Monopsony, Price Squeezing and Sub-optimal Investments

Sangin Park
Graduate School of Public Administration
Seoul National University
South Korea
sanpark@snu.ac.kr

Very Preliminary and Do Not Quote

October 2020

1. Introduction

Emergence of Monopsony in Korea

- The economic growth of Korea since 1960s was driven by the government-led and chaebol-centered strategy of development.
- However, this developmental strategy was accompanied with increasing economy-wide concentration of *chaebols*, large business groups controlled by founder families.
- The consolidation by big chaebol firms in major industries, which was accelerated after the Korean crisis in 1997.
- For example, in the automobile industry, Hyundai Motors acquired Kia Motors while all the other three car-makers went into bankruptcy and then sold to foreign producers between 1998 and 2004.
- This merger and reshuffling led to local monopolization in the automobile market, establishing monopsony in the industry of automobile parts and components.

Monopsony is an issue in other countries as well

- Dominant retailers, such as Amazon and Walmart, wield monopsony power to depress wages up their entire supply chains especially in the rural areas.

- An antitrust suit against the National Collegiate Athletic Association (NCAA) is ongoing since the NCAA and its member colleges and universities cap the compensation which players can receive. (https://promarket.org/2020/02/03/antitrusts-monopsony-problem/)

Exploitation and higher consumer price by monopsony

- These examples indicate the ill protection of the workers in the monopsony of labor markets.
- Once the monopsonist establishes exclusive supply chains with suppliers (subcontractors) of parts and components, it begins to engage in price squeezing in the bargaining with its subcontractors
- As shown by the Korean Metal Workers Union, in 2014, Hyundai Motors, the monopsonist, enjoyed an 8.5% of operating profits. In contrast, operating profits were 5.8% at large primary subcontractors, 3.8% at primary medium-sized subcontractors, and 2.8% at small subcontractors in the secondary tier, respectively.
- This gap in profitability is directly reflected in the wage gap between SMEs and large firms, which becomes a key element of widening income inequality in Korea.
- On the other hand, the OECD (2008) points out that the exercise of monopsony power usually results in higher prices downstream, reducing consumer welfare.

Monopsony may affect Innovation as well

- The devastating consequences of monopsony on innovations and thus loss of consumer welfare have been documented in several occasions.
- As illustrated in *Saving Capitalism from the Capitalists*, a book written by Rajan and Zingales, until the 1960s, the three U.S. automakers, GM, Ford, and Chrysler, colluded to dominate the U.S. automobile industry; hence parts and components suppliers had exclusive-dealing contracts with them.
- In Korea, it is widely speculated that the subcontractors, faced with profit squeezing, have less incentive for innovation. They thus become largely indistinguishable and replaceable, and fall prey to price squeezing once again. This is how such subcontractors lose both the incentive and the capacity to innovate, and are forced to compete in terms of price alone, rather than quality or technological capacity.
- However, **it is not straightforward that monopsony reduces incentive of exclusive-dealing subcontractors for innovations since she can extract all the rent upon the entry of subcontractors anyway**.

Purposes of the paper

- In the paper I will first present a theoretical model in which monopsony reduces subcontractors' incentive for innovation, leading to sub-optimal investments in R&D.

- Then I will present econometric evidence supporting the theoretical prediction that substantially less subcontractors invest in research and development (R&D) if they are under exclusive-dealing contract.

2. The model

Setup

- My model builds on the model for political economy under elite control in Acemoglu (2009).

- An economy is populated by a continuum of workers, one final-good producer and intermediate-good manufacturers with a discount factor equal to β.

- I assume that the final-good producer competes in a competitive international market but is the monopsonist for intermediate-good manufacturers.

- I also assume that the monopsonist assembles the manufacturers' intermediate outputs without any assembly cost.

The timing of events (1)

- At date 0, the monopsonist determines whether she hires intermediate-good manufacturers directly (vertical integration) or contracts with them independently (outsourcing).
- In the case of vertical integration, the monopsonist suffers a loss of a fraction δ^I in final-good production, while she loses a δ^O in final-good production In the case of outsourcing.
- These losses reflect incomplete contracts as in Grossman and Hart (1986).
- Ex ante, there are a large number of identical manufacturers for each intermediate good, and thus upon their contracts with the monopsonist (as managers of factories or independent subcontractors), each intermediate-good manufacturer makes a lump-sum transfer $T_i^I(0)$ or $T_i^O(0)$ to the monopsonist so as to make them break even.
- **In the case of outsourcing, the monopsonist cannot commit not to engage in price squeezing** (from date 1) at date 0.
- **This lack of commitment (holdup problem) is the key element** of my model.

The timing of events (2)

- At date t (t ≥ 1), in the case of outsourcing, the monopsonist may set a sequence of price squeezing rates $\tau_i^t = \{\tau_i(s)\}_{s=t}^{\infty}$ on each subcontractor. Then with τ_i^t as well as the capital stock $K_i(t)$ of each subcontractor, she decides how much labor to hire $L_i(t)$ and how much to make investments.
- In the case of vertical integration, the monopsonist does not engage in price squeezing, and with the (knowledge) capital stock $K_i(t)$, each manufacturer decides how much labor to hire $L_i(t)$ and how much to make investments.
- When the intermediate goods are produced, the monopsonist simply assembles these intermediate goods without any assembly cost to produce final products.
- Since I assume that the monopsonist competes in a competitive international market, no profit is made from the markup of final products.
- Hence in the case of outsourcing, monopsonist can make profits from lump-sum tax $T_i^O(0)$ at date 0 and the sum of profit squeezing from date 1 and on, while she can collect lump-sum tax $T_i^I(0)$ at date 0 in the case of vertical integration.

My model differs from that of Antrás (2003, 2005) in two elements.

- First, a generalized Nash bargaining game in the allocation of surplus between final producers and intermediate-good producers v. price squeezing.
- Second, relationship-specific investments under vertical integration and outsourcing v. R&D investments independent of relationship specific investments.
- In my model, I simply assume that $\delta^{O} < \delta^{I}$.
- This assumption is consistent with the results in Antrás (2003, 2005): if production is very intense in intermediate goods, it will thus be optimal to assign the residual rights of control to the operators of manufacturing plants.
- In my model, the final-good producer's contribution to the production is minimal since she simply assembles the subcontractors' intermediate goods without any assembly cost.

Intermediate-good manufacturer's investment decision (1)

- I solve the model backward.
- Let me begin with exclusive-dealing subcontractors faced with price squeezing.
- At date t, given any feasible policy sequence $\tau^t = \{\tau(s)\}_{s=t}^{\infty}$ and equilibrium wage $w^t = \{w(s)\}_{s=t}^{\infty}$, the utility of a subcontractor with capital stock $K_i(t)$ at time t as a function of these policies is:

$$U_i(\{K_i(s), L_i(s)\}_{s=t}^{\infty} | \tau^t, w^t) = \sum_{s=t}^{\infty} \beta^{s-t}[(1-\tau(s))F\big(K_i(s), L_i(s)\big) \\ -\big(K_i(s+1)-(1-\delta)K_i(s)\big) - w(s)L_i(s)], \qquad (1)$$

where F satisfies continuity differentiability, positive and diminishing marginal products and constant returns to scale as well as Inada condition.

- I assume that $L_i(t) = L$ where L is the number of workers employed by subcontractor i.

Intermediate-good manufacturer's investment decision (2)

- Maximizing (1) w.r.t. the sequences of capital stock and labor choices, I obtain the following simple first-order condition:

$$\beta\left[\left(1-\tau(t+1)\right)f'\left(k_i(t+1)\right)+(1-\delta)\right]=1, \tag{2}$$

  where $k_i(t+1)$ denotes the capital-labor ratio $(K_i(t)/L)$ chosen by subcontractor i for time $t+1$ given the tax rate $\tau(t+1)$, and $f\left(k_i(t)\right)=F(K_i(t)/L,1)$.

- Thanks to the Inada condition, this first-order condition holds an equality for any $\tau \in [0,1)$.

Intermediate-good manufacturer's investment decision (3)

- Thanks to linear preferences, the choice of the capital-labor ratio by each subcontractor at time $t+1$ only depends on the tax rate $\tau(t+1)$ and not on all the future taxes.
- I can therefore write the equilibrium capital-labor ratio at time t for all subcontractors as follows.

$$\hat{k}(\tau(t)) = (f')^{-1}\left(\frac{\beta^{-1}+\delta-1}{1-\tau(t)}\right). \tag{3}$$

- Given the expression in (3) and full employment, the equilibrium wage at time t is given by the usual expression:

$$\hat{w}\big(\tau(t)\big) = \big(1-\tau(t)\big)\left[f\left(\hat{k}\big(\tau(t)\big)\right) - \hat{k}\big(\tau(t)\big)f'\left(\hat{k}\big(\tau(t)\big)\right)\right]. \tag{5}$$

Price squeezing (1)

- I proceed to see if the unintegrated monopsonist actually engage in price squeezing, setting $\tau > 0$.
- Without loss of generality, I assume that the total number of workers is equal to 1. Then, the final goods are produced by: $\int F\big(K_i(t), L_i(t)\big)di = f\left(\hat{k}(\tau)\right)$.
- The monopsonist's profit from profit squeezing at date t is:

$$T^e(t) = \tau(t)\int F\big(K_i(t), L_i(t)\big)di = \tau(t)f\left(\hat{k}(\tau)\right), \tag{6}$$

- The maximization problem of the monopsonist can then be written recursively as

$$V^e(\tau(t), [K_i(t)]_i) = \max_{\tau(t+1)}\{T^e(t) + \beta \mathrm{V}^e(\tau(t+1), [K_i(t+1)]_i)\}. \tag{7}$$

Price squeezing (2)

- The utility-maximizing tax rate for the monopsonist is the same at all dates and is given by the solution to the following first-order condition from equation (6):

$$f\left(\hat{k}(\hat{\tau})\right) + \hat{\tau} f'\left(\hat{k}(\hat{\tau})\right) \hat{k}'(\hat{\tau}) = 0. \tag{8}$$

- Due to (2) and (3), (8) can be rewritten as:

$$f\left(\hat{k}(\hat{\tau})\right) + \frac{\hat{\tau}\left(f'\left(\hat{k}(\hat{\tau})\right)\right)^2}{(1-\hat{\tau}) f''(\hat{k}(\hat{\tau}))} = 0. \tag{9}$$

- It is easily shown that this equilibrium tax rate $\hat{\tau}$ is always between 0 and 1.

Price squeezing (3)

Proposition: Suppose full employment. Then for any initial distribution of capital stocks among subcontractors, $[\boldsymbol{K_i(0)}]_i$, there exists a unique Markov Perfect Equilibrium, where at each $\boldsymbol{t}$ = 1, …, the monopsonist set the tax $\hat{\boldsymbol{\tau}} \in (\boldsymbol{0}, \boldsymbol{1})$ as given in (9), all subcontractors choose the capital-labor ratio $\hat{\boldsymbol{k}}(\hat{\boldsymbol{\tau}})$ as given by (3) and the equilibrium wage rate is $\hat{\boldsymbol{w}}(\hat{\boldsymbol{\tau}})$ as given by (5). We have $\hat{\boldsymbol{k}}(\hat{\boldsymbol{\tau}}) < \boldsymbol{k}^*$, where $\boldsymbol{k}^*$ is the first-best capital-labor ratio, and $\hat{\boldsymbol{w}}(\hat{\boldsymbol{\tau}}) < \boldsymbol{w}^*$, where $\boldsymbol{w}^*$ is the first-best wage.

The proposition indicates that the subcontractor's investment is sub-optimal and thus the wage of the subcontractor's worker is lowered. The source of this inefficiency is the combination of revenue extraction by the monopsonist with distortionary taxes.

Conditions for subcontracting and price squeezing (1)

- At date 0, the final-good producer contracts out and engage in price squeezing if

$$\delta^I - \delta^O > T^I - (T^O + T^e). \tag{11}$$

- Note that $(T^O + T^e)$ and T^I are total sales of intermediate-good producers net of capital and labor costs which are proportional to the sales. Since ex post outputs of intermediate-good producers are greater under vertical integration, we have: $T^O + T^e < T^I$.

- Hence, for a given relative loss from sub-optimal relationship-specific investments, **the monopsonist will contact out and engage in price squeezing if under-investment due to price squeezing is less severe** since under-investment in R&D lead to less equilibrium output and poorer profit made by taxations on subcontractors.

Conditions for subcontracting and price squeezing (2)

- Equation (11) implies that the monopsonist may choose to **over-vertical-integration** due to the holdup problem of price squeezing in the area as in (12):

$$T^I - (T^O + T^e) > \delta^I - \delta^O > 0. \tag{12}$$

- Note that the final good producer will choose to contract out to intermediate-good producers if $\delta^O < \delta^I$ when these upstream and downstream firms can negotiate with each other in a generalized Nash bargaining manner in the allocation of surplus.

3. Empirical Evidence

Data

- Workplace Panel Survey (WPS) conducted by the Korea Labor Institute (KLI).

- The WPS is a biannual survey beginning from 2006, which randomly samples establishments with more than thirty employees in the population of the National Establishments Survey conducted by National Statistics Office of Korea.

- In the paper, I employ the data of the manufacturing sector in the WPS in 2015 and 2017 since more **specific subcontracting information** is made available from the WPS in 2015.

- The WPS includes 1,455 manufacturing establishments in 2015 and 1,231 in 2017, identifying **331 (23%) establishments** in 2015 and **201 (16%) establishments** in 2017 which engage **in subcontracting**.

Table 1. Number of vendors (upstream firms) in subcontracting of manufacturing sector

Number of upstream firms	1	2	3 and more	
Year 2015	103 (31.12%)	51 (15.41%)	177 (53.47%)	331 (100%)
Year 2017	63 (31.98%)	28 (14.21%)	106 (53.81%)	197* (100%)

* 4 observations are missing in this survey question.

Figure 1. Distribution of the number of vendors in subcontracting

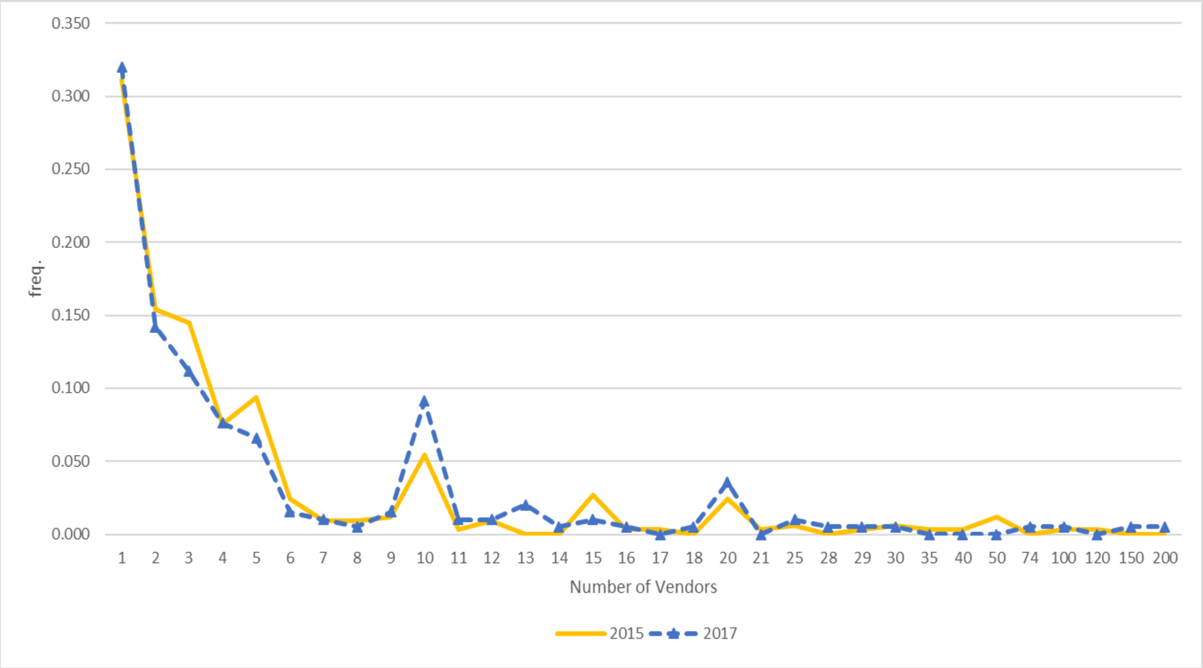


Table 2. Revenue share of subcontracting in manufacturing sector

Revenue share	Less than 25%	25%-49%	50%-74%	75%-99%	100%	
Year 2015	48 (14.5%)	49 (14.8%)	70 (21.15%)	90 (27.19%)	74 (22.36%)	331 (100%)
Year 2017	52 (25.87%)	29 (14.43%)	42 (20.90%)	44 (21.89%)	34 (16.92%)	201 (100%)

Table 3. Definition of exclusive-dealing subcontractor

	Subcontractors with only one vender and more than 50% revenues from subcontracting sales	Subcontractors with two venders and more than 75% revenues from subcontracting sales	Total subcontractors
Year 2015	79 (23.9%)	23 (6.9%)	331 (100%)
Year 2017	37 (18.4%)	9 (4.1%)	201 (100%)

As indicated in table 4, more than 80% of manufacturing establishments in the WPS in 2015 and 2017 are SMEs with less than 300 employees. Among them, more subcontractors are SMEs, and more exclusive-dealing subcontractors are SMEs.

Table 4. Firm size of subcontractors

Year	Size	Less than 300 employees	More than 300 employees	Total
2015	Manufacturing Firms	1,194 (82.2%)	259 (17.8%)	1,453 (100%)
	Subcontractors	285 (86.1%)	46 (13.9%)	331 (100%)
	Exclusive-dealing subcontractor 1*	73 (92.4%)	6 (7.6%)	79 (100%)
	Exclusive-dealing subcontractor 2**	92 (90.1%)	10 (9.9%)	102 (100%)
2017	Manufacturing Firms	987 (80.4%)	240 (19.6%)	1,227 (100%)
	Subcontractors	161 (81.7%)	36 (18.3%)	197 (100%)
	Exclusive-dealing subcontractor 1	33 (89.2%)	4 (10.8%)	37 (100%)
	Exclusive-dealing subcontractor 2	42 (91.3%)	4 (8.7%)	46 (100%)

* The exclusive-dealing subcontractors are defined to have only one vender and more than 50% revenues from subcontracting sales.

** In addition to the exclusive-dealing subcontractors defined in Definition 1, subcontractors with two venders and more than 75% revenues from subcontracting sales are included as the exclusive-dealing subcontractors.

Table 5. R&D activities by subcontractors

Year		2015	2017
R&D investment	Yes	145 (43.81%)	99 (49.25%)
	No	186 (56.19%)	102 (50.75%)
Total subcontractors		331 (100%)	201 (100%)

Table 6. R&D activities by exclusive-dealing subcontractors

		Exclusive-dealing subcontractor 1*		Exclusive-dealing subcontractor 2**	
		Exclusive-dealing subcontractor	The other subcont ractors	Exclusive-dealing subcontractor	The other subcont ractors
R&D investment	Yes	25 (21.55%)	219 (52.64%)	36 (24.32%)	208 (54.17%)
	No	91 (78.45%)	97 (47.36%)	112 (75.68%)	176 (45.83%)
Total subcontractors		116 (100%)	416 (100%)	148 (100%)	384 (100%)

* The exclusive-dealing subcontractors are defined to have only one vender and more than 50% revenues from subcontracting sales.

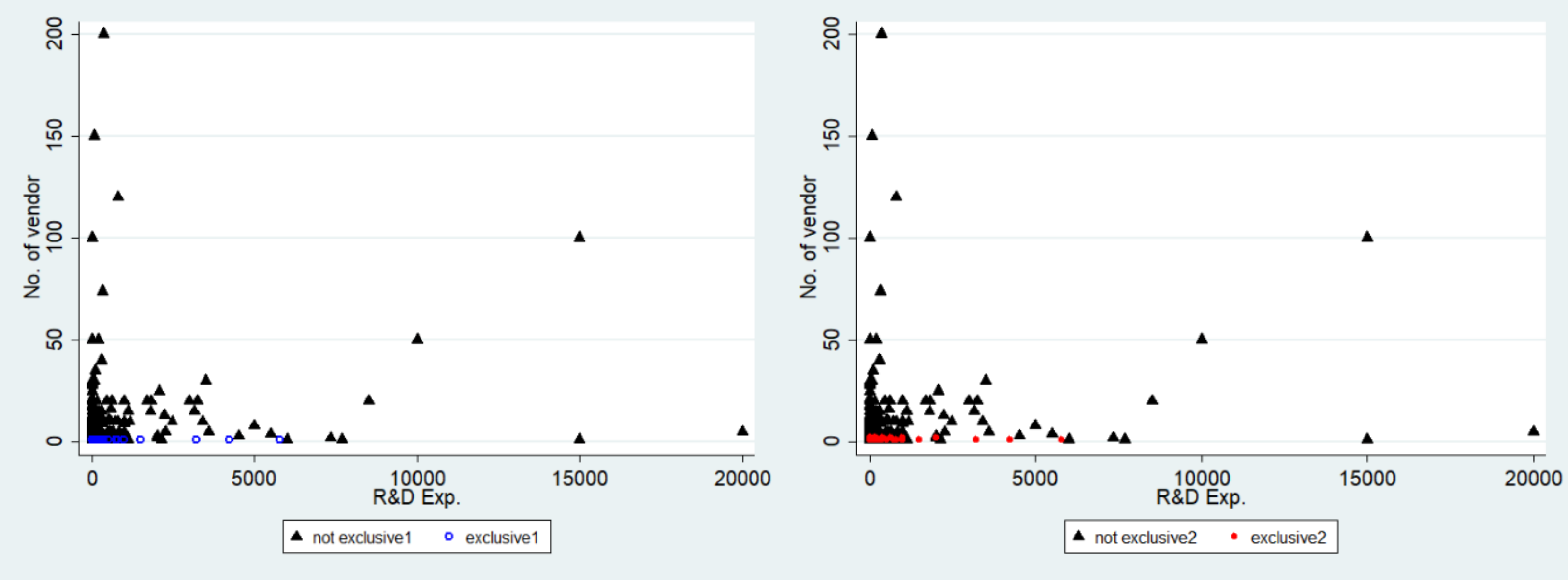
** In addition to the exclusive-dealing subcontractors defined in Definition 1, subcontractors with two venders and more than 75% revenues from subcontracting sales are included as the exclusive-dealing subcontractors.

- The difference in R&D expenditures between these two is also significant at the significance level of 0.1: exclusive-dealing subcontractors invest 362 million KRW less than non-exclusive subcontractors (see figure 2).

- If I use the alternative definition of the exclusive-dealing subcontractors, the difference is 403 million KRW which is significant at the significance level of 0.05 (see figure 2)

- The t test is conducted after removing upper 1% expenditures which are apparent outliers as shown in figure 2.

Figure 2. R&D expenditures by subcontractors (1,000,000 KRW)



* exclusive1: The exclusive-dealing subcontractors are defined to have only one vender and more than 50% revenues from subcontracting sales.

** exclusive2: In addition to the exclusive-dealing subcontractors defined in Definition 1, subcontractors with two venders and more than 75% revenues from subcontracting sales are included as the exclusive-dealing subcontractors.

Empirical Model Specification

- My empirical analysis is based on an R&D demand equation similar to (2) in Agrawl, Rosell and Simcoe (2019). Specifically, I estimate the following reduced-form model of R&D spending:

$$E[R_{it}|S_{it}, X_{it}] = exp\{S_{it}, +X_{it}\theta\}, \tag{13}$$

  where R_{it} is R&D expenditure by firm i in year t, S_{it} is an indicator for exclusive dealing subcontractor, and X_{it} are time-varying firm-level and industry-level controls.

- I apply a Poisson regression to estimating equation (13) since a Poisson estimator handles the many cases where R_{it} = 0 more naturally than a log-log specification.
- In addition to the Poisson regression, I also use a log-log specification in (13) and a Probit regression for a R&D indicator.

Summary Statistics

Variable	Exclusive-dealing subcontractors 1				The other subcontractors				Diff (1)-(2)
	Obs	Mean (1)	Std. Dev.	Median	Obs	Mean (2)	Std. Dev.	Median	
R&D Expenditure	115	204.8	764.66	0	407	566.89	2044.18	10	-362.09*
Sales	71	47015.29	67583.38	17628.25	318	65506.85	182011.6	22067.5	-18491.57
Number of Employees	115	117.56	108.59	77	407	168.39	259.73	79	-50.83**
Total asset	69	51441.1	93172.24	15290	316	69803.42	179838.1	23087.5	-18362.32
Export ratio	115	3.62	12.62	0	407	15.00	23.79	0	-11.38***
CR3	115	47.00	18.93	37.2	407	41.41	17.08	35.4	5.59**
Age	115	16.69	11.91	15	407	23.00	12.86	21	-6.31***

Note: *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Variable	Exclusive-dealing subcontractors 2				The other subcontractors				Diff (1)-(2)
	Obs	Mean (1)	Std. Dev.	Median	Obs	Mean (2)	Std. Dev.	Median	
R&D Expenditure	147	197.56	701.68	0	375	600.62	2123.68	20	-403.06**
Sales	90	46113.47	66728.38	19343.63	299	66953.35	186947.2	22,619	-20839.88
Number of Employees	147	119.66	116.82	72	375	171.90	267.11	80	-52.24**
Total asset	88	50122.01	85803.11	17,259	297	71368.95	184957.1	22,970	-21246.94
Export ratio	147	4.40	14.64	0	375	15.66	23.97	0	-11.27***
CR3	147	45.59	18.26	36.8	375	41.49	17.29	35.4	4.10**
Age	147	16.94	11.57	16	375	23.44	12.96	22	-6.50***

Note: *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Regression Results: Exclusive-dealing subcontractor 1

Dependent variable	Poisson (1)			OLS (2)			Probit (3)		
	R&D Expenditure (in natural logarithm)			R&D Expenditure (in natural logarithm)			R&D Indicator		
Exclusive-dealing subcontractor1	-0.452*** (-4.85)	-0.430*** (-4.10)	-0.419*** (-4.00)	-0.684** (-2.16)	-0.851** (-2.05)	-0.841** (-2.00)	-0.593*** (-3.51)	-0.630*** (-3.11)	-0.624*** (-3.06)
Number of employees	0.000*** (3.13)			0.001** (2.03)			0.000 (1.50)		
Ln(Sales)		0.035 (1.33)			0.097 (0.78)			-0.026 (-0.43)	
Ln(Total asset)			0.042 (1.62)			0.099 (0.80)			-0.027 (-0.45)
Export ratio	0.011*** (9.51)	0.008*** (6.89)	0.008*** (6.67)	0.034*** (6.00)	0.032*** (4.52)	0.031*** (4.42)	0.015*** (5.02)	0.013*** (3.89)	0.013*** (3.87)
Age	0.012*** (5.36)	0.005** (1.96)	0.004* (1.72)	0.031*** (3.07)	0.015 (1.15)	0.014 (1.04)	0.014** (2.58)	0.006 (0.99)	0.006 (0.92)
CR_3	-0.047 (-0.63)	0.000 (0.00)	-0.001 (-0.02)	-0.110 (-0.31)	0.022 (0.05)	0.010 (0.02)	-0.151 (-0.84)	-0.174 (-0.80)	-0.180 (-0.83)
$(CR\_3)^2$	0.001* (1.90)	0.001 (1.05)	0.001 (1.03)	0.002 (0.69)	0.002 (0.43)	0.002 (0.45)	0.002 (1.54)	0.002 (1.32)	0.002 (1.32)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy (2digit KSIC9)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	522	389	385	522	389	385	512	379	375
Adj. R^2				0.1931	0.1375	0.1332			
Pseudo R^2	0.1500	0.1154	0.1130				0.1943	0.1600	0.1560
Log likelihood	-1297.978	-1026.743	-1020.314				-284.5494	-220.3544	-218.9871

Note: *, **, *** indicate significance at the 10%, 5% and 1% level, respectively (two-tailed test).
t-values (model 2) and z-values (model 1 and 3) are reported in the parenthesis.

Regression Results: Exclusive-dealing subcontractor 2

Dependent variable	Poisson (1)			OLS (2)			Probit (3)		
	R&D Expenditure (in natural logarithm)			R&D Expenditure (in natural logarithm)			R&D Indicator		
Exclusive-dealing subcontractor2	-0.416*** (-5.13)	-0.301*** (-3.42)	-0.295*** (-3.35)	-0.672** (-2.30)	-0.627* (-1.66)	-0.622 (-1.63)	-0.522*** (-3.44)	-0.476*** (-2.64)	-0.469** (-2.59)
Number of employees	0.000*** (2.97)			0.001** (2.00)			0.000 (1.49)		
Ln(Sales)		0.031 (1.18)			0.093 (0.74)			-0.028 (-0.46)	
Ln(Total asset)			0.040 (1.55)			0.100 (0.80)			-0.025 (-0.43)
Export ratio	0.011*** (9.58)	0.009*** (7.27)	0.009*** (7.03)	0.034*** (5.98)	0.033*** (4.65)	0.032*** (4.53)	0.015*** (4.97)	0.014*** (3.97)	0.014*** (3.95)
Age	0.011*** (5.11)	0.005** (2.04)	0.004* (1.77)	0.030*** (2.98)	0.016 (1.22)	0.014 (1.09)	0.014** (2.53)	0.007 (1.10)	0.006 (1.01)
CR_3	-0.057 (-0.76)	-0.002 (-0.02)	-0.003 (-0.04)	-0.134 (-0.37)	0.015 (0.03)	0.004 (0.01)	-0.174 (-0.96)	-0.177 (-0.81)	-0.183 (-0.84)
$(CR\_3)^2$	0.001** (1.99)	0.001 (1.07)	0.001 (1.05)	0.002 (0.75)	0.002 (0.45)	0.002 (0.46)	0.002 (1.64)	0.002 (1.34)	0.002 (1.34)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy (2digit KSIC9)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	522	389	385	522	389	385	512	379	375
Adj. R^2				0.1942	0.1340	0.1299			
Pseudo R^2	0.1508	0.1128	0.1105				0.1933	0.1544	0.1503
Log likelihood	-1296.793	-1029.762	-1023.126				-284.9120	-221.8288	-220.4469

Note: *, **, *** indicate significance at the 10%, 5% and 1% level, respectively (two-tailed test).
t-values (model 2) and z-values (model 1 and 3) are reported in the parenthesis.