = 0)$ since $V(P_s; I = 0)$ is increasing in P_s, $V(P_s)$, and $V(P_{s+1})$.

C Solution of $V(P_s)$ by Backward Induction

Integration is a real option, and the base price is the only state variable. The series of value functions $\{V(P_0), V(P_1), \ldots V(P_s)\}$ is solved by backward induction.

- $P_b = P_N$: we know that $V(P_N) = V(P_N; I = 1) = \frac{1+r}{r} v(P_N; I = 1)$ which can be solved directly

- $P_b = P_{N-1}$: note that the value of integration is pre-determined as $V(P_{N-1}; I = 1) = \frac{1+r}{r} v(P_{N-1}; I = 1)$, so if $V(P_{N-1}) = V(P_{N-1}; I = 0)$ then it must be true that $V(P_{N-1}; I = 0)$ is the solution solving the following equation on M and M must be greater than $V(P_{N-1})$

$$M = \max_{\{x,y\}} [P_{N-1}(1 + y) - Ry^h] + [\frac{1}{1+r}(xM + (1 - x)V(P_N)) - Sx^g]$$

- $P_b = P_s$: by now $V(P_{s+1})$ is known. Again, solve the following equation on M, then $V(P_s) = \max\{V(P_s; I = 1), M\}$

$$M = \max_{\{x,y\}}[P_s(1+y) - Ry^h] + [\frac{1}{1+r}(xM + (1-x)V(P_{s+1})) - Sx^g]$$

The above is a valid solution as long as the integration decision is monotonic in s, in other words, there is a triggering state s^* such that separation is chosen whenever $s < s^*$ and integration is chosen when $s \geq s^*$

Assumption 1 *The increase in price P_s decreases with each successive innovation such that the series of value functions solved using the above method satisfies this condition: $V(P_{s+2}) - V(P_{s+1}) < V(P_{s+1}) - V(P_s)$.*

The following Proposition then claims that there exists a triggering state s^*, so the series of value functions solved using the backward induction is the true solution.

Note that under this assumption, Lemma 1 holds, and the marginal benefit of R&D expenditures which equals $\frac{V(P_{s+1})-V(P_s)}{1+r}$ in separation is decreasing in base price, and the optimal level of R&D expenditures in separation is also decreasing. Also note that even though the function $V(P; I = 1)$ is convex in P, we could make the increment in base price so small such that conditions in Assumption 3 hold.

Proposition 3 *There exists a state s^* such that $V(P_s) = V(P_s; I = 1) \geq V(P_s; I = 0)$ for any $s \geq s^*$, and $V(P_s) = V(P_s; I = 1) < V(P_s; I = 0)$ for any $s < s^*$. The state s^* would then be the triggering state for integration.*

Proof:

We only need to prove that there does not exist a state s such that integration is chosen with base price P_s while separation is chosen with base price P_{s+1}.

In state s, we have

$$\begin{aligned} V(P_s; I = 1) &= \max_y[P_s(1+\rho(y)) - Ry^h] + \frac{V(P_s; I = 1)}{1+r} \\ V(P_s; I = 0) &= \max_y[P_s(1+y) - Ry^h] + \frac{V(P_s)}{1+r} + \max_x[\frac{V(P_{s+1}) - V(P_s)}{1+r}x - Sx^g] \end{aligned}$$

Integration is chosen in state s meaning $V(P_s) = V(P_s; I = 1)$ and

$$\underbrace{\max_y[P_s(1+\rho(y)) - Ry^h] - \max_y[P_s(1+y) - Ry^h]}_{\substack{\text{Increments in TS by commercialization expenditures in integration} \\ \text{if the integration as a real option is exercised right now}}} \qquad >$$

$$\underbrace{\max_x[\frac{V(P_{s+1}) - V(P_s)}{1+r}x - Sx^g]}_{\substack{\text{Increments in TS by R\&D exp.} \\ \text{Continuation value in separation}}}$$

First note that $\max_x[\frac{V(P_{s+1})-V(P_s)}{1+r}x - Sx^g]$ is always non-negative so we must have $\max_y[P_s(1+\rho(y)) - Ry^h] - \max_y[P_s(1+y) - Ry^h] > 0$.

The difference $\max_y[P_s(1+\rho(y)) - Ry^h] - \max_y[P_s(1+y) - Ry^h]$ is a function of P_s and the derivative with respect to P_s is $\rho(y^1) - y^0$ (by the Envelope Theorem), with y^1 and y^0 the optimum under integration and separation. Note that from the FOC we have $P_s = Rh(y^0)^{h-1}$ and $P_s = Rh(y^1)^{h-1}$, since $\rho'(y^1) > 1$ and $h > 1$ we must have $y^1 > y^0$ (commercialization expenditures are larger in integration) and thus $\rho(y^1) > \rho(y^0) > y^0$. So the difference is increasing in P_s so that

$$\begin{aligned} \max_y[P_{s+1}(1+\rho(y)) - Ry^h] - \max_y[P_{s+1}(1+y) - Ry^h] \quad &> \\ \max_y[P_s(1+\rho(y)) - Ry^h] - \max_y[P_s(1+y) - Ry^h] & \end{aligned}$$

The net benefit of R&D expenditures $\max_x[\frac{V(P_{s+1})-V(P_s)}{1+r}x - Sx^g]$, however, is decreasing in P_s because the increments in the value function $V(P_{s+1}) - V(P_s)$, by assumption, are decreasing in P_s, so must have

$$\max_x[\frac{V(P_{s+2}) - V(P_{s+1})}{1+r}x - Sx^g] \quad < \quad \max_x[\frac{V(P_{s+1}) - V(P_s)}{1+r}x - Sx^g]$$

Combining the three inequalities, we have that

$$\max_y[P_{s+1}(1+\rho(y)) - Ry^h] - \max_y[P_{s+1}(1+y) - Ry^h] \quad > \quad \max_x[\frac{V(P_{s+2}) - V(P_{s+1})}{1+r}x - Sx^g]$$

So the exercise value (exercise the option of integration) is greater than the continuation value (in separation) in state $s+1$. From this it is easy to see that

$$V(P_{s+1}; I = 1) > V(P_{s+1}; I = 0)$$

since otherwise $V(P_{s+1}; I = 0)$ would be equal to

$$\frac{1+r}{r}\{\max_y[P_{s+1}(1+y) - Ry^h] + \max_x[\frac{V(P_{s+2}) - V(P_{s+1})}{1+r}x - Sx^g]\}$$

which is less than $V(P_{s+1}; I = 1)$ which is equal to $\frac{1+r}{r}\max_y[P_{s+1}(1+\rho(y)) - Ry^h]$.

Therefore, if in state s, integration is chosen, then in state $s+1$, integration will be chosen too. By induction, all states after s will be under integration. Given the fact that the two firms start as separated, and in the final state N they must choose integration, there must exist a triggering state s^* such that integration is chosen in states $s \geq s^*$ and separation is chosen in states $s < s^*$. In other words, s^* would be the state in which the real option of integration is exercised in equilibrium.

Note that some states of the world could not be reached in equilibrium. For example, for any $s > s^*$, the base price P_s would never appear in equilibrium since the two firms have integrated at state s^*. So the total surplus $V(P_{s^*})$ would be the highest one reached in equilibrium, which is also the final value in integration.

II Excluded BEA words

Because they are used in a large number of commodities and are not specific, we exclude the following words from the BEA commodity vocabulary we use to compute vertical relatedness:

Accessories, accessory, air, airs, attachment, attachments, commercial, commercials, component, components, consumer, consumers, development, developments, equipment, exempt, expense, expenses, ga, gas, industrial, industrials, net, part, parts, processing, product, products, purchased, purchase, receipt, receipts, research, researches, sale, sales, service, services, system, systems, unit, units, work, works, tax, taxes, oil, repair, repairs, aids, aid, air, apparatuses, apparatus, applications, application, assemblies, assembly, attachments, attachment, automatic, auxiliary, bars, bar, bases, base, blocks, block, bodies, body, bulk, business, businesses, byproducts, byproduct, cares, care, centers, center, collections, collection, combinations, combination, commercials, commercial, completes, complete, components, component, consumers, consumer, consumption, contracts, contract, controls, control, covers, cover, customs, custom, customers, customer, cuts, cut, developments, development, directly, distributions, distribution, domestic, dries, dry, equipments, equipment, establishments, establishment, exempt, expenses, expense, facilities, facility, fees, fee, fields, field, finished, finish, finishings, finishing, gas, generals, general, greater, hands, hand, handling, high, hot, individuals, individual, industrials, industrial, industries, industry, installations, installation, lights, light, lines, line, maintenances, maintenance, managements, management, manmade, manufactured, manufacture, materials, material, naturals, natural, nets, net, offices, office, only, open, operated, operate, organizations, organization, others, other, pads, pad, paid, pay, parts, part, permanent, portable, powers, power, processing, products, product, productions, production, public, purchased, purchase, purposes, purpose, receipts, receipt, reclassified, reclassify, repairs, repair, researches, research, sales, sale, self, services, service, sets, set, shares, share, shipped, similar, singles, single, sizes, size, small, soft, specials, special, stocks, stock, storages, storage, supplies, supply, supports, support, surfaces, surface, systems, system, taxes, tax, taxable, technical, this, trades, trade, transfers, transfer, types, type, units, unit, used, without, work, works.

III 10-K Phrase Exclusions

Because we use 10-K text to identify a firm's own-product market location (vertically related vocabulary is identified using BEA data), we exclude any part of a sentence that follows any of the following 81 phrases:

Buy, buys, sells its, are sold, buying, products for, for sale, for their, used in, used by, used as, used for, used with, used primarily, used mainly, used commonly, primarily used, mainly used, commonly used, for use, uses, utilized, serve, serving, serves, sold to, sold primarily, sold mainly, sold commonly, designed for, supply of, supply for, supplier to, supplied to, service to, purchase, purchaser, purchasers, customer, customers, user, users, for application, equipment for, equipment to, equipment by, product for, product to, product by, solution for, solution to, solution by, component for, component to, component by, application for, application to, application by, system for, system to, system by, equipments for, equipment for, equipment to, equipments to, equipments by, products for, products to, products by, solutions for, solutions to, solutions by, components for, components to, components by, applications for, applications to, applications by, systems for, systems to, systems by.

IV Additional Validation Tests of Text-Based Vertical Measures

We perform four analyses to provide additional external validation for the text-based measures of vertical integration and vertical relatedness we introduce and use in the paper. First, we introduce a test based on firms' sensitivity to trade credit shocks to assess whether our measure of vertical relatedness among firm pairs truly capture vertical linkages. Second, we compare our measure of vertical integration to (industry) measures of related-party trade (RPT). Third, we investigate whether and how our text-based measure of firm-level vertical integration and firm-pair vertical relatedness changes following vertical and non-vertical acquisitions.

A Correlation of Trade Credit shocks

First, we construct a test of the extent to which any proposed vertical relatedness network is vertical based on the extent to which accounts receivable (AR) and accounts payable (AP) respond to shocks in a way that is consistent with adjacency along a supply chain (as opposed to being consistent with horizontal links). Intuitively, our test is based on how firms that are related vertically versus horizontally should respond to trade-credit shocks. Firm pairs that are vertically related will experience *negatively* correlated shocks in accounts payable versus accounts receivable due to their supply chain adjacency. For example, a shock to an upstream industry's *receivables* should be associated with a similar shock to the downstream industry's *payables*. In contrast, firms that are horizontally related should experience trade-credit shocks in either accounts payable or accounts receivable that are positively correlated. We define trade credit as accounts payable minus accounts receivable for each firm. We then regress changes in trade credit of upstream firms on the changes in the trade credit of downstream firms.

To operationalize these predictions in our setting, we consider trade-credit shocks among firm pairs. When AR increases for a supplier, one should expect an adjacent increase in the AP of its customers. We first compute for each firm-year $\triangle AR$ as $\frac{AR_t - AR_{t-1}}{AR_t + AR_{t-1}}$ and $\triangle AP$ as $\frac{AP_t - AP_{t-1}}{AP_t + AP_{t-1}}$.[1] Critical to our examination, we then compute the difference $(\triangle AR - \triangle AP)$. To measure firm pairwise trade credit correlations for a given network, we estimate the following regression, where one observation is one firm-pair that is a member of a given network:

$$(\Delta AR - \Delta AP)_{i,t} = \alpha + \gamma \cdot (\Delta AR - \Delta AP)_{j,t} + \eta_t + \epsilon_{i,t} \tag{1}$$

The subscript i corresponds to an upstream firm and j to a downstream firm indicated by the given network being tested. We account for time variation in aggregate trade credit shocks (e.g. macroeconomic conditions) by including year fixed effects (η). In more refined tests, we then focus on sub-samples of firm-pair observations where (1) $| \triangle AR_{i,t}| > | \triangle AP_{i,t}|$, or (2) $| \triangle AR_{j,t}| < | \triangle AP_{j,t}|$). The former condition focuses on positive shocks to the AR of upstream firms, while the latter focuses on positive shocks to the AP of downstream firms. The prediction is that the coefficient γ should be positive for horizontal networks, and negative for vertical networks.

The results in Table IA.1 show that γ is systematically negative for the vertical networks we construct. However, the estimates of γ are far more negative, and are also statistically different from zero, only for our text-based networks. Not surprisingly, results are strongest of all for the text-1% network (the t-statistic ranges from 3.19 to 4.55), where the likelihood of contamination due to breadth is minimized. None of the estimates of γ are significant for the NAICS-based vertical network, and the coefficient estimates are an order of magnitude smaller. In the last column we can see that the estimates of γ for the TNIC-3 horizontal network are significantly positive, as is predicted for horizontal relationships.

The results of these tests show that horizontally related firms experience positively correlated responses in accounts payable and accounts receivable, whereas our vertically related firm pairs experience negatively correlated responses. These results provide a strong validation test of our new measure of vertical linkages. These tests further illustrate that our measures of vertical relatedness statistically capture vertical integration and information about vertical links, whereas NAICS-based measures of vertical integration

[1] By construction, $\triangle AR$ and $\triangle AP$ can take values between +1 and -1 and are thus not influenced by outliers.

are likely contaminated.

B Related-Party Trade

As an alternative way of to provide external validation, we relate our text-based measure of vertical integration to industry measures of related-party trade (RPT) provided by the U.S. Census Bureau.[2] The data measure the intensity of trade (both imports or exports) that occurs between related parties, where "related party trade" is defined as trade with an entity located outside the United States in which the importer (exporter) holds at least a 6% (10%) equity interest (as defined by the Census). The data thus captures the intensity of international transactions that occur within firm boundaries. Arguably, related party trade could capture both horizontal and vertical flows of goods. Yet, to the extent that our text-based measure of vertical integration builds on vertical relations between products described in firm 10Ks, any correlation between our measure and RPT should be related to international transactions that are vertical in nature (see Antras (2013), or Antras and Chor (2013) for instance).

The RPT data is available over the 2000-2010 sample period at the NAICS 6-digit level. We aggregate the data to the NAICS 4-digit and 5-digit levels to map it to our Compustat sample. For each industry, we compute the share of related-party imports to total imports to capture the propensity of firms to integrate foreign supplier activities (RPT(import)). Similarly, we compute the share of related-party exports in total exports to capture the propensity of firms to integrate foreign customers (RPT(export)). We also consider the average share between the import and export shares (RPT). We then aggregate VI and $VI_{segment}$ at the industry-level (NAICS 4-digit and 5-digit levels) using equally-weighted averages.

Table IA.2 presents the results of OLS regressions of industry-level VI (or $VI_{segment}$) on the three measures of related-party trade. Across all specifications, we observe a positive correlation between our text-based measure vertical integration and measures of RPT. Focusing on the average level of RPT in the first column, the correlation with VI is 0.490 at the NAICS 4-digit industry level, and 0.791 at the NAICS 5-digit industry level. Both coefficients are statistically significant at the 5% confidence level. At both aggregation

[2]http://sasweb.ssd.census.gov/relatedparty/

levels, our measure of vertical integration is also more strongly related to related-party import transactions compared to related-party export transactions (columns (2) and (3)). The coefficients on related-party import are 0.508 and 0.626, and they are 0.116 and 0.547 for related-party export. Moreover, columns (4) to (6) indicate that related-party trade is negatively and only weakly related to vertical integration when measured using Compustat segments as an alternative.

C Changes in Vertical Position following Acquisitions

We also investigate whether and how our text-based measure of firm-level vertical integration and firm-pair vertical relatedness changes following vertical and non-vertical acquisitions. We perform two tests. First, we regress (including firm and year fixed effects) our text-based (VI) and the Compustat-based measure of firm-level vertical integration ($VI_{segment}$), measured in year t, on binary variables indicating whether the firm made a vertical ($D(vertical) = 1$) or non-vertical ($D(nonvertical) = 1$) acquisition in year t, $t-1$ or $t-2$, identified using our text-based vertical network (as in the paper).

Panel A of Table IA.3 presents the results. For both measures, the intensity of vertical integration increases following vertical acquisitions, and decreases following non-vertical acquisitions. Yet, comparing coefficients in columns 1 and 2, we observe that the estimates are only significant for our text-based measure of vertical integration (VI), and the magnitude of the coefficients indicate that our text-based measure of integration is about two times more responsive to actual acquisitions compared to the COMPUSTAT-based measure.

Panel B of Table IA.3 reports a similar analysis using the number of vertical peers for each firm-year as independent variable, computed as the number of pairs for a given firm in a vertical network. When using our text-based vertical networks (1% or 10% granularity), we estimate that the number of vertical peers is sensitive to acquisition events. The number of vertical peers measured using the NAICS-based networks, in contrast, is largely insensitive to acquisition events.

V Additional Results

This section contains additional tables and figure that are mentioned and described in the paper but were not reported there to preserve space. Specifically, this appendix includes:

- **Table IA.4**: Probit regressions whose dependent variable is the probability of being a target in a vertical acquisition. We measure industry patenting intensity using patents' application years instead of patents' grant years. We also report a regression where industry patenting intensity is weighted by patent citations.
- **Table IA.5**: Probit regressions whose dependent variable is the probability of being a target in a vertical acquisition. In the first column, we focus on own-firm independent variables instead of industry variables. In the second column, we identify vertical transaction using the NAICS-10% vertical network instead of our Text-10% vertical network.
- **Table IA.6**: Probit regressions whose dependent variable is the probability of being a target in a vertical acquisition. We measure industry patenting intensity by including patents assigned to firms' subsidiaries, identified using data from corporatewatch.com.
- **Table IA.7**: Probit regressions whose dependent variable is the probability of being a target in a vertical acquisition. We split the sample based on industry acquisition intensity and industry subsidiary intensity.
- **Table IA.8**: Probit and OLS regressions whose dependent variable is the probability of being a target in a vertical acquisition or our firm-level measure of vertical integration. We include industry R&D and patenting intensity individually and not together.
- **Table IA.9**: OLS regressions of firm-year R&D/sales on the user cost of R&D capital. We use the estimation presented in column (3) to predict R&D for each firm-year, and use these predicted values to construct our instrument.
- **Table IA.10**: Linear Probability Model (LPM) regressions whose dependent variables are the probability of being a target in a vertical acquisition or our firm-level

measure of vertical integration.

- **Table IA.11**: List of the 30 most vertically integrated firms in 2008 based on our firm-level measure of vertical integration.
- **Table IA.12**: OLS regressions whose dependent variable is firm-level vertical integration to assess the robustness of the results presented in Table IX of the paper.
- **Table IA.13**: Description of the construction of the firm-patent dataset we use in the analysis.
- **Figure IA.1**: Distribution of estimated coefficients on industry R&D and patenting intensity and their respective t-statistics based on 1,000 estimations made on random samples of 3,000 firms using probit models in which the dependent variable is the probability of being a target in a vertical acquisition.

Table IA.1: Correlation of Trade Credit Shocks

Network:	Text-10%	Text-1%	NAICS-1%	NAICS-5%	TNIC
γ (unconditional)	-0.0006^a	-0.0024^a	-0.0001	-0.0001	0.0071^a
(t-statistic)	(-3.37)	(4.57)	(-0.93)	(-0.03)	(15.91)
γ (if $\mid \triangle AR_{i,t}\mid > \mid \triangle AP_{i,t}\mid$)	-0.0006^b	-0.0030^a	-0.0002	-0.0007	0.0071^a
(t-statistic)	(-2.40)	(-3.71)	(-0.90)	(-0.92)	(12.37)
γ (if $\mid \triangle AR_{j,t}\mid < \mid \triangle AP_{j,t}\mid$)	-0.0006^b	-0.0027^a	-0.0001	-0.0005	0.054^a
(t-statistic)	(-2.47)	(-3.83)	(-0.051)	(-0.06)	(8.37)

Note: This table displays characteristics of our new Text-based vertical network and the existing NAICS-based vertical network. Our sample is based on annual firm observations from 1996 to 2010. We consider five networks: Text-10% and Text-1% networks correspond to vertical networks based on textual analysis set at a 10% and respectively 1% granularity level, NAICS-1% and NAICS-5% correspond to vertical networks based in the 2002 BEA Input-Output Table with relatedness cutoffs of 1% and 5% respectively, and TNIC corresponds to the horizontal Text-based Network Industry Classification developed by Hoberg and Phillips (2010). The coefficient γ is obtained from OLS regressions of trade credit shocks of upstream firms on trade credit shocks of downstream firms. We report t-statistic below the coefficients. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels

Table IA.2: VI and Related-Party Trade

Dep. Variable:		VI			$VI_{segment}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: NAICS 4-digit industries						
RPT	0.490^b			-0.037		
	(0.244)			(0.244)		
RPT(import)		0.508^a			0.366^b	
		(0.185)			(0.185)	
RPT(export)			0.116			-0.816^a
			(0.262)			(0.261)
#.Obs.	820	820	820	820	820	820
Pseudo R^2	0.005	0.013	0.001	0.001	0.016	0.004
Panel B: NAICS 5-digit industries						
RPT	0.791^a			-0.455^a		
	(0.171)			(0.172)		
RPT(import)		0.626^a			-0.076	
		(0.130)			(0.131)	
RPT(export)			0.547^a			-0.847^a
			(0.179)			(0.178)
#.Obs.	1,422	1,422	1,422	1,422	1,422	1,422
Pseudo R^2	0.014	0.015	0.006	0.004	0.001	0.014

Note: Columns (1) to (3) report OLS estimations where the dependent variable is our new text-based measure of vertical integration VI. Columns (4) to (6) report OLS estimations where the dependent variable is a measure of vertical integration based on Compustat segments $VI_{segment}$. In Panel A, all variables are aggregated at the NAICS 4-digit industry level (averages). In Panel B, all variables are aggregated at the NAICS 5-digit industry level (averages). The independent variables are standardized for convenience. Standard errors are clustered by industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.3: Changes in Vertical Measures Following Acquisitions

Dep. Variable:	VI	$VI_{segment}$	# Vertical Peers			
Vertical Network:			Text-10%	Text-1%	NAICS-1%	NAICS-5%
	(1)	(2)	(3)	(4)	(5)	(6)
$D(vertical)_t$	0.091[a]	0.042	0.115[a]	0.026	-0.002	0.008
	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)
$D(vertical)_{t-1}$	0.069[a]	0.046	0.102[a]	0.042[b]	-0.010	0.004
	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)
$D(vertical)_{t-2}$	0.048[a]	0.033	0.073[a]	0.019	-0.015[b]	-0.006
	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)
$D(nonvertical)_t$	-0.082[a]	-0.019	-0.116[a]	-0.091[a]	0.001	0.009
	(0.01)	(0.02)	(0.01)	(0.03)	(0.00)	(0.01)
$D(nonvertical)_{t-1}$	-0.040[a]	-0.024	-0.058[a]	-0.071[a]	0.001	0.011
	(0.01)	(0.02)	(0.01)	(0.03)	(0.00)	(0.01)
$D(nonvertical)_{t-2}$	-0.025[a]	-0.043[b]	-0.038[a]	-0.048[c]	-0.001	0.011
	(0.01)	(0.02)	(0.01)	(0.03)	(0.00)	(0.01)
Firn FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
#Obs.	35,384	35,384	29,793	15,050	24,536	14,561
Pseudo. R^2	0.846	0.830	0.815	0.766	0.973	0.0966

Note: This table presents results from OLS models in which the dependent variables are firm-level measures of vertical integration (columns (1) and (2)) and a firm's number of vertical peers (columns (3) to (6)). We consider our text-based measure of vertical integration (VI) in column (1) and the Compustat-based measure ($VI_{segment}$) in column (2). We compute the number of vertical peers for a given firm by counting its the number of vertical pairs in a given vertical network. The independent variables are binary variables indicating whether the firm made a vertical ($D(vertical) = 1$) or non-vertical ($D(nonvertical) = 1$) acquisition in year t, $t-1$ or $t-2$, identified using our text-based vertical network (as in the paper). All specifications include firm and year fixed effects. Standard errors are clustered by industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.4: Patent Application Year and Citation Weighting

Dep. Variable:	Prob(Target)			
Specification:	App. Year	Low	High	Cites-w
	(1)	(2)	(3)	(4)
Ind.(R&D/sales)	-0.117[a]	-0.006[c]	-0.193[a]	-0.082[a]
	(0.02)	(0.04)	(0.03)	(0.02)
Ind.(#Patent/assets)	0.143[a]	0.140[a]	0.184[a]	0.104[a]
	(0.01)	(0.02)	(0.02)	(0.01)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
#Obs.	51,012	25,506	25,506	51,012
Pseudo. R^2	0.119	0.117	0.132	0.116

Note: This table presents results from probit models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. In column (1), we measure patenting intensity based on patent application year instead of patent grant year. In columns (2) and (3), we split the sample into a Low and High group based on the median (below or above) value for the average industry differences between patents' grant and application years. In column (4), we construct citation-weighted industry patenting averages, where the weight assigned to a given firm-year is proportional to the total citations of all of its patents granted in that year. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols [a], [b], and [c] indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.5: Own Firm Variables and NAICS-based Vertical Targets

Dep. Variable:	**Prob(Target)**	
Specification:	Own Firm	NAICS
	(1)	(2)
R&D/sales	-0.002	-0.020
	(0.02)	(0.03)
#Patent/assets	0.114^a	0.080^a
	(0.01)	(0.01)
Controls	Yes	Yes
Year FE	Yes	Yes
#Obs.	51,012	51,012
Pseudo. R^2	0.120	0.032

Note: This table presents results from probit models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. In column (1), vertical transactions are identified using the Vertical Text-10% network, and we replace industry averages measures of R&D and patenting intensity by firm-level measures. In column (2), vertical transactions are identified using the Vertical NAICS-10% network. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.6: Patent Count Including Subsidiaries Assignees

Dep. Variable:	Prob(Target)			
Patent Measure	Incl. Subs.	Excl. Subs	Incl. Subs	Excl. Subs
Period:	2003-2006		1996-2010	
	(1)	(2)	(3)	(4)
Ind.(R&D/sales)	-0.148[a]	-0.148[a]	-0.154[a]	-0.154[a]
	(0.03)	(0.03)	(0.02)	(0.02)
Ind.(#Patent/assets)	0.197[a]	0.200[a]	0.175[a]	0.174[a]
	(0.02)	(0.02)	(0.01)	(0.01)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
#Obs.	12,308	12,308	51,012	51,012
Pseudo. R^2	0.111	0.110	0.123	0.123

Note: This table presents results from probit models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. In columns (1) and (2), we restrict the sample to the period 2003-2006, and in columns (3) and (4), we estimates models on the whole 1996-2010 period. In columns (1) and (3), we measure industry patenting intensity by including patents assigned to firms subsidiaries, identified using data from corporatewatch.com. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols [a], [b], and [c] indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.7: Acquisition and Subsidiary Intensity

Dep. Variable:	Prob(Target)			
Cut Variable:	Acquisition Intensity		Subsidiary Intensity	
Specification:	Low	High	Low	High
	(1)	(2)	(3)	(4)
Ind.(R&D/sales)	-0.109[a]	-0.213[a]	-0.150[a]	-0.121[a]
	(0.03)	(0.04)	(0.03)	(0.04)
Ind.(#Patent/assets)	0.146[a]	0.220[a]	0.197[a]	0.151[a]
	(0.02)	(0.02)	(0.01)	(0.02)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
#Obs.	25,506	25,506	25,506	25,506
Pseudo. R^2	0.095	0.141	0.112	0.111

Note: This table presents results from probit models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. In columns (1) and (2), we split the sample into a Low and High group based on the median (below or above) value for the average industry acquisition intensity, based on firms' ratio of acquisition spending to total assets. In columns (3) and (4), we split the sample into a Low and High group based on the median (below or above) value for the average industry subsidiary intensity, measured using industries average fraction of firms paragraphs in 10Ks mentioning subsidiaries (using the words subsidiary or subsidiaries. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols [a], [b], and [c] indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.8: R&D and Patenting Intensity Individually

Dep. Variable:	Prob(Target)		VI	
	(1)	(2)	(3)	(4)
Ind.(R&D/sales)	-0.024		-0.022^a	
	(0.03)		(0.01)	
Ind.(#Patent/assets)		0.119^a		0.024^a
		(0.01)		(0.01)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes
#Obs.	51,012	51,012	51,012	51,012
Pseudo. R^2	0.113	0.119	0.844	0.844

Note: This table presents results from including industry R&D and patenting intensity individually. In column (1) and (2) we estimate probit models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. In columns (3) and (4), we estimate OLS models in which the dependent variable is our firm-level measure of vertical integration VI. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.9: Predicting R&D using R&D tax credit

Dep. Variable:	R&D/sales		
	(1)	(2)	(3)
User cost of R&D capital	-0.732[a]	-0.106[a]	-0.050[b]
	(0.015)	(0.021)	(0.024)
Firm FE	No	Yes	Yes
Year FE	No	No	Yes
#Obs.	39,553	39,553	39,553
Adj. R^2	0.052	0.859	0.860

Note: This table reports OLS estimations where the dependent variable is firm-year *R&D/sales*, and the independent variable is the user cost of R&D capital. Standard errors are clustered by industry and year and are reported in parentheses. Symbols [a], [b], and [c] indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.10: The Determinants of Vertical Targets: Linear Probability Models

Dep. Variable:	**Prob(Target)**		
Specification:	LPM	IV LPM	
	Baseline	1st Stage	2nd stage
	(1)	(5)	(6)
Ind.(R&D/sales)	-0.005^a		-0.005^a
	(0.001)		(0.001)
Ind.(#Patents/asse)	0.008^a	-0.048^a	0.007^a
	(0.001)	(0.007)	(0.001)
Ind.(Predicted R&D/sales)		0.987^a	
		(0.014)	
Controls	Yes	Yes	Yes
#obs.	51,012	39,915	39,915
Pseudo R^2	0.032	0.920	0.034

Note: This table presents results from Linear Probability models in which the dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. The last two columns report results of instrumental variable estimations where we use tax-induced industry predicted R&D/sales (using exogenous variation in the user cost of R&D capital) as instrument for industry R&D intensity. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.11: Examples of Vertically Integrated firms: Top 30 in 2008

Company	Rank	#Segments	VI	Perc.(VI)	Perc.($VI(Segment)$)
HANDY & HARMAN LTD	1	5	0.091	1	0.969
PARKER-HANNIFIN CORP	2	2	0.079	0.999	0.000
EATON CORP	3	5	0.076	0.999	0.966
EMERSON ELECTRIC CO	4	6	0.074	0.999	0.991
FRANKLIN ELECTRIC CO INC	5	1	0.073	0.998	0.717
COMMERCIAL VEHICLE GROUP INC	6	1	0.069	0.998	0.000
ROCKWOOD HOLDINGS INC	7	5	0.069	0.997	0.959
SCHNITZER STEEL INDS -CL A	8	3	0.064	0.997	0.000
LEGGETT & PLATT INC	9	3	0.062	0.997	0.710
DOVER CORP	10	4	0.058	0.996	0.641
SIFCO INDUSTRIES	11	2	0.055	0.996	0.994
MYERS INDUSTRIES INC	12	1	0.053	0.996	0.000
AMPCO-PITTSBURGH CORP	13	2	0.053	0.995	0.681
SONOCO PRODUCTS CO	14	3	0.052	0.995	0.000
LKQ CORP	15	1	0.052	0.995	0.000
P & F INDUSTRIES -CL A	16	2	0.052	0.994	0.760
BERKSHIRE HATHAWAY	17	9	0.051	0.994	0.000
PRECISION CASTPARTS CORP	18	2	0.051	0.993	0.790
MATTHEWS INTL CORP -CL A	19	6	0.051	0.993	0.884
RELIANCE STEEL & ALUMINUM CO	20	1	0.050	0.993	0.000
CARLISLE COS INC	21	6	0.050	0.992	0.962
UNVL STAINLESS & ALLOY PRODS	22	1	0.050	0.992	0.000
AMERICAN AXLE & MFG HOLDINGS	23	1	0.049	0.992	0.000
ENCORE WIRE CORP	24	1	0.049	0.991	0.000
HAWK CORP	25	1	0.049	0.991	0.000
KANSAS CITY SOUTHERN	26	1	0.049	0.991	0.000
AMERICAN ELECTRIC TECH INC	27	3	0.049	0.990	0.885
DREW INDUSTRIES INC	28	1	0.049	0.990	0.000
CHINA PRECISION STEEL INC	29	1	0.048	0.989	0.000
COLEMAN CABLE INC	30	1	0.048	0.989	0.000

Note: The table displays the 30 most vertically integrated firms in 2008 based on our text-based measure of vertical integration (VI). The table also presents the number of Compustat segments, the VI score, the firm's percentile VI ranking, and the firm's percentile $VI(Segment)$ ranking.

Table IA.12: The Determinants of Vertical Integration: Robustness

Dep. Variable:	VI								
Specification:	log	$VI_{segment}$	Ind×Yr	Sales-w	lags	Text	Mcol 1	Mcol 2	Mcol 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ind.(R&D/sales)	-0.005^{b}	0.000	-0.016^{a}	-0.017^{a}	-0.024^{a}	-0.048^{a}	-0.014^{b}	-0.012^{b}	-0.015^{a}
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Ind.(#Patent/assets)	0.011^{a}	0.000	0.021^{a}	0.020^{a}	0.024^{a}	0.056^{a}	0.005	0.014^{b}	0.018^{a}
	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind×Year FE	No	No	Yes	No	No	No	No	No	No
#Obs.	51,012	51,012	51,012	51,012	42,528	51,012	16,891	23,478	27,218
R^2	0.861	0.819	0.850	0.845	0.846	0.845	0.859	0.846	0.845

Note: This table presents results from OLS models in which the dependent variable is our firm-level measure of vertical integration VI. The first column consider the log of VI as the dependent variable. Column (2) consider the Compustat-based measure of vertical integration ($VI_{segment}$). Column (3) includes industry × year fixed effect, where industries are defined using FIC-100 industries from Hoberg and Phillips (2016). Column (4) computes industry-weighted averages based on sales as opposed to equally-weighted averages. Column (5) considers lagged independent variables. Column (6) considers R&D and patenting intensities directly from 10Ks mentions. Columns (7) to (9) consider subsamples created so that the correlation between industry R&D and patenting intensity is small. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year and are reported in parentheses. Symbols ^{a}, ^{b}, and ^{c} indicate statistical significance at the 1%, 5%, and 10% confidence levels.

Table IA.13: Patent Sample

Sample:	**All gvkey-patent-year**				**gvkey-patent-year in OUR sample**			
Dataset:	NBER	+KPSS	BOTH	SUBS	NBER	+KPSS	BOTH	SUBS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1996	39,453	2,002	41,455	-	20,218	1,446	21,664	-
1997	39,847	1,836	41,683	-	21,838	1,279	23,117	-
1998	54,785	2,254	57,039	-	28,853	1,290	30,143	-
1999	57,528	2,209	59,737	-	29,605	1,125	30,730	-
2000	60,717	1,860	62,577	-	30,367	1,301	31,668	-
2001	65,475	2,075	67,550	-	32,207	1,654	33,861	-
2002	67,353	2,427	69,780	-	32,585	2,013	34,598	-
2003	68,366	2,097	70,463	3,586	36,446	1,517	37,963	3,173
2004	67,442	2,018	69,460	3,894	37,715	1,638	39,353	2,822
2005	57,526	11,116	68,642	2,377	33,679	3,359	37,038	2,021
2006	58,145	19,634	77,779	4,426	37,449	4,934	42,383	3,804
2007	-	64,291	64,291	-	-	35,480	35,480	-
2008	-	62,110	62,110	-	-	35,889	35,889	-
2009	-	64,033	64,033	-	-	38,375	38,375	-
2010	-	65,252	65,252	-	-	38,913	38,913	-
Total	636,637	305,214	941,851	14,283	340,962	170,213	511,175	11,820

Note: This tables presents the sample of patents we use in our analysis. We detail for each year the number of patents assigned to firms with available GVKEYs (on the left panel), and to firms in our sample (on the right panel). We combined patents from the NBER dataset covering the 1996-2006 period, and from the augmented sample compiled by Kogan, Papanilolaou, Seru and Stoffman (2016) covering the 1996-2010 period, labeled KPSS. We refer to such combination as BOTH. We also present patents assigned to firms' subsidiaries, obtained from matching patent assignee names to firms' subsidiary list compiled by corporatewatch.com, labeled as SUBS, which covers the period 2003-2006.

Figure 1: Bootstrapped Models. This we performed a bootstrap analysis in which we re-estimate our baseline probit specification 1,000 times on sub-samples composed of 3,000 randomly selected firms. The dependent variable is a dummy indicating whether the given firm is a target in a vertical transaction in a given year. Vertical transactions are identified using the Vertical Text-10% network. All estimations include control variables similar to our baseline model, defined in the Appendix of the paper. The independent variables are standardized for convenience. All estimations include year fixed effects. Standard errors are clustered by FIC-300 industry and year. We present the distribution of the estimated coefficients on industry R&D and patenting intensity, as well as the corresponding *t*-statistics.