Do Business-Group Affiliations Affect Firms' Performance in Indonesia?

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Motivation

- Robison (1986, 2009): (pre-crisis) business groups were connected to Suharto, essential for the birth and the rise of modern firms in Indonesia
- Sato (2003): IDN business groups $\rightarrow$ stimulate investment in manufacturing industry, develop a new class of business managers, and nurture the formation of domestic capital. But, also integral part of corrupt Suharto network
- Carney and Hamilton-Hart (2015): top ten conglomerates controlled 29 % of the 178 largest listed firms in 1996 and 26.5 % in 2008, with changes in owners' identity.
- Sato (2004):
  - In 1996, 58/top-100 firms were group-affiliated, had higher D/E and ROE, but slightly lower ROA than non-affiliated firms
  - In 2000, 44/100, had higher ROE, but lower D/E and ROA

- Are they?

- Business groups definition used in previous studies: publicly listed firms, based on ownership link. For example:

Figure 1: (Suharto) Business group. W.I. Carr (1997) in Claessens et.al. (1999)

- My definition: From survey of medium and large manufacturing firms 1996 and 2006

42. **a. Apakah perusahaan ini anggota grup perusahaan?**
Does this establishment belong to any group of companies?
Ya/*Yes* -1 Tidak/*No*

- 1996 N=852/13,830 ; 2006 N=728/14,740

Table 1: Share of business-group firms in the industry

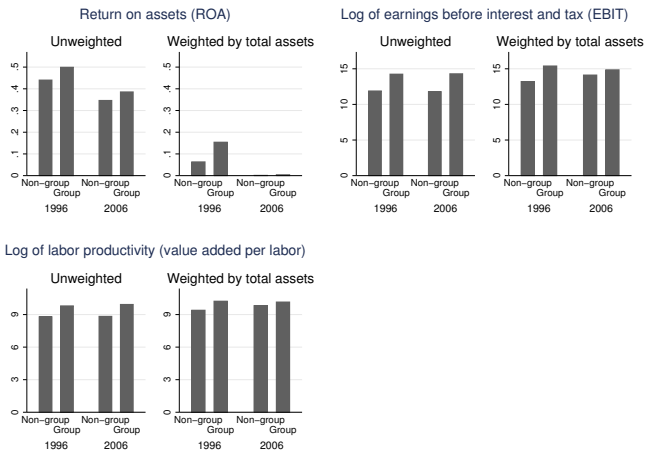|	1996 & 2006	1996	2006
Number of affiliated firms	5.2%	5.8%	4.7%
Real total assets	10.8%	11.3%	10.8%
Real sales	26.6%	24.6%	29%
Real value added	24.1%	23.4%	24%
Number of workers	16.1%	16.7%	15.4%
Number of high-educated workers	23.6%	22.4%	24.4%

Figure 2: Indonesia medium and large manufacturing firms performance - mean value
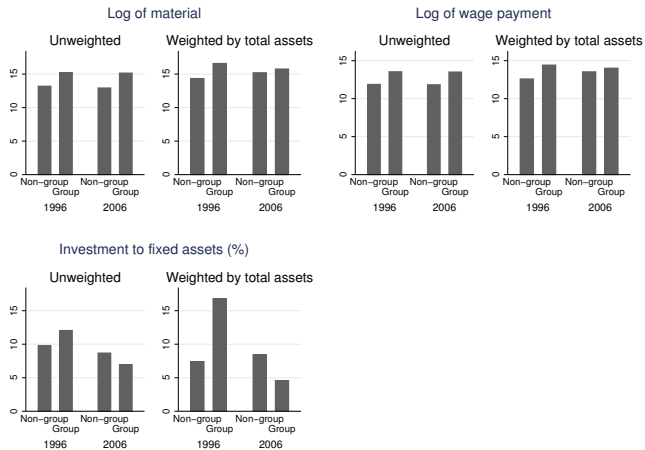
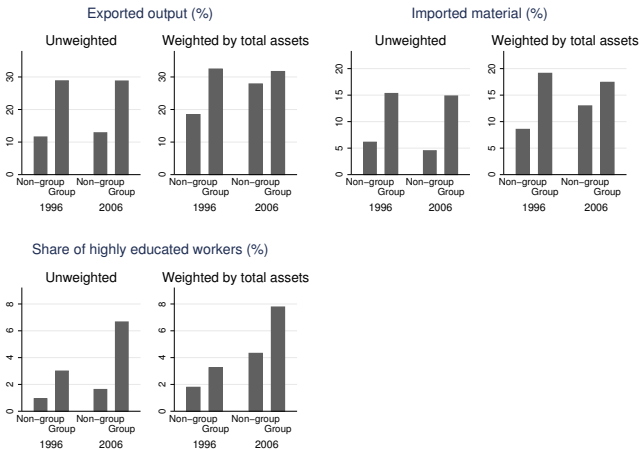Figure 3: Indonesia medium and large manufacturing firms operation - mean value

Figure 4: Indonesia medium and large manufacturing firms market access -
mean value

This Paper

- Estimate the performance effects of being a business-group member
- Investigate the channels through which the effects come: production and market access
- Apply matching method to control selection bias and measurement errors
- Use manufacturing firms data – not only publicly listed, thus more representative for developing countries with weak financial market

Preview of Findings

In the Indonesian manufacturing industry:

- ▶ Being affiliated with a business group positively affected firms' performance (i.e. 21 percent higher earning than non affiliated firms).

- ▶ The effects was channelled through better access to market, rather than improvement in the firms' production activities.

- ▶ Additionally, business-group membership effects do not statistically significantly change in 2006 (post-Suharto), relative to 1996.

Data

- The Indonesian Survey of Medium and Large Manufacturing Firms, panel data set, 1996 and 2006, by year and firm.
    - EBIT: (gross income-total expense)+ interest and indirect tax payment (th. in 2000 Rp)
    - ROA: EBIT/total assets value in beg. of year survey
    - Productivity: value added per worker (th. in 2000 Rp)
    - Material: material expenditure (th. in 2000 Rp)
    - Wage payment: payment to all workers (th. in 2000 Rp)
    - Investment: total fixed assets beg. minus end of year divided by total assets beg.
    - Percentage of exported output and imported material

- ▶ Share of high-educated workers: pct of workers w/ $\geqslant$ BA degree
- ▶ Controls: sales, number of workers, total assets (total fixed assets in the beg. year), age, Java, Exporter, and Herfindahl sales index 3-digit industry

▶ Business group membership status (yes/no) from Special Module in the same Survey of Manufacturing Firms 1996 and 2006, by firm and year. N=1,580 of 30,150 (5.2%)

▶ Outliers:
  - ▶ 1st and 99th percentile of firm's total assets, ROA, EBIT, investment, and cash flow.

Identification Strategy

Business group membership to a firm's performance may be:

- Positive:
  - Internalize factor market against external market imperfection (Morck et.al, 2005)
    - capital market (Stein, 1997)
    - public goods i.e., education, legal (Khanna & Yafeh, 2007)
- Negative:
  - Agency and coordination problem within group (Rajan et.al (2000) and Scharfstein and Stein (2000))
  - Embezzlement and tunnelling by ultimate owner with low cash flow right (Shleifer and Wolfenzon, 2002).
  - Substantial market distortion, if group controls major resources (Morck, 2005)

Empirical specification

► Baseline:

$$y_{it} = \alpha + \beta_1 Group_{it} + \beta_2 \mathbf{X}_i + \beta_3 \mathbf{X}_{it} + \epsilon_{it},$$

where

  ► y_{it}: the firm i's performance indicator at time t
  ► $Group_{it}$: dummy variable indicating whether the firm is a member of a business group
  ► $\mathbf{X}_i$ and $\mathbf{X}_{it}$: time-invariant and time-variant vectors of firm-level controls.

Estimators: OLS and firm-fixed effects (FE) regressions

- Main specification "treatment effects":

$$ATT = \frac{1}{n_1} \sum_{i \in \{D=1\}} \left[y_{1,i} - \sum_j w(i,j) y_{0,j} \right],$$

where

- ATT: the average treatment effect on the treated group,
- $y_{1,i}$: the outcome of each treated observation (affiliated firm)
- $y_{0,j}$: and the outcome of its control (standalone firms),
- $w(i,j)$: weight to make the two groups comparable.

- ▶ Preprocess data, finding counterfactuals
  - ▶ Propensity score matching (one-nearest neighbor matching)

$$Pr(D_i = 1 \mid X_i) = \Phi \{h(X_i)\},$$

where

- ▶ D_i: dummy variable whether a firm is affiliated with a business group
- ▶ Φ: the normal cumulative probability density
- ▶ $h(X_i)$: a vector of a firm's observable characteristics → Size (sales and assets), age, production capital-intensity, exporter status, Herfindahl index (3-digits industry), Java, and postcrisis year of 2006.

- ▶ Coarsened-exact matching
  - ▶ non-parametrically coarsened the data, by creating stratum based on the same observables above.
  - ▶ stratum cutpoints: 1-point increase of logs sales, total assets, capital per worker; 0.5 point increase of num. labor; ten-years increase of firm's age; and 0.1, 0.15, and 0.25 for Herfindahl index (highly competitive, unconcetrated, moderately concentrated, and highly concentrated conventional benchmarks).
- ▶ OLS and firm-fixed effect regressions and ATT specifications are repeated for production activity and access to market measures.

Results

▶ Predicting group affiliation to find counterfactuals

Table 2: Probit regression - group membership status

Log sales	0.169***
	(0.0113)
Log number of workers	0.368***
	(0.0878)
Log number of workers, squared	-0.0253**
	(0.00808)
Log total assets	0.0241
	(0.0173)
Age	-0.0105***
	(0.00248)
Firm's age, squared	0.000195***
	(0.0000382)
Log capital per worker	-0.00706
	(0.0167)
Export=1	0.130***
	(0.0328)
Herfindahl index	0.426
	(0.225)
Located in Java=1	-0.382***
	(0.0302)
Year 2006=1	-0.102**
	(0.0315)
Observations	28335
Chi-2	1928.6
Prob>Chi-2	0
Pseudo R2	0.164

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
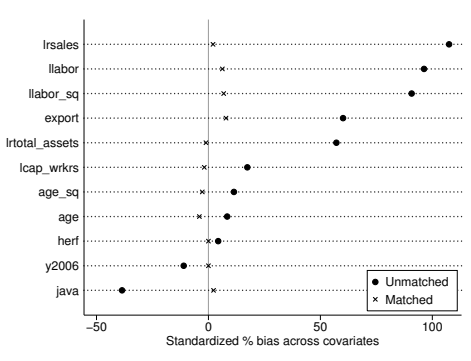
Figure 5: Standardized percentage bias

▶ Propensity Score Matching significantly improved the balance of each covariates.

Table 3: CEM matching summary

A. Matching summary

Number of strata	13,796	
Number of matched strata	518	
	Standalone	Affiliated
All	28,570	1,580
Matched	3,713	579
Unmatched	24,857	1,001

B. Balance test $\mathcal{L}_1$

	Unmatched	Matched
Multivariate imbalance	0.9999	0.9978
Univariate imbalance		
- Log sales	0.46	0.07
- Log number of workers	0.42	0.05
- Log number of workers, squared	0.42	0.05
- Log total assets	0.36	0.08
- Firm's age	0.08	0.09
- Firm's age, squared	0.06	0.08
- Log capital per worker	0.29	0.07
- Export=1	0.27	0.00
- Herfindahl index	0.11	0.13
- Java=1	0.17	0.00
- Year 2006=1	0.06	0.00

▶ CEM also improved the balance of each covariates.

Table 4: Did business-group membership increase firms' performance?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Return on assets (ROA)	0.0242	0.0870	0.038	0.0443
	(0.0270)	(0.0701)	0.038	(0.0303)
Log earning before interest and tax (EBIT)	0.233***	-0.0653	0.211***	0.141
	(0.0383)	(0.0949)	(0.054)	(0.107)
Log value added per labor (VA/L)	0.196***	0.0262	0.113**	0.0715
	(0.0246)	(0.0534)	(0.039)	(0.0540)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix A. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

- ▶ Yes, especially EBIT and VA/labor
  - ▶ Being an affiliated firm increases EBIT by 21 percent
  - ▶ . . . and labor productivity by 11 percent
  - ▶ No effects on ROA

Did business-group membership increase firms' production activities?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Log material	-0.0789**	0.0819	-0.105*	-0.00973
	(0.0282)	(0.0460)	(0.050)	(0.104)
Log wage payment	0.0991***	0.0623	0.149***	0.175*
	(0.0176)	(0.0394)	(0.034)	(0.0714)
Ratio of investment to total assets (%)	-0.159	-2.206	0.333	-0.620
	(1.155)	(2.742)	(1.49)	(2.013)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix B.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

- ▶ Mixed results:
    - ▶ ... decrease in material spending by 11 percent
    - ▶ ... increase in wage payment spending by 15 percent
    - ▶ ... small and statistically insignificant change on ratio of investment to total assets

Did business-group membership improve firms' access to market?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Exported product (%)	-1.781**	0.304	1.491	0.810
	(0.594)	(1.426)	(1.29)	(1.696)
Imported input (%)	2.276***	0.998	1.614	2.278
	(0.689)	(1.518)	(0.908)	(1.251)
Share of highly educated workers (%)	1.574***	0.835**	1.240***	0.949***
	(0.179)	(0.312)	(0.263)	(0.289)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix C.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

- ► Generally positive,
    - ► but not statistically significant for export and import accesses
    - ► more evident on access to pool of highly educated workers - 1.24 percentage-point increase, equivalent to 26 percent increase in comparison to mean value of non-affiliated firms'

		Regression		Matching, ATT	
		OLS	FE	PSM	CEM
ROA	Group	0.0705	0.0809	0.0867	0.0588
		(0.0402)	(0.0902)	(0.0494)	(0.0305)
	year=2006	0.234	0.124	0.352	-0.230*
		(0.203)	(0.330)	(0.198)	(0.0901)
	Group × year=2006	-0.102	0.0133	-0.134	-0.0392
		(0.0538)	(0.109)	(0.0934)	(0.0697)
log EBIT	Group	0.201***	-0.0664	0.132*	0.152
		(0.0430)	(0.115)	(0.0555)	(0.139)
	year=2006	0.0361	-0.693	-0.863	1.967***
		(0.393)	(0.435)	(0.624)	(0.172)
	Group × year=2006	0.0712	0.00226	0.102	-0.0294
		(0.0721)	(0.161)	(0.0998)	(0.219)
Log VA/labor	Group	0.204***	0.0152	0.149***	0.0971
		(0.0264)	(0.0632)	(0.0353)	(0.0675)
	year=2006	0.0382	-0.901	-0.0604	1.666***
		(0.266)	(0.633)	(0.305)	(0.161)
	Group × year=2006	-0.0194	0.0239	-0.0299	-0.0690
		(0.0456)	(0.0851)	(0.0653)	(0.112)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on
the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

▶ No statistically significant change on benefit of affiliation in post-Suharto year

		Regression		Matching, ATT	
		OLS	FE	PSM	CEM
Log Material	Group	-0.0799**	-0.0446	-0.144**	-0.0363
		(0.0290)	(0.0631)	(0.0451)	(0.131)
	year=2006	-0.0940	-0.201	0.736	1.039***
		(0.127)	(0.233)	(0.845)	(0.290)
	Group × year=2006	0.00231	-0.0811	-0.00199	0.0722
		(0.0526)	(0.0916)	(0.0792)	(0.216)
Log Wage Payment	Group	0.122***	0.0481	0.102***	0.215*
		(0.0217)	(0.0478)	(0.0299)	(0.0923)
	year=2006	0.0823	0.546*	-0.0170	0.967***
		(0.132)	(0.258)	(0.211)	(0.0520)
	Group × year=2006	-0.0499	0.0310	-0.0329	-0.107
		(0.0336)	(0.0569)	(0.0465)	(0.145)
Investment/tot. assets (%)	Group	1.945	-0.752	1.171	0.457
		(1.727)	(3.605)	(2.185)	(2.863)
	year=2006	8.203	19.31	3.221	12.08***
		(6.649)	(11.83)	(10.55)	(2.375)
	Group × year=2006	-4.640*	-3.167	-2.181	-2.905
		(2.248)	(5.071)	(2.931)	(3.748)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

▶ Also generally no statistically significant effects

		Regression		Matching, ATT	
		OLS	FE	PSM	CEM
Exported product (%)	Group	-2.574**	1.430	-2.853**	1.329
		(0.785)	(1.683)	(1.075)	(2.186)
	year=2006	3.494	10.70	7.147	51.17
		(1.912)	(8.706)	(10.39)	(29.74)
	Group × year=2006	1.747	-2.451	4.761**	-1.399
		(1.121)	(2.224)	(1.623)	(3.450)
Imported input (%)	Group	2.123*	0.586	1.745	3.344
		(0.880)	(1.853)	(1.154)	(1.752)
	year=2006	4.703	2.059	11.04	-0.0712
		(4.722)	(4.629)	(13.56)	(0.257)
	Group × year=2006	0.339	0.896	-1.241	-2.898
		(1.317)	(2.364)	(1.812)	(2.347)
Share of highly-educated workers (%)	Group	0.881***	0.358	0.696**	0.711
		(0.182)	(0.388)	(0.231)	(0.380)
	year=2006	4.152***	8.911***	-1.368	2.626
		(1.247)	(1.731)	(1.347)	(2.230)
	Group × year=2006	1.530***	1.039*	1.214*	0.643
		(0.352)	(0.492)	(0.539)	(0.581)

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* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

▶ Increasing benefit of affiliation in post Suharto years in percentage of exported product and share of highly-educated workers.

Conclusion

In Indonesian manufacturing industry, 1996 and 2006

- Business group membership had positive productivity effects.
- On the channels for the productivity effects:
    - Mixed results from production activities/operation
    - More likely from access to market, esp. educated labor
- Generally business-group membership effects persist in post-Suharto 2006