Techno-Industrial FDI Policy and China's Export Surge

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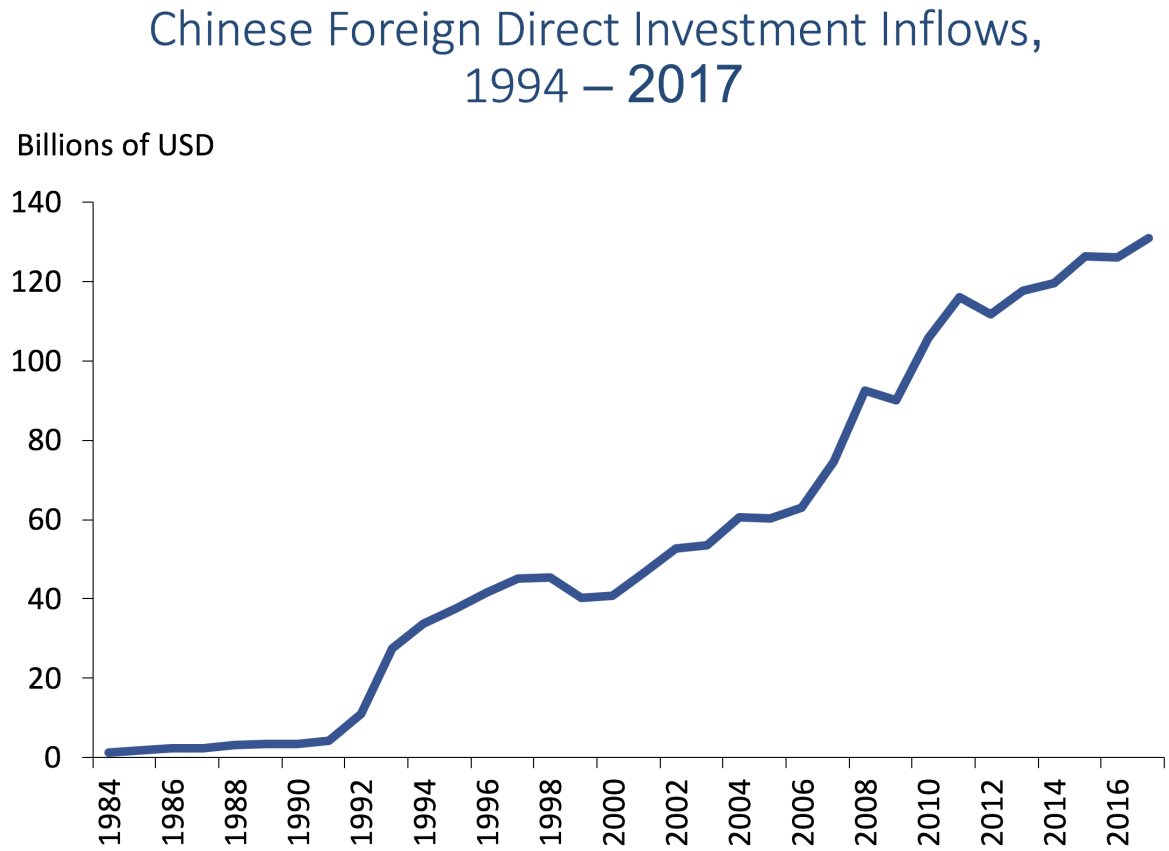
- Missing story: How did Chinese foreign investment policies affect export growth?
- Our paper studies the extent to which Chinese FDI policy shapes this export surge.

Why focus on foreign investment?

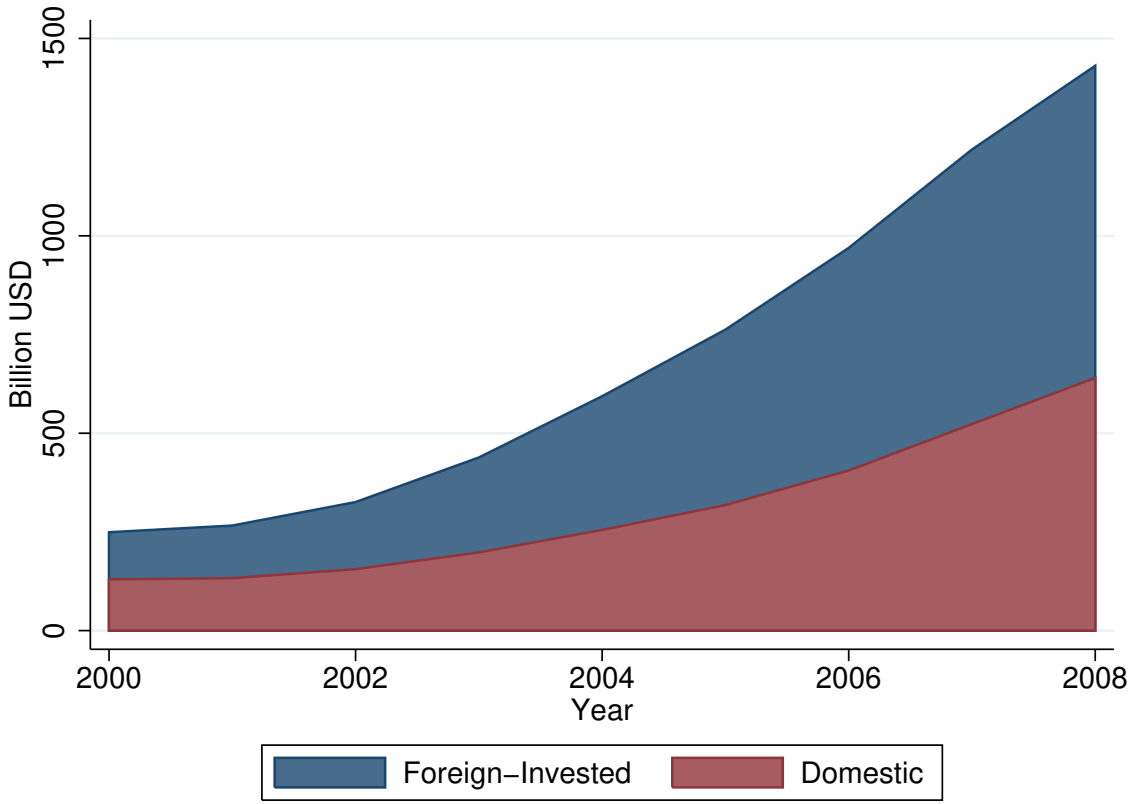
- Along with Chinese WTO entry, FDI flows to China surged between 2000 and 2007.



Source: National Bureau of Statistics of China, data.stats.gov.cn

Why focus on foreign investment?

- Exports from foreign-invested enterprises (FIEs) grew even faster than exports from domestic firms.



Source: China Custom Records by WIND

This Paper

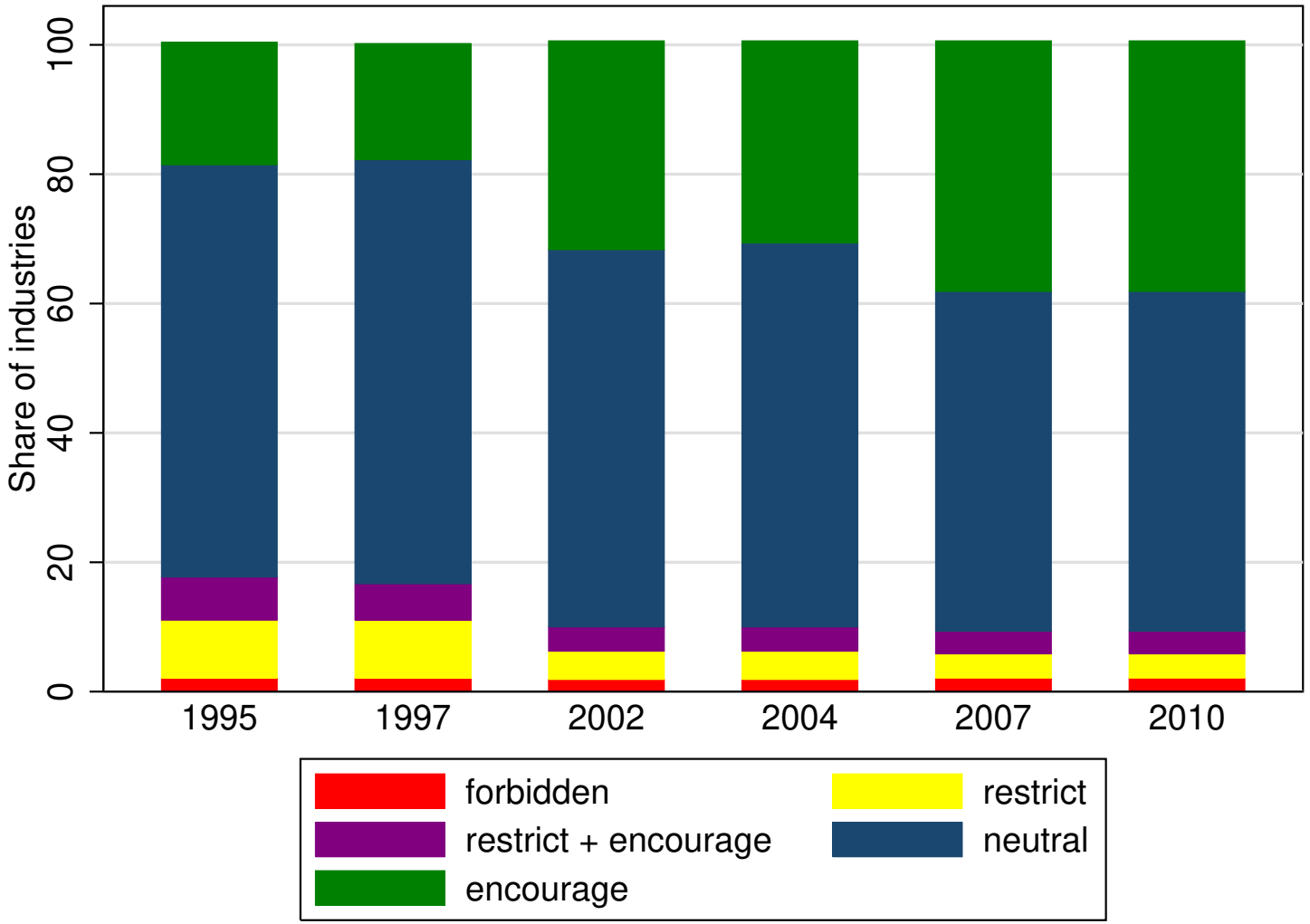
- **Question:** Does foreign investment activity change when a sector's FDI regulation is changed?
  - Outcomes: entry, exporters, export values
  - Setting: compare activity patterns over time, using diff-in-diff methods.
- How important are foreign-invested enterprises to the growth in Chinese exports following its WTO accession.
  - counterfactual
- Can we account for possible policy endogeneity?
  - event-study analysis
- Is activity being driven by other factors?
  - add controls
  - triple-differencing method

Guidelines Categorize Sectors by Openness to Investment

- Forbidden: no foreign investment permitted.
- Restricted: investment by permission and only as minority shareholder in a joint venture.
- Encouraged: preferences available on a deal-by-deal basis.
- Investment in all other industries is allowed, with no explicit restrictions on ownership, subject to approval.

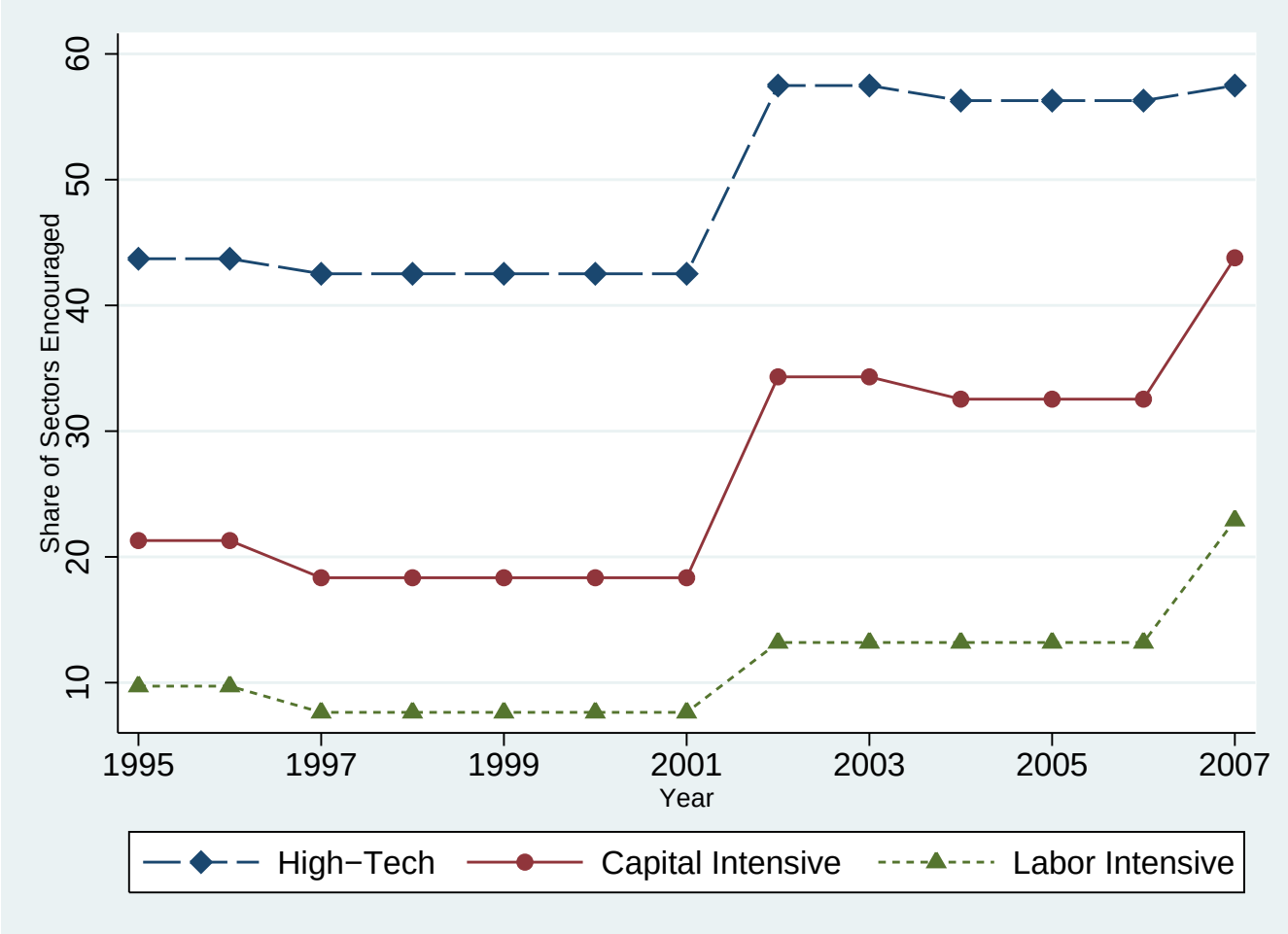
What do we expect the policy to do?

- Encouraged: policies are deal specific, but they may lower fixed costs of entry and, by lowering corporate tax rate, encourage entry and raise exports.
- Restricted: sectors are closed to wholly owned foreign investment, so liberalization should reduce encourage by this mode and raise exports by such firms.



Source: Policy designation at SCIC four-digit taken from Sheng and Yang (2016). Grouping and calculations by authors.

Share of Sectors Designated Encouraged, by Group, 1995-2007



(a) Encouraged

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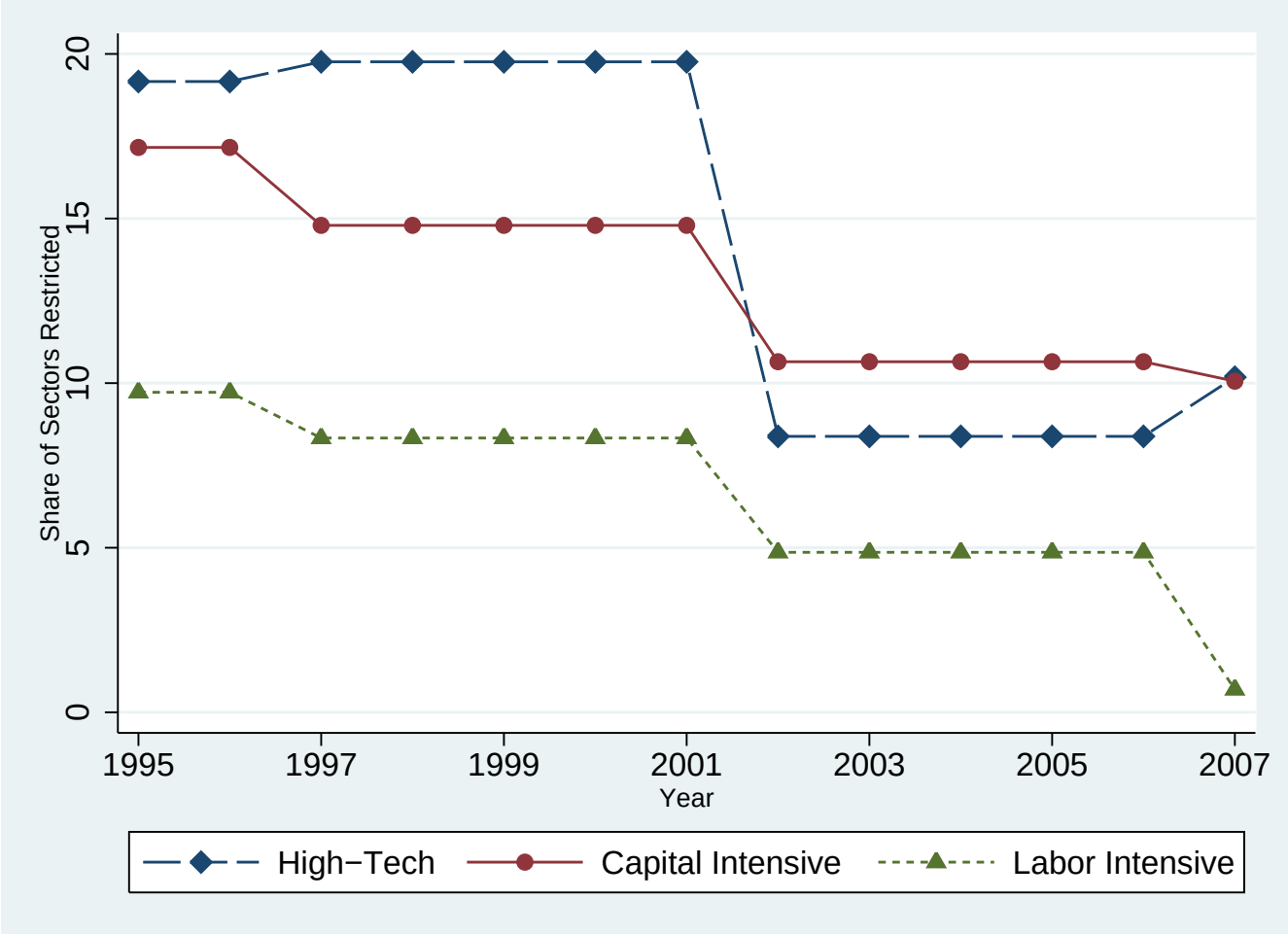
Share of Sectors Designated Restricted, by Group, 1995-2007



(a) Restricted

Source: Policy designation at SCIC four-digit taken from Sheng and Yang (2016). Grouping and calculations by authors.

Linear Probability Models of Policy Designations

	(1) Encouraged	(2) Encouraged	(3) Restricted	(4) Restricted
Capital-Labor Ratio (1998)	0.000	0.000	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
High-Tech Dummy	0.297***	0.293***	0.046	0.034
	(0.070)	(0.067)	(0.029)	(0.032)
SOE Output Share	0.055	0.005	0.016	0.009
	(0.124)	(0.134)	(0.065)	(0.069)
COD Intensity		0.001		-0.000
		(0.002)		(0.001)
SO2 Intensity		0.011		-0.005
		(0.009)		(0.004)
Year FE	Yes	Yes	Yes	Yes

Note: Dependent variables are policy designations for CIC four-digit sectors from Sheng and Yang (2016). Other data sources described in text. Pooled observations, 1995-2007. Robustness standard errors in parentheses are two-way clustered at the industry and year level.

* $p < .10$, ** $p < .05$, *** $p < .01$

Which industries are designated as high tech? (some examples)

- Chemicals (also capital intensive)
- Medical and pharmaceutical products (also cap int)
- Special equipment manufacturing (also cap int)
- Communications, computers, other electronics
- Instruments, meters, office machinery

Empirical Approach

Baseline Specification (Difference-in-Differences)

$$\ln Y_{jt} = \alpha + \beta_1 Encouraged_{jt} + \beta_2 Restricted_{jt} + \mu_j + \eta_t + \epsilon_{jt}$$

- $j =$ industry, $t =$ year
- *Encouraged* $= 1$ if industry j contains encouraged item in the FDI catalogue
- *Restricted* $= 1$ if industry j contains restricted item in the FDI catalogue
- μ_j, η_t are industry and year fixed effects
- Standard errors are two-way clustered at the industry and year level.

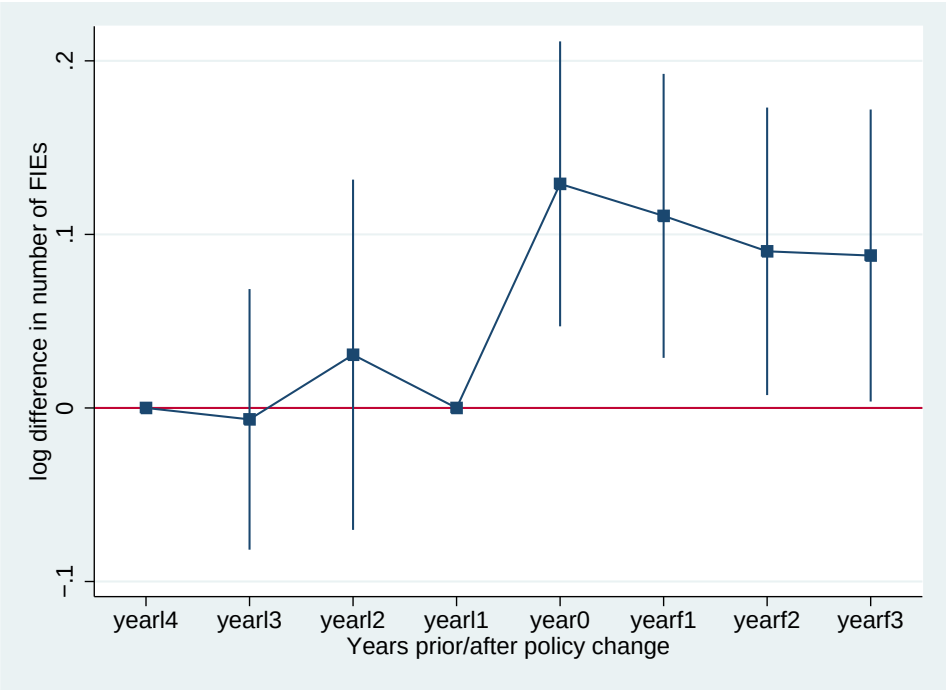
Event Study

$$\ln Y_{jt} = \alpha + \sum_{t=-3}^{4} \beta_{1t} Encouraged_{jt} + \sum_{t=-3}^{4} \beta_{2t} Restricted_{jt} + \mu_j + \eta_t + \epsilon_{jt}$$

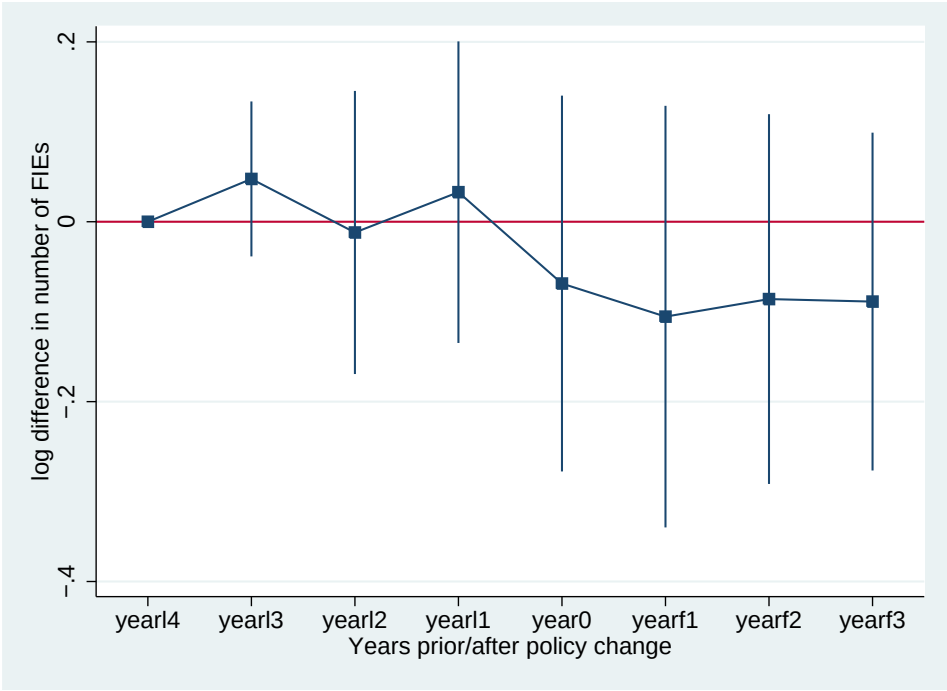
Event Study

Number of FIE firms

Number of FIE Firms



(a) Encouraged

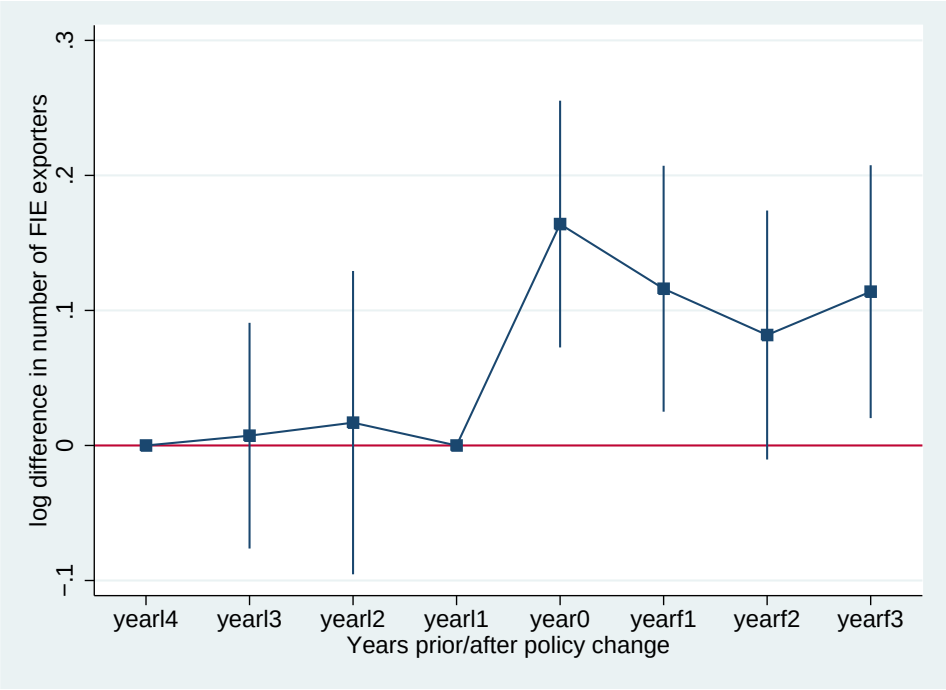


(b) Restricted

Event Study

Number of FIE exporters

Number of FIE Exporters



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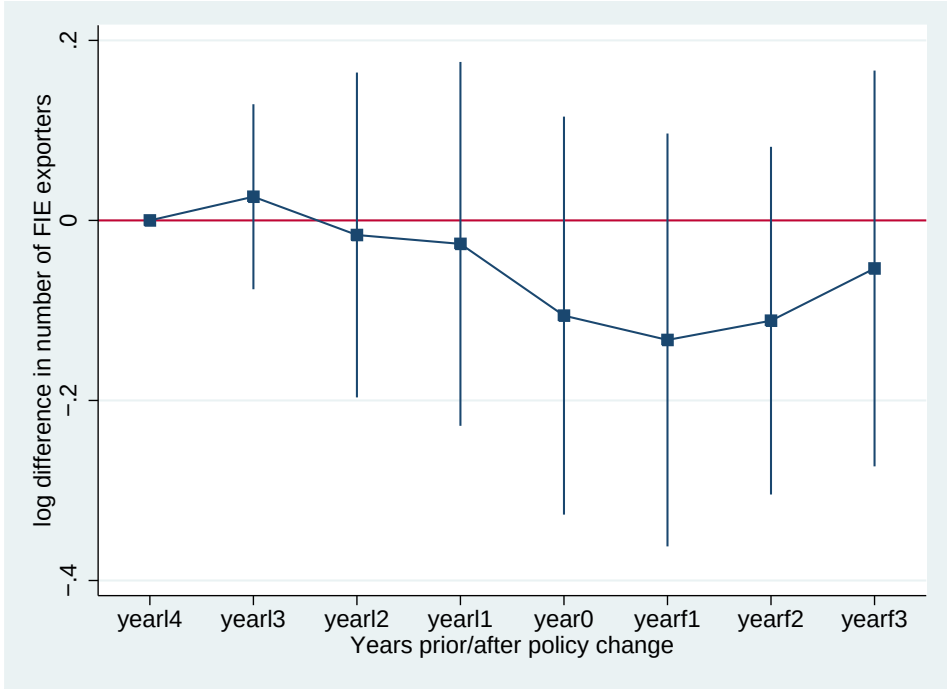

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Export values for FIEs

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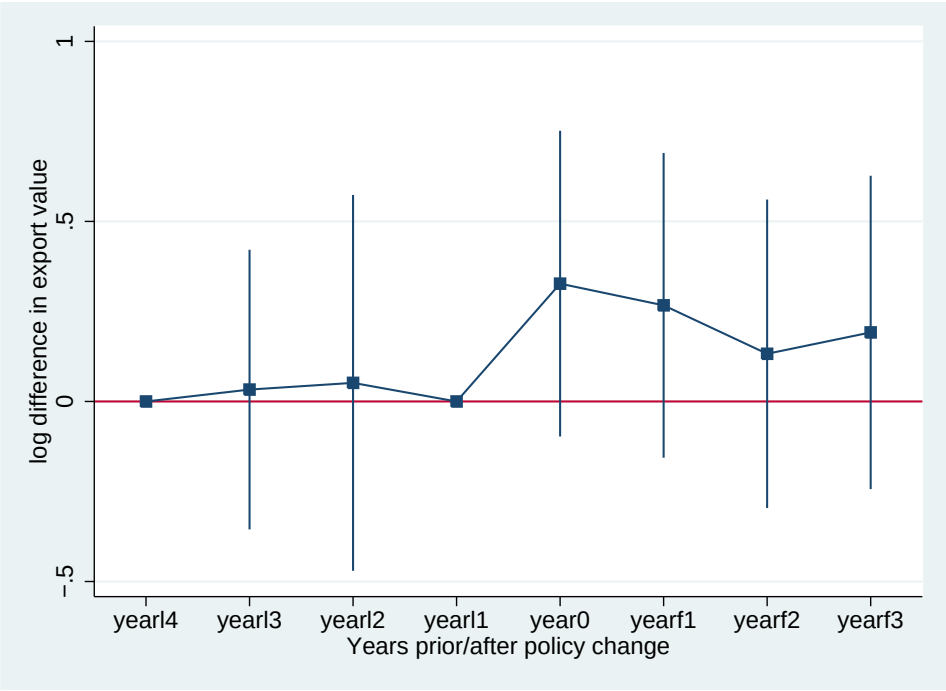

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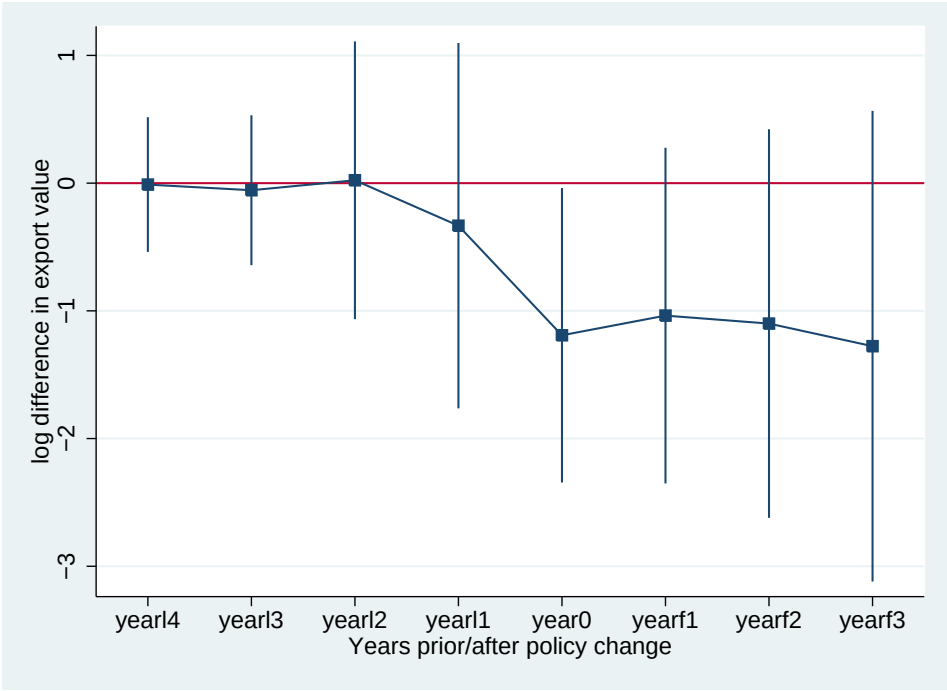

(b) Restricted

Other Possible Threats to Identification

- ~~reverse causality/simultaneity~~
- concurrent policies (OVB)
  - NTR gap
  - Chinese import tariffs
  - Non-tariff barriers
- Not enough?

Triple Differencing: Domestic Firms as Controls

$$\begin{aligned}\ln Y_{ijt} = \alpha &+ \beta_1 Encouraged_{jt} \times FIE_i + \beta_2 Restricted_{jt} \times FIE_i \\ &+ \gamma_{jt} + FIE_i \times \mu_j + FIE_i \times \eta_t \\ &+ FIE_i + \mu_j + \eta_t + \epsilon_{jt},\end{aligned}$$

- γ_{jt}= industry-by-year fixed effects
- $i = 1$ if if outcome variable refers to foreign-invested enterprises in industry j
- $j =$ industry, $t =$ year
- *Encouraged* $= 1$ if industry j contains encouraged item in the FDI catalogue
- *Restricted* $= 1$ if industry j contains restricted item in the FDI catalogue
- μ_j, η_t are industry and year fixed effects
- Standard errors are two-way clustered at the industry and year level.

What Data We Use?

- Chinese manufacturing firm census, 1998-2010
  - Omits the smallest firms
  - Provides number of firms, ownership, export value
- Chinese Customs Records, 2000-2013 Universe of exports
  - Provides information on ownership type
  - Provides product and destination information
- Sheng and Yang (2016) - policy designations
- Brandt et al. (2018) - other policy controls

Results

Which activities do we expect to be influenced by FDI policy?

- Entry of new foreign enterprises into China
- Entry of foreign enterprises into exporting
- Export volume of foreign firms
- Other aspects of export behavior:
  - Intensity of existing relationships
  - Export of new products to new destinations
  - Exports to the United States only

Baseline Results: DID

Regression DD Estimates of FDI Policy Effects

	(1) FIE	(2) JV	(3) WOFE	(4) Domestic
(*Panel A: Depvar = ln Number of Firms*)				
Encouraged	0.141***	0.142***	0.102**	0.077
	(0.044)	(0.042)	(0.046)	(0.059)
Restricted	-0.005	0.029	-0.147**	-0.034
	(0.045)	(0.039)	(0.067)	(0.062)
(*Panel B: Depvar = ln Number of Exporters*)				
Encouraged	0.153***	0.138***	0.101*	0.021
	(0.047)	(0.041)	(0.055)	(0.069)
Restricted	-0.047	0.024	-0.197**	0.000
	(0.049)	(0.042)	(0.074)	(0.065)
(*Panel C: Depvar = ln Export Values*)				
Encouraged	0.357**	0.382*	0.261	-0.171
	(0.141)	(0.177)	(0.185)	(0.123)
Restricted	0.173	0.207	-0.493	0.195*
	(0.153)	(0.195)	(0.329)	(0.104)
Observations	5615	5483	5194	5425

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Baseline Results: DID

Regression DD Estimates, with Industry-Specific Year Trends

	(1) FIE	(2) JV	(3) WOFE	(4) Domestic
(*Panel A: Depvar = ln Number of Firms*)				
Encouraged	0.098**	0.112**	0.044	0.013
	(0.037)	(0.038)	(0.038)	(0.041)
Restricted	0.023	0.039	-0.134*	-0.044
	(0.045)	(0.040)	(0.073)	(0.053)
(*Panel B: Depvar = ln Number of Exporters*)				
Encouraged	0.116**	0.107**	0.053	-0.081
	(0.040)	(0.039)	(0.047)	(0.048)
Restricted	-0.005	0.049	-0.180**	0.002
	(0.050)	(0.047)	(0.075)	(0.059)
(*Panel C: Depvar = ln Export Values*)				
Encouraged	0.461**	0.333	0.425**	-0.354***
	(0.154)	(0.187)	(0.175)	(0.104)
Restricted	0.246	0.211	-0.485	0.265**
	(0.157)	(0.212)	(0.301)	(0.095)
Industry Specific Year Trends	Yes	Yes	Yes	Yes
Observations	5615	5483	5194	5425

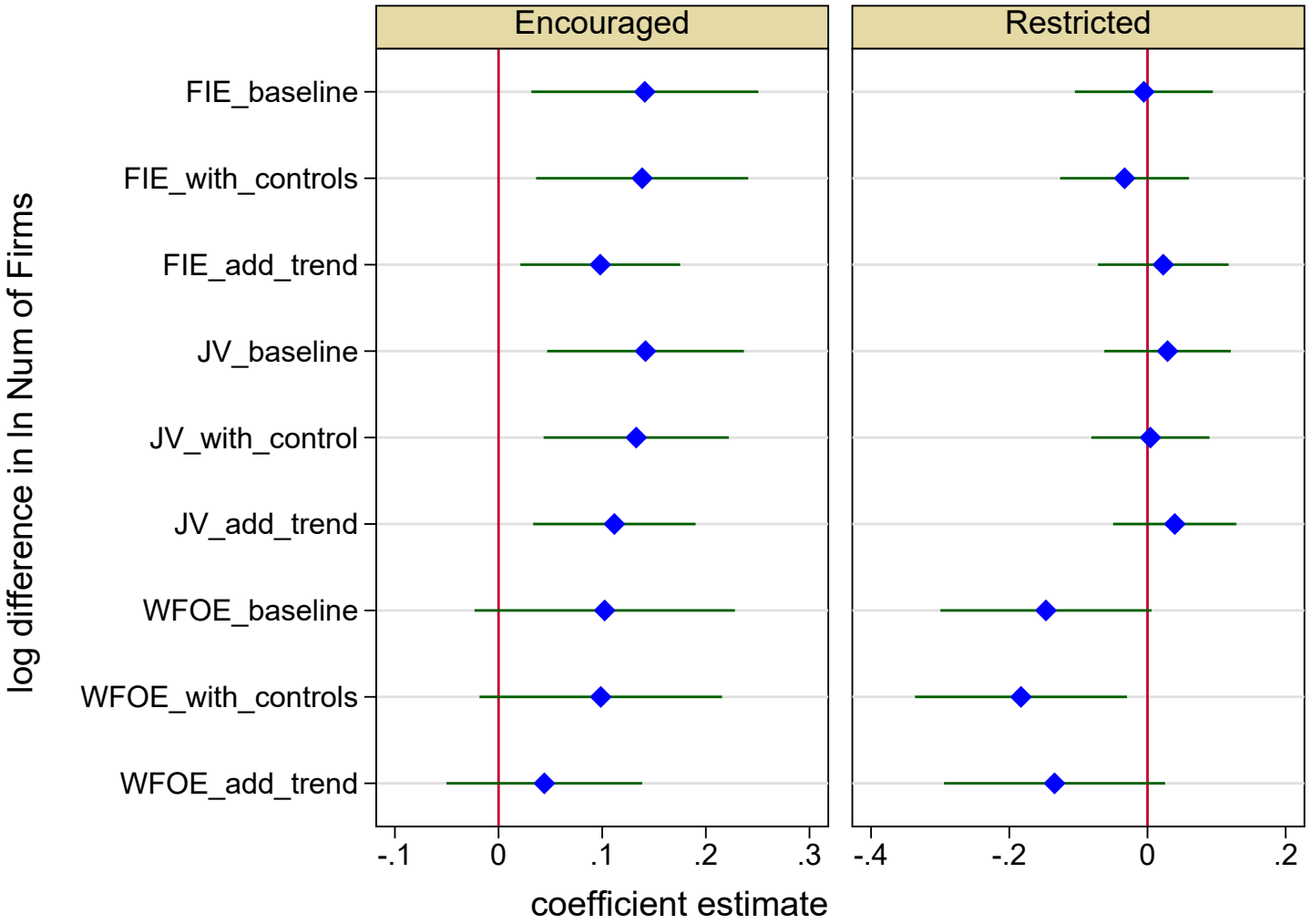
Adding Controls

DD Regressions with Controls

	ln Num of Firms			ln Num of Exporters			ln Export Values		
	(1) FIE	(2) JV	(3) WOFE	(4) FIE	(5) JV	(6) WOFE	(7) FIE	(8) JV	(9) WOFE
Encouraged	0.139**	0.133***	0.099*	0.153**	0.131***	0.098	0.349**	0.367*	0.098
	(0.047)	(0.041)	(0.054)	(0.051)	(0.039)	(0.062)	(0.125)	(0.175)	(0.092)
Restricted	-0.033	0.004	-0.183**	-0.067	0.013	-0.230**	0.198	0.229	-0.264*
	(0.043)	(0.039)	(0.070)	(0.050)	(0.045)	(0.082)	(0.163)	(0.185)	(0.137)
NTR Gap	0.007***	0.006***	0.006***	0.009***	0.007***	0.008***	-0.005	0.005	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.007)	(0.007)	(0.004)
ln Output Tariff	0.013	0.122***	-0.007	-0.016	0.119**	-0.047	-0.239*	0.126	-0.239
	(0.034)	(0.033)	(0.045)	(0.041)	(0.049)	(0.048)	(0.126)	(0.268)	(0.136)
Non-Tariff Barriers	0.255**	0.168**	0.301**	0.181*	0.033	0.270*	-0.379	-0.421*	0.449
	(0.096)	(0.063)	(0.125)	(0.098)	(0.081)	(0.146)	(0.404)	(0.223)	(0.337)

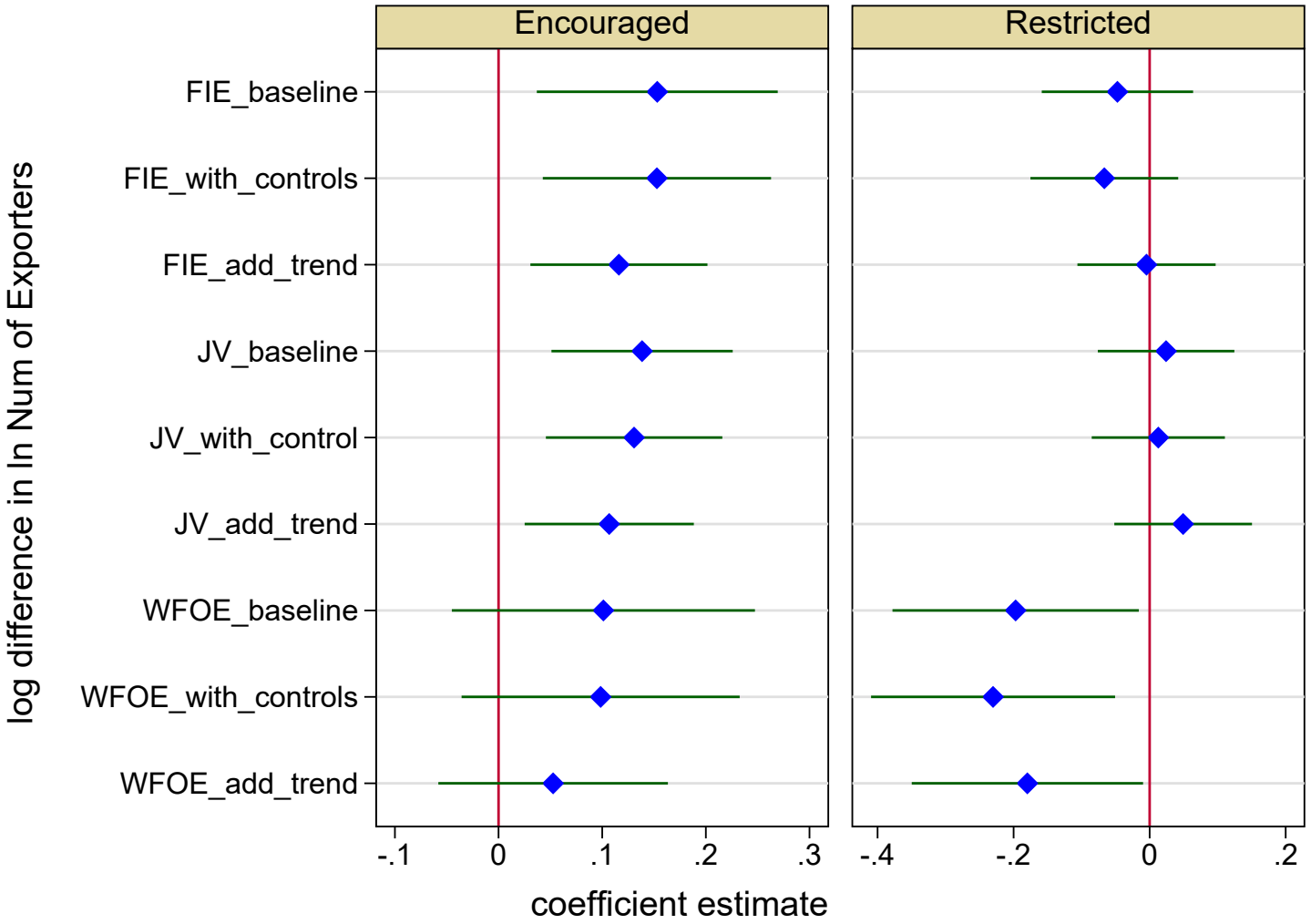
Robustness Check

of Firms



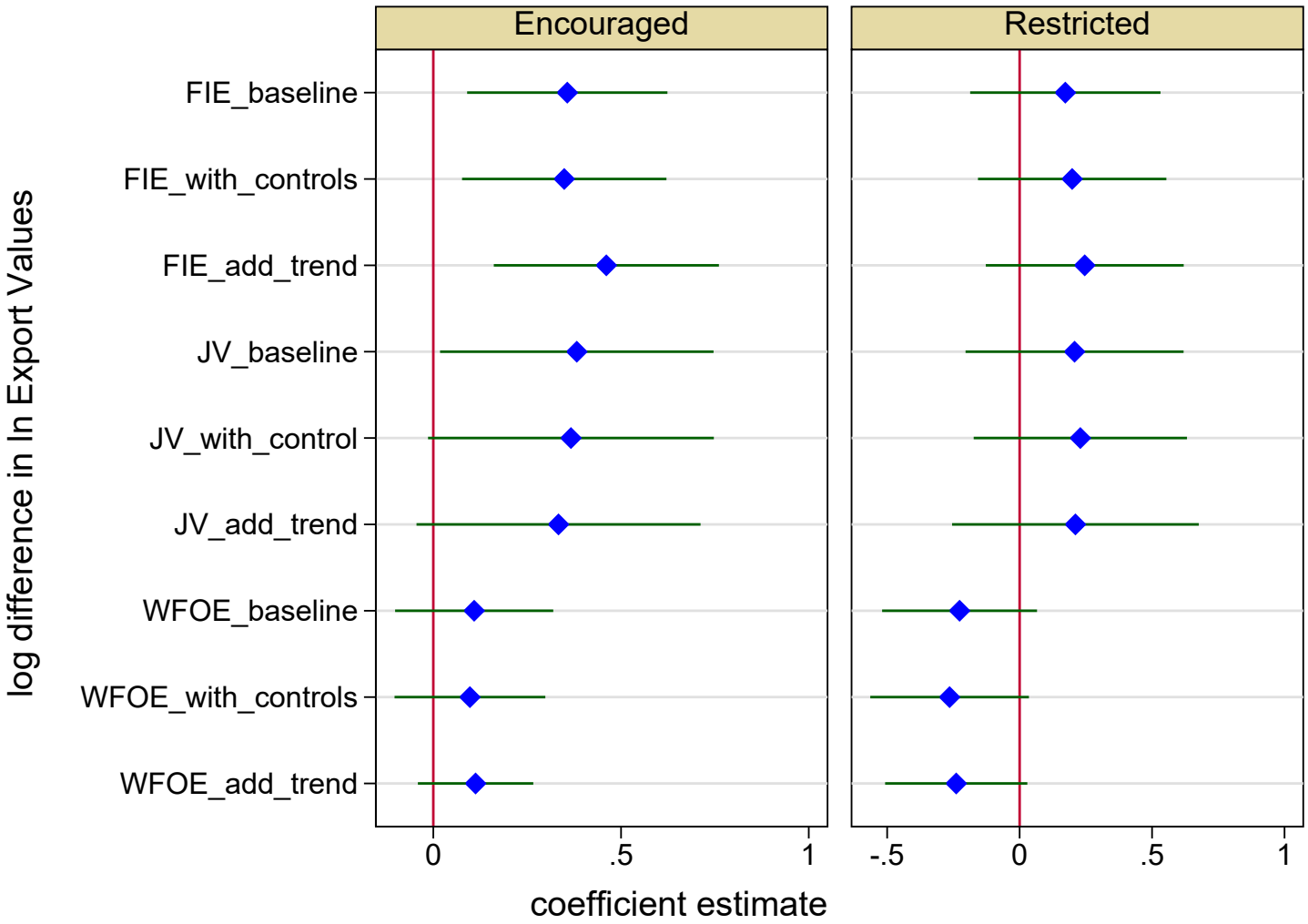
Robustness Check

of Exporters



Robustness Check

Export Values



Results: Triple-Differencing

Regression DDD Estimates of FDI Policy Effects

	(1) FIE	(2) JV	(3) WOFE
(*Panel A: Depvar = ln Number of Firms*)			
DDD Enc	0.115***	0.116***	0.076*
	(0.028)	(0.031)	(0.036)
DDD Res	0.015	0.049	-0.127**
	(0.044)	(0.045)	(0.052)
(*Panel B: Depvar = ln Number of Exporters*)			
DDD Enc	0.180***	0.165***	0.128***
	(0.039)	(0.040)	(0.041)
DDD Res	-0.024	0.048	-0.173**
	(0.056)	(0.056)	(0.058)
(*Panel C: Depvar = ln Export Values*)			
DDD Enc	0.224**	0.341***	0.323**
	(0.109)	(0.118)	(0.130)
DDD Res	0.156	0.241	-0.095
	(0.159)	(0.174)	(0.201)

Extensive Margins

- We concord industry-level policies to the product level and estimate a DID specification.
- We use Chinese Customs Records to capture all exporters and to observe both products and destinations. Allows us to explore extensive margins.
- Extensive margins
  - # of firms exporting to a HS6 product-country cell

$$\ln Y_{cjt} = \alpha + \beta_1 Encouraged_{jt} + \beta_2 Restricted_{jt} + \mu_{ct} + \delta_{cj} + \epsilon_{cjt}$$

Extensive margins for all countries and US only

DD Estimates of Policy Effects on Extensive Margins, Total Exports and US Only

	To All countries			To the US		
	(1) FIE	(2) WOFE	(3) JV	(4) FIE	(5) WOFE	(6) JV
Enc	0.093***	0.096***	0.058***	0.195***	0.195***	0.155***
	(0.019)	(0.020)	(0.016)	(0.052)	(0.051)	(0.043)
Res	0.032	0.012	0.006	0.040	0.053	0.001
	(0.048)	(0.041)	(0.042)	(0.050)	(0.062)	(0.035)
Observations	4262156	4262156	4262156	64030	64030	64030
FE	HS#C,C#Y	HS#C,C#Y	HS#C,C#Y	HS,Y	HS,Y	HS,Y

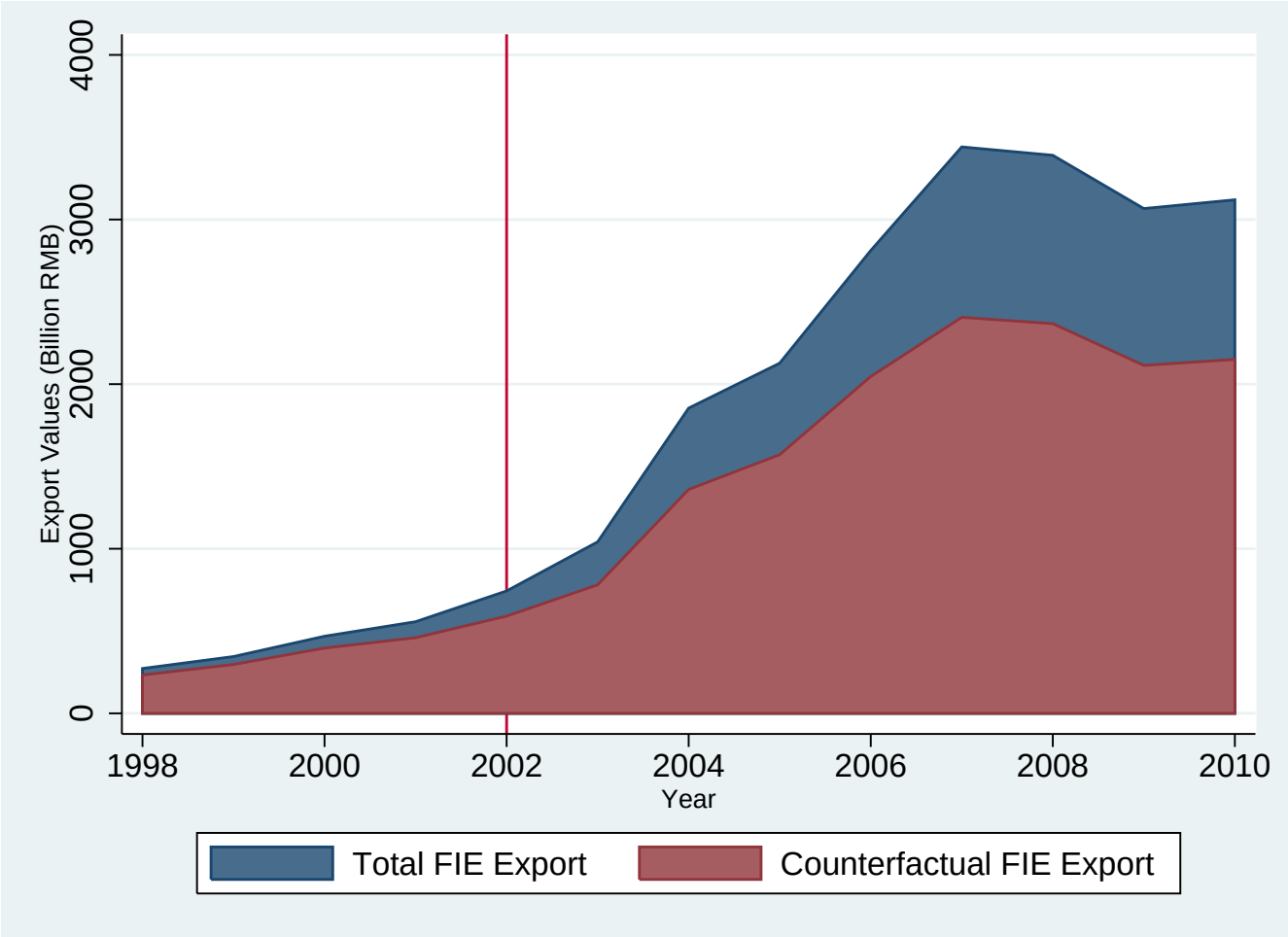
Magnitudes: Counterfactuals

- Use the regression coefficients and actual trade flows to calculate predicted exported values in absence of encouragement.

$$\Delta Export_t = \sum_j X_{jt} \cdot (e^{\beta_1 \cdot \mathbb{1}\{\text{Encouraged}_{jt}\}} - 1)$$

FIE export counterfactual, actual vs. without encouragement

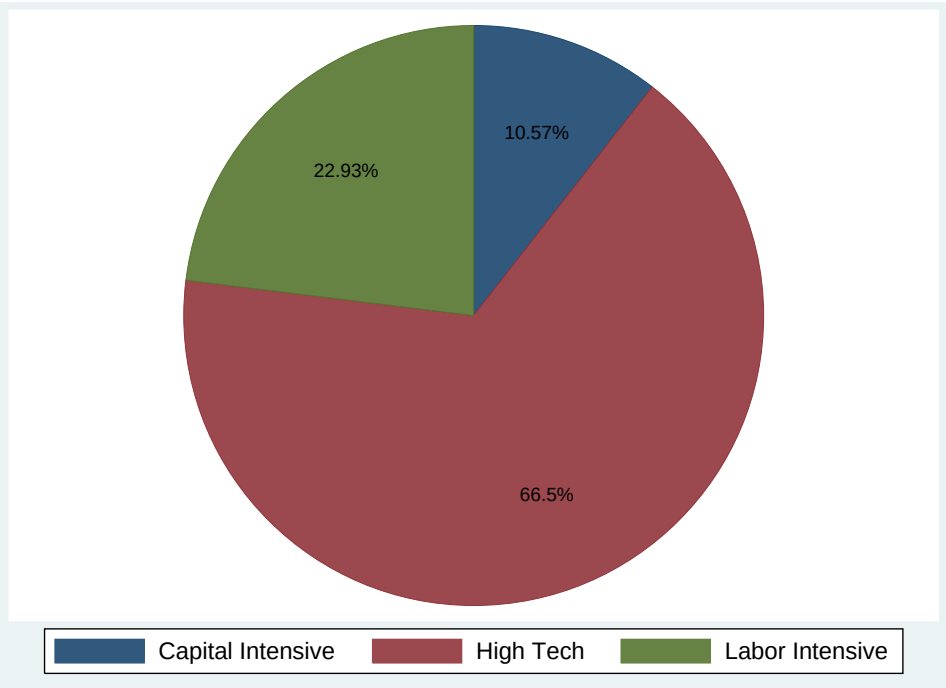
FIE Export Values, Actual v. Counerfactual, 1998-2010



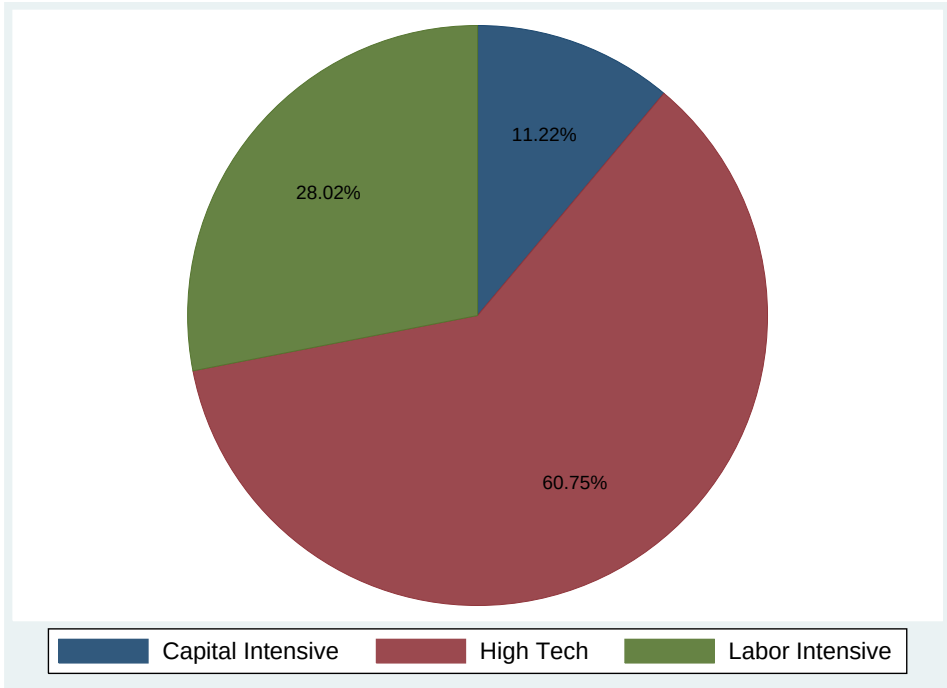
Source: Source of export data is the ASIP.

Export composition in 2010, actual and counterfactual

Share of FIE Export Values by Group, Actual v. Counterfactual, 2010



(a) Actual



(b) Counterfactual

Source: Source of export data is the ASIP. Grouping and calculations by authors.

Conclusion

- Encouraged investment
  - Raises the number of foreign enterprises by 14%
  - Raises the number of foreign exporters by 15%
  - Raises the value of exports from foreign-invested enterprises by 36%
  - FDI promotion policies have no effect on domestic enterprises.
- Removing Restrictions
  - Removing restrictions limiting wholly owned foreign firms raises the number of such firms by 15%.
  - Raises the value of exports from WFOEs.
  - Has no significant effect on activity of joint ventures.
  - Reduces the value of exports from domestic enterprises.

Conclusion

- Encouraging investment increases the number of new products sent to new destinations.
- This outcome is consistent with technology upgrading of FIE firms in the aggregate.
- This extensive-margin effect is powerful for the US.

Thank you!