

# **The U.S.-Chinese Trade War: An Event Study of Stock-Market Responses**

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# The Paper Underlying My Talk

- **CEPR Discussion Paper DP14164** (from this week).
- Presented at the **Economic Policy** October meeting at Helsinki.
- Awaiting final acceptance by **Economic Policy**.
- Will be advertised by a **VoxEU Column** (already submitted).

# Research Motives

- “Trade war” between U.S. and China is taking **a toll everywhere**.
- But quantifying cross-country impact on basis of solid statistical **data will take years**.
- Currently, cross-country **stock-market data** are among the few (immediately) **measurable** objects revealing hard signals about how investors view “trade war”.

# Research Motives

## Interesting questions:

- Does the “trade war” do its **intended** job?  
**Protect and promote** domestic industry in targeted sectors.
- Are there **unintended** consequences? Effects on
  - **untargeted sectors;**
  - **untargeted countries.**
- How important are **expected-retaliation and global-value-chain links** between sectors and countries in shaping/counteracting effects? Overall effects may be beyond comprehension of politicians in charge.

# Related Literature

- **Event studies on stock-market responses to PTA-membership announcements** (Thompson, 1993, 1994; Rodriguez, 2003; Breinlich, 2014; and Moser and Rose, 2014) and **Brexit vote** (Breinlich, Leromain, Novy, Sampson, and Usman, 2018 and Davies and Studnicka, 2018).
- **Work on “trade-war” effects on U.S. trade, prices, and welfare** (Amiti, Redding, and Weinstein, 2019; Fajgelbaum, Goldberg, Kennedy, and Khandelwal, 2019).

# Related Literature

- **Economic theory of trade wars** (Grossman and Helpman, 1995; Harrison and Rutström, 1991; Lockwood and Wong, 2000) and **associated empirical work on noncooperative tariffs** (Ossa, 2014).

# This Paper

Estimate **stock-price deviations from “normal market value”** for

- each of **31,217 listed firms**
- in **40 countries and territories** and
- **30 (WIOD-aggregate) sectors**
- around the sequence of **19 U.S.-China “trade-war” events between March 2018 and May 2019.**

Consider **event windows** of -1 to +10 days around each individual event and **pool data across events.**

**Direct** (on U.S. and Chinese firms in targeted sectors) as well as **indirect** (global-input-output-linked) **effects.**

# This Paper

Methodology is a blend of

- **event study;**
- (treatment-and-control-group) **average treatment effect estimation;**
- **difference-in-difference estimation** techniques;
- **continuous treatment effects studies** (use of tariffs).



# Economic Theory on Protectionism

Here is what we teach students:

- (i) **protectionism** is always **bad** (in terms of welfare) **for small economies**; and
- (ii) **modest degree of protectionism** (i.e., tariffs that are not too high), may be **positive for large economies**.

Necessary conditions

- there is **no retaliation** and
- **cross-border complementarities** through the integration in global value chains are **absent**.

# Reality of Protectionism

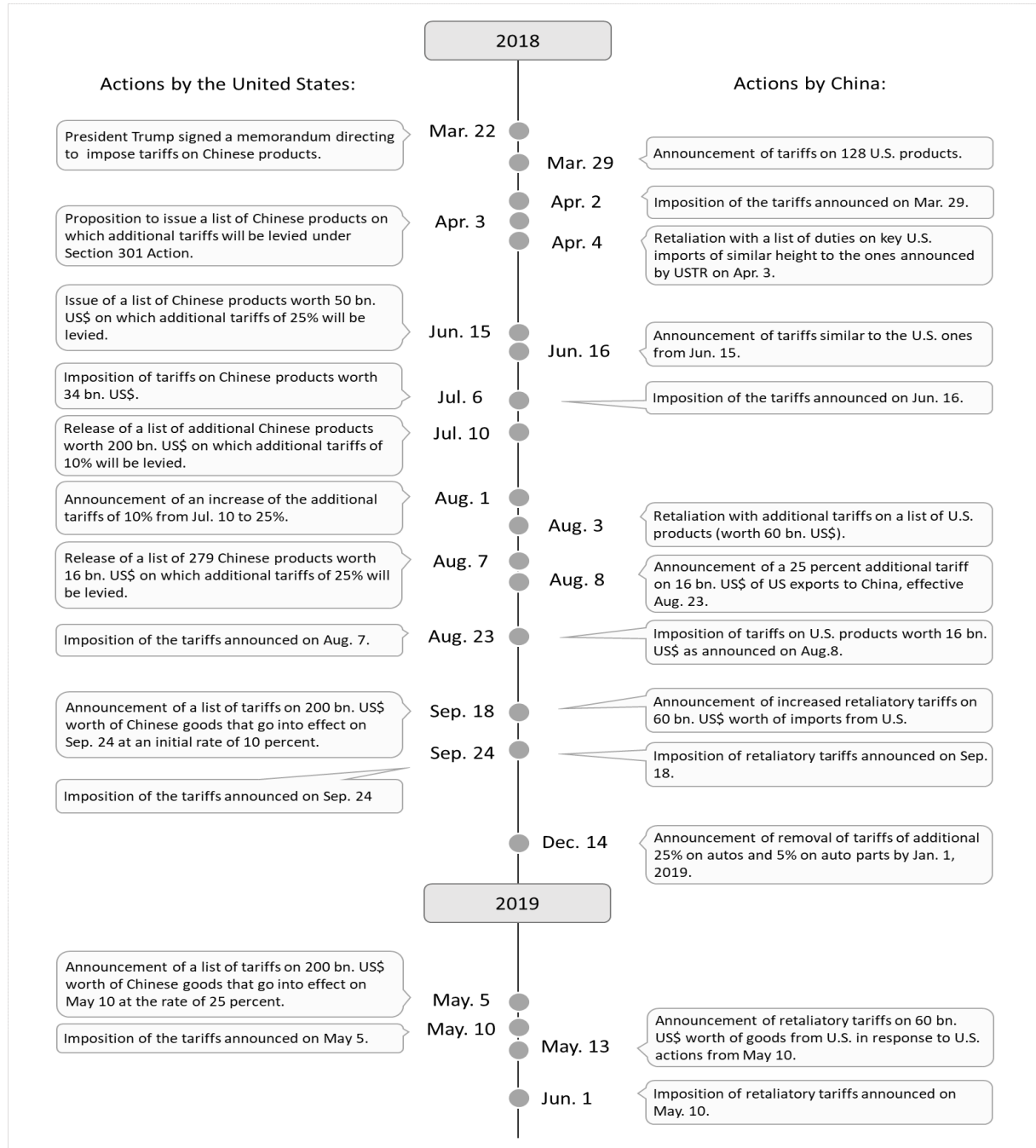
- (i) There is always retaliation!**
- (ii) And it is expected (by business).**
- (iii) And global value chains are ubiquitous** (domestic inter-sector dependencies plus international country-sector-with-country-sector interdependencies).
- (iv) Trade-war tariffs are never modest (see U.S.-China).**
- (v) What exactly does it mean for a country to be large?**  
(Everybody agrees on Austria and Liechtenstein, but are UK, Germany, China, or U.S. large in that they dominate world prices sufficiently?)

# Hypotheses

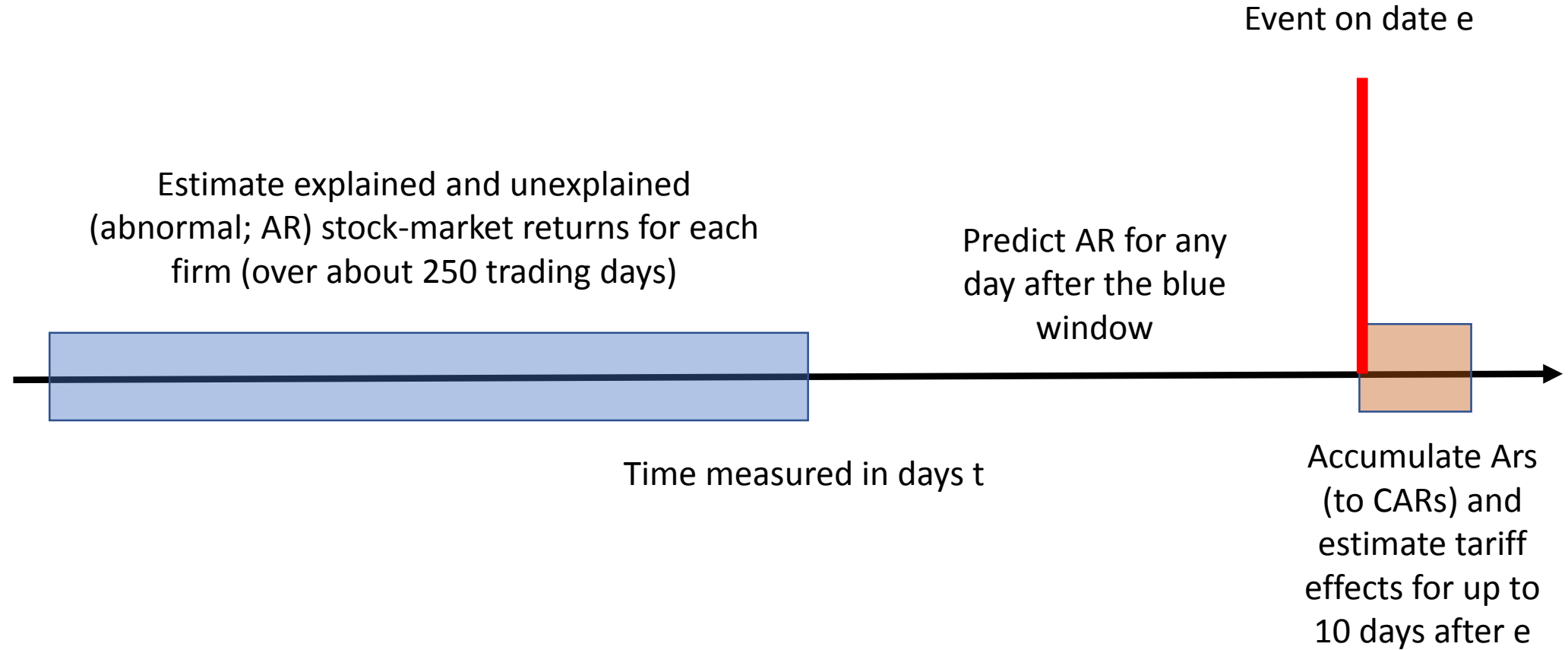
With (expected) retaliation and strong complementarities

- “trade-war” tariffs may exert **negative effects even on targeted sectors**;
- particularly ones which heavily rely on **inputs from tariff-targeted foreign countries**; expect negative effects on firms, which are more strongly affected by foreign retaliatory tariffs;
- effects on **untargeted countries and sectors**.

# Figure 1. Chronology of the U.S.-China “Trade War”



# Research Design Graphically



# Research Design – Step 1

- Decompose **daily stock-market returns** of each company  $i$  on day  $t$  around event date  $e$  into their systematic and their **residual component**:

$$\text{FirmReturn}_{ite} = \alpha_{ie} + \beta_{ie} \text{MarketReturn}_{ite} + \gamma_{ie} \text{EffExchRate}_{ite} + \varepsilon_{ite} \text{ over } t = [T_e - 610, T_e - 361]$$

[End of estimation window for the last event considered is

December 31, 2017  $\Rightarrow$  prior to any events. 1 year  $\approx$  250 trading days.]

# Research Design – Step 1

- Abnormal Returns (AR) for firm  $i$ , day  $t$ , and event  $e$  :

$$AR_{ite} = \hat{\varepsilon}_{ite} = \text{FirmReturn}_{ite} - (\hat{\alpha}_{ie} + \hat{\beta}_{ie} \text{MarketReturn}_{ite} + \hat{\gamma}_{ie} \text{EffExchRate}_{ite})$$

- Cumulative abnormal returns (CAR) for firm  $i$ , day  $s$ , and event  $e$ :

$$CAR_{ies} = \sum_{t=T_e-1}^{T_e+s} AR_{ite} \text{ for } s=\{1,3,5,7,10\}.$$

## Research Design – Step 2

- Use  $CAR_{ies}$  to learn about its responses to changes in direct and indirect “trade-war” tariff changes.

$$CAR_{ies} = \text{DirectTariff}_{ies} \gamma + \text{IndirectTariff}_{ies} \delta + \zeta \text{MarketCap}_i + \text{Controls}_{ies} \eta + FE_{\text{country}(i),e} + FE_{\text{sector}(i),e} + U_{ies}$$

- Use a vector with four elements regarding direct tariff changes associated with actions of the U.S. and China, respectively:

$$\text{DirectTariff} = (\text{DirectTariff}_{USA,USA}, \text{DirectTariff}_{USA,CHN}, \text{DirectTariff}_{CHN,USA}, \text{DirectTariff}_{CHN,CHN})$$

- The tariffs are weighted by the operating income in up to 10 sectors reported in the firm data.



# Research Design – Step 2

- Indirect effects of tariff changes which depend on an economy's “position” in the input-use-related world-input-output network:

$$\mathbf{IndirectTariff} = (\text{IndirectTariff}_{USA}, \text{IndirectTariff}_{CHN})$$

- Define (row-normalized) matrix  $\mathbf{W}$  based on the WIOD international input-output matrix of 2011 (released in 2013).  
Rows are users and columns makers.
- Overall size of  $\mathbf{W}$  is 1200 x 1200 (40 countries and 30 aggregated sectors in WIOD).

# Research Design – Step 2

- $\mathbf{I}$ : 1200 x 1200 identity matrix.
- $\mathbf{D}_{USA}$  and  $\mathbf{D}_{CHN}$ : 30 x 1 vectors of tariff changes in U.S. and in China for a generic event, resp.
- $\mathbf{J}_{USA}$  and  $\mathbf{J}_{CHN}$ : 1200 x 1 vectors of all zeros except for elements of  $\mathbf{D}_{USA}$  and  $\mathbf{D}_{CHN}$  in the 30 x 1 row blocks pertaining to the U.S. and China, resp.
- $\mathbf{R} = (\mathbf{I} - \mathbf{W})^{-1}$  (Leontief-type inverse) =  $\mathbf{I} + \sum_{p=1}^{\infty} \mathbf{W}^p$
- Indirect effects of the tariff changes of the U.S. and China:  $(\mathbf{R} - \mathbf{I})\mathbf{J}_{USA}$  and  $(\mathbf{R} - \mathbf{I})\mathbf{J}_{CHN}$ , resp.

# Data

Include data on all **40 economies** covered by **WIOD** in our analysis.

- **Direct parties to the “trade war” (2):**

China and United States.

- **Third parties to the “trade war” (38):**

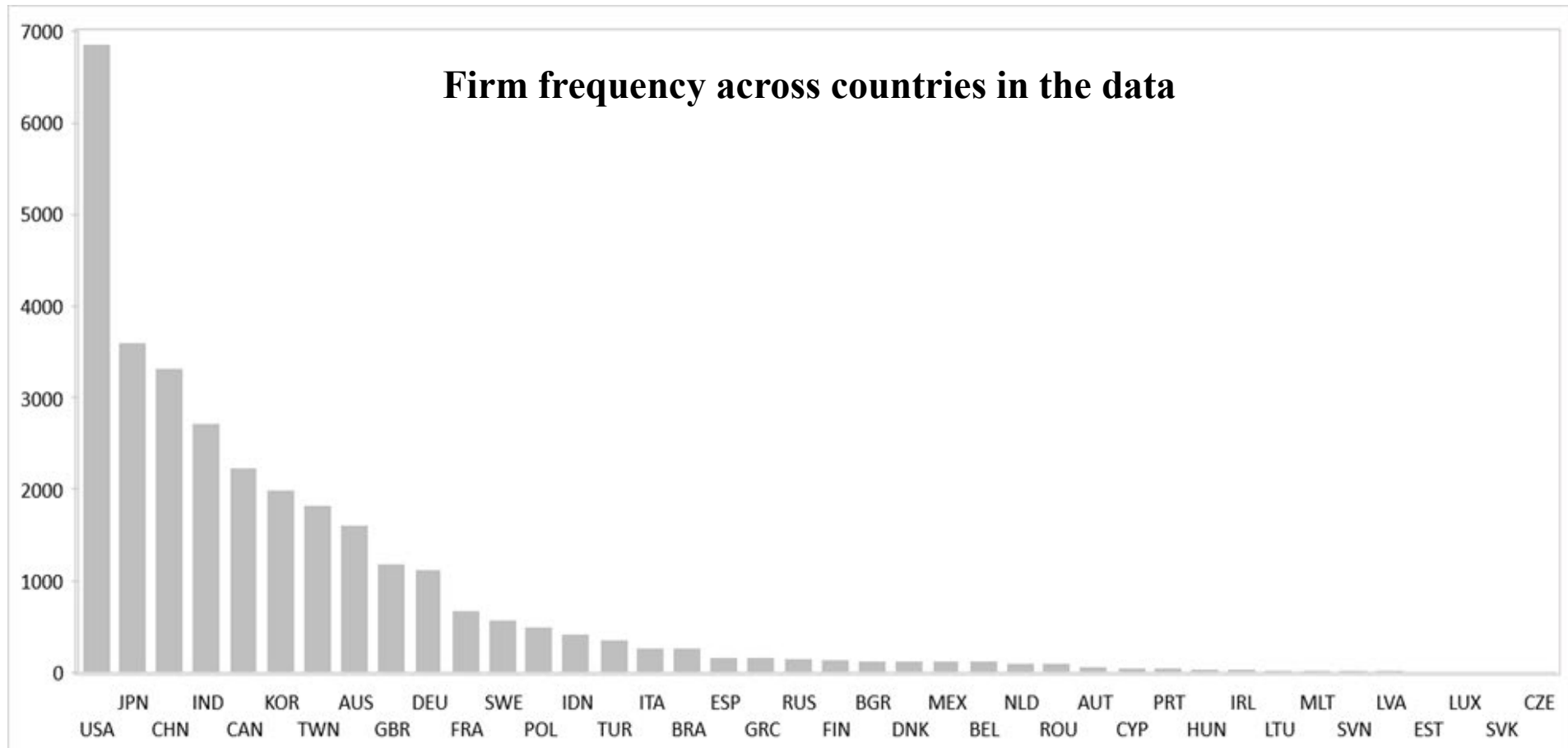
Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, Poland, Portugal, Romania, Russia, Slovenia, Slovak Republic, South Korea, Spain, Sweden, Taiwan, Turkey, and United Kingdom.

# Data

- **Stock-market data:** daily data on active companies listed on local stock exchanges in a window of days around each US-China “trade-war” tariff-announcement or – implementation event from **Datastream** for the aforementioned economies.
- Consider **19 event dates** in this estimation including:  
**Year 2018:** March 29, April 2, 3, and 4, June 15 and 16, July 6 and 10, August 1, 3, 7, 8, and 23, September 18 and 24, December 14.  
**Year 2019:** May 5, 10, and 13.

# Data

- Final sample used in first-step and second-step regressions includes **31,217 firms** yielding **543,304 observations** across all events covered.



# Data

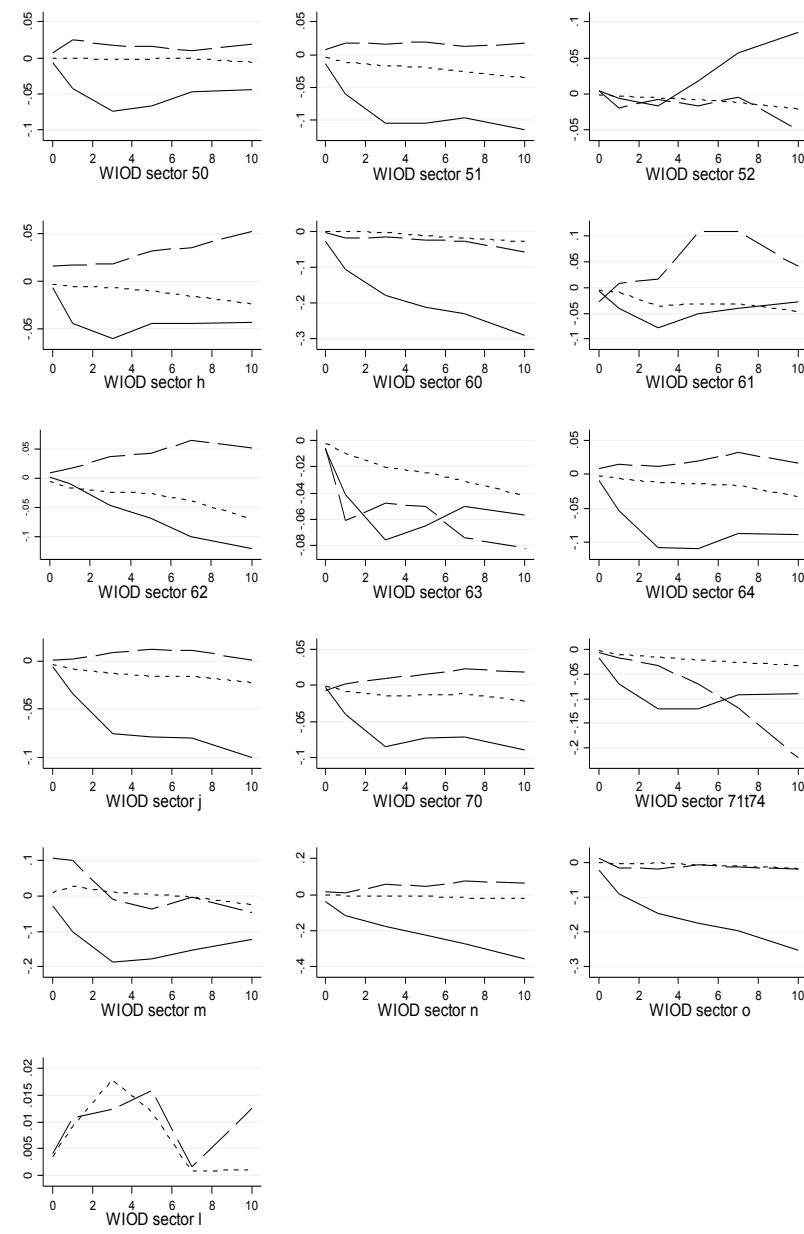
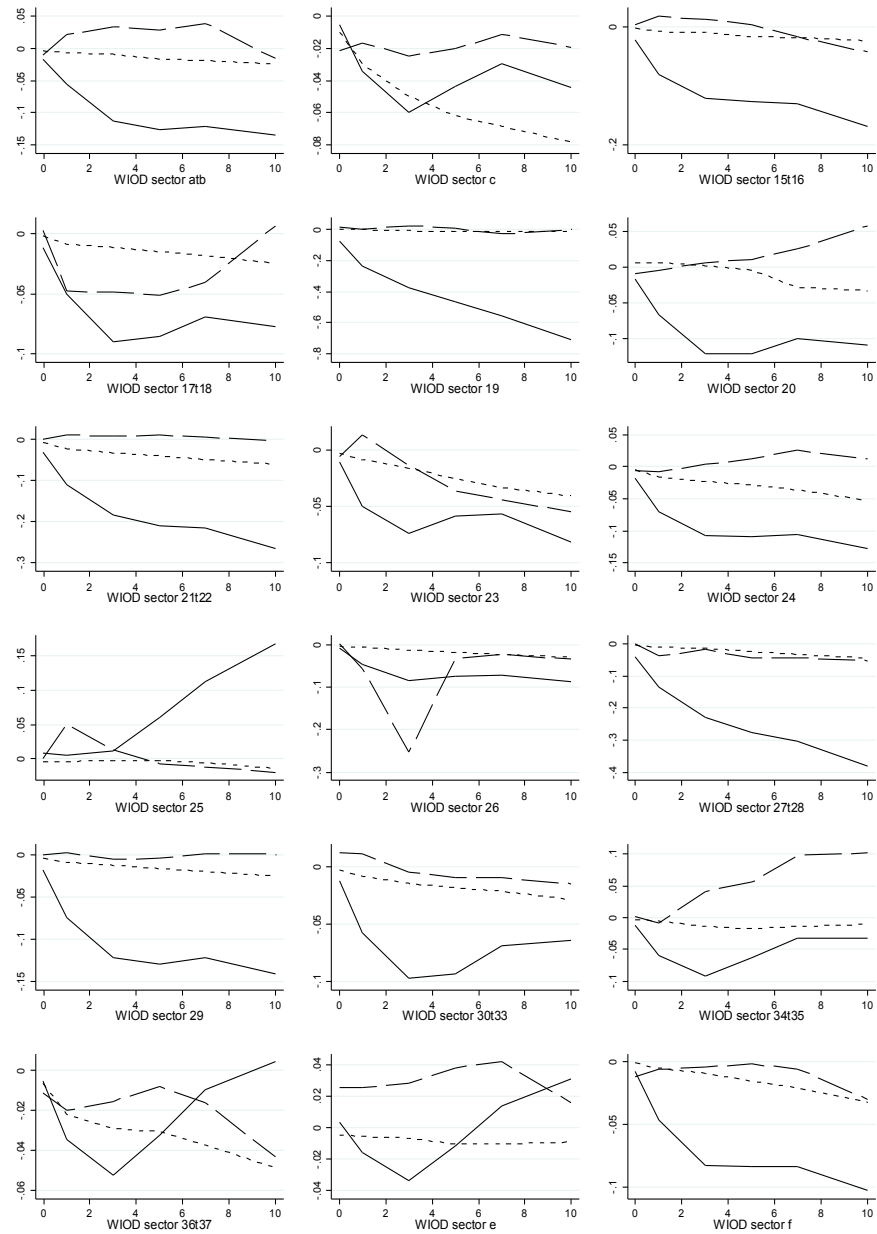
- **“Trade-war” tariff-change data:** Obtain the lists of products on which “trade-war” tariffs were announced or imposed for each event from each country’s official websites.
- HTS codes → 6-digit HS2017 codes → 5-digit STIC rev.3 → ISIC rev.3 4-digit codes → ISIC rev.3 2-digit codes (used by WIOD).







# Average CARs in U.S. after the event on June 15, 2018



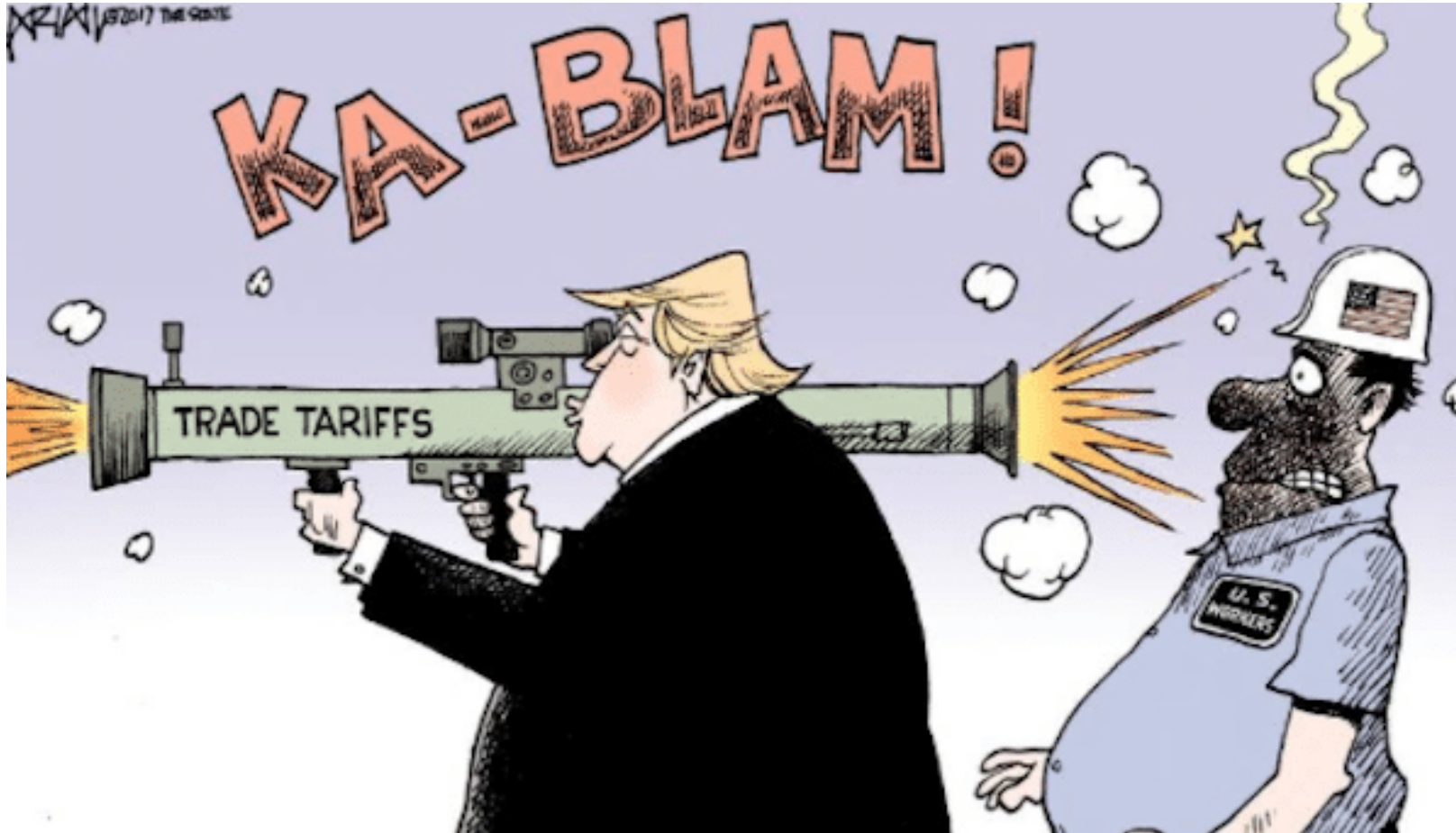
## Second-step regressions

Variables	(0,0)	(-1,+1)	(-1,+3)	(-1,+5)	(-1,+7)	(-1,+10)
<b>DirectTariff</b> <sub>USA,USA</sub>	0.0018	-0.3084	-1.3629*	-1.8323**	-2.0021*	-3.2761**
	(0.157)	(0.443)	(0.752)	(0.786)	(1.039)	(1.259)
<b>DirectTariff</b> <sub>USA,CHN</sub>	0.0038	-0.0123	-0.0542	-0.0667	-0.0261	-0.1113
	(0.019)	(0.046)	(0.084)	(0.093)	(0.108)	(0.139)
<b>DirectTariff</b> <sub>CHN,CHN</sub>	-0.0060***	0.0063	0.0121	-0.0255***	-0.0354***	-0.0332**
	(0.002)	(0.005)	(0.008)	(0.009)	(0.011)	(0.014)
<b>DirectTariff</b> <sub>CHN,USA</sub>	0.1083	-0.6458*	-0.7895	-1.7313**	-1.7201	-1.9595
	(0.216)	(0.353)	(0.542)	(0.773)	(1.046)	(1.193)
<b>IndirectTariff</b> <sub>USA</sub>	-0.6014	-0.5189	3.5532	1.0426	-3.0777	5.6769
	(3.168)	(7.626)	(13.687)	(15.067)	(17.542)	(22.484)
<b>IndirectTariff</b> <sub>CHN</sub>	0.0311*	0.1730***	0.2663***	0.2621***	0.4463***	0.6758***
	(0.017)	(0.050)	(0.069)	(0.086)	(0.097)	(0.126)
<b>MarketCap</b>	0.0001**	0.0007***	0.0011***	0.0012***	0.0014***	0.0016***
	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0003)	(0.0015)
<b>Constant</b>	-0.0014*	-0.0194***	-0.0316***	-0.0393***	-0.0517***	-0.0616***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.005)	(0.007)
<b>Other tariff controls</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Sector-event-fixed effects</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Country(Territory)-event-fixed effects</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Observations</b>	543,304	543,304	543,304	543,304	543,304	543,304
<b>R-squared</b>	0.039	0.036	0.034	0.031	0.028	0.029

# Summary of Table 3

***Observation 1:*** On average, trade-war tariffs of the U.S. and China directly **hurt targeted firms/sectors abroad as intended** (i.e., U.S. tariffs hurt Chinese firms and vice versa) **but also ones at home** (i.e., U.S. tariffs hurt U.S. firms in the same sector and similarly for China).

# Summary of Table 3



Source: <https://moneymaven.io/mishtalk/economics/nonstop-trade-lies-markets-not-exactly-pleased-with-trump-s-tariff-man-act-NZrBBrOie0iscp6wJDjb0Q/>

# Summary of Table 3 Cont'd

**Observation 2:** There was **retaliation** about almost any actions by the U.S. and China, and we saw from before that direct effects on foreign parties were negative.

**Expected retaliation (or expected value-chain effects)** on U.S harmed U.S. firms, and retaliation on China harmed Chinese firms.

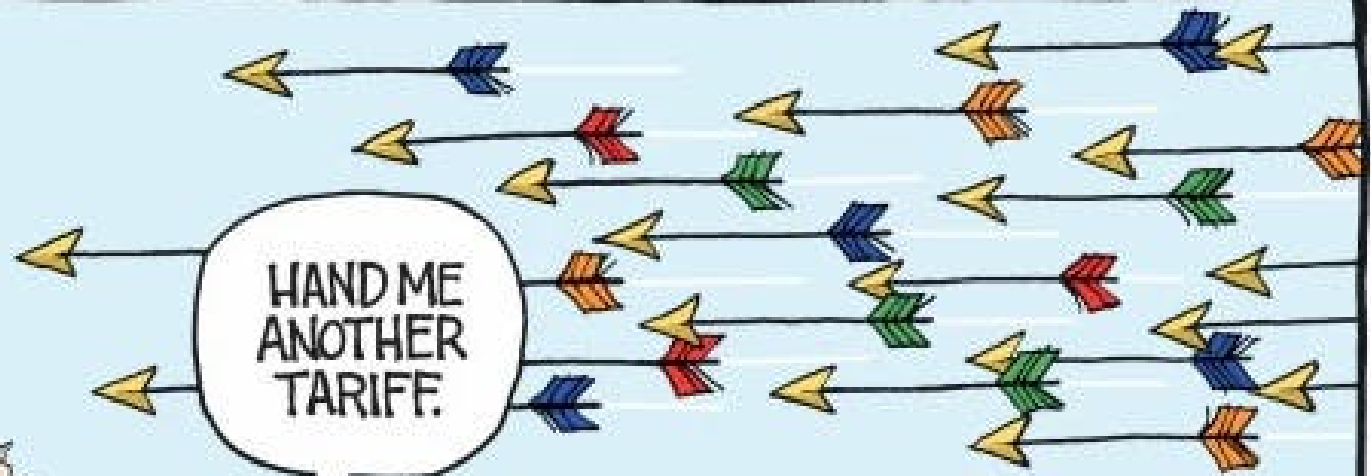
Lisa © 2018 3-7 Dist by Wash Post Writers Group



TRADE WARS  
ARE EASY  
TO WIN.



HAND ME  
ANOTHER  
TARIFF.



# Summary of Table 3 Cont'd

***Observation 3:*** The global-value-chain-mediated **indirect effects** of the U.S.-China “trade-war” tariffs were **positive or negative**, depending on a sector and economy’s position in the global value chain.

## Summary statistics of the predicted tariff effects in %

*Full sample (daily firm/stock micro data).*

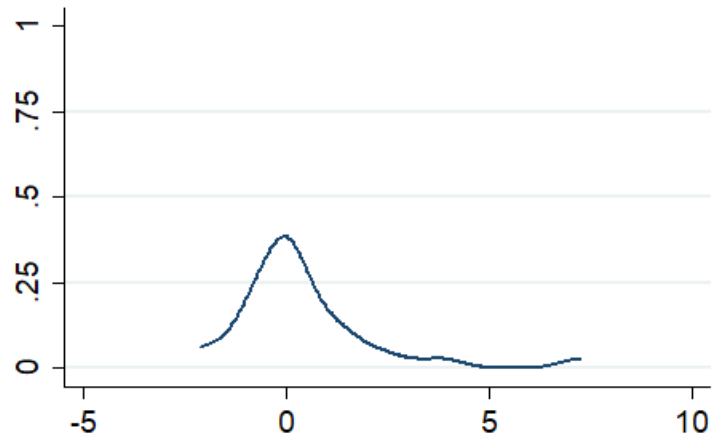
Variable	No. of obs.	Mean	Min	P25	P50	P75	Max
$\hat{\gamma}_1 \text{DirectTariff}_{\text{USA,USA}}$	30,158	-0.0634	-12.7978	-0.0819	-0.0819	-0.0328	12.8071
$\hat{\gamma}_2 \text{DirectTariff}_{\text{USA,CHN}}$	20,268	-0.0037	-8.1546	-0.0028	-0.0028	-0.0011	0.5315
$\hat{\gamma}_3 \text{DirectTariff}_{\text{CHN,CHN}}$	14,389	-0.0002	-1.3546	-0.0008	-0.0007	-0.0005	5.0478
$\hat{\gamma}_4 \text{DirectTariff}_{\text{CHN,USA}}$	24,279	-0.0406	-7.6540	-0.0490	-0.0441	-0.0294	8.1702
$\hat{\delta}_1 \text{IndirectTariff}_{\text{USA}}$	317,812	0.0026	-1.5444	0.0000	0.0001	0.0009	2.5658
$\hat{\delta}_2 \text{IndirectTariff}_{\text{CHN}}$	335,495	0.0005	-1.0750	0.0000	0.0000	0.0001	11.6309



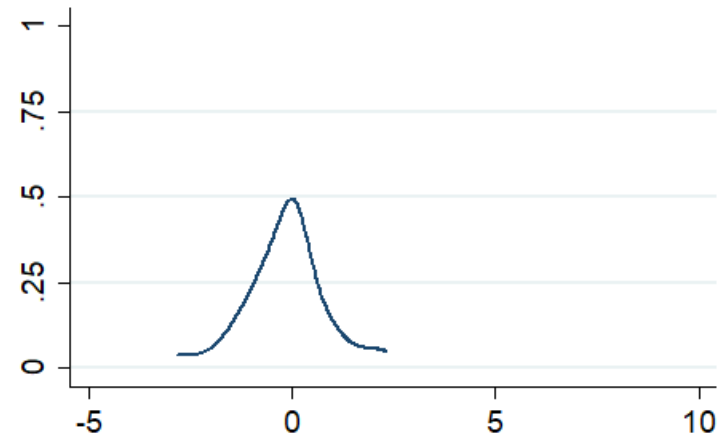
# Summary of Previous Table

***Observation 4:*** On average, the **direct effects on firms in the U.S. are the largest**, and the **indirect effects** induced by tariff changes of the U.S. are much larger than those of China.

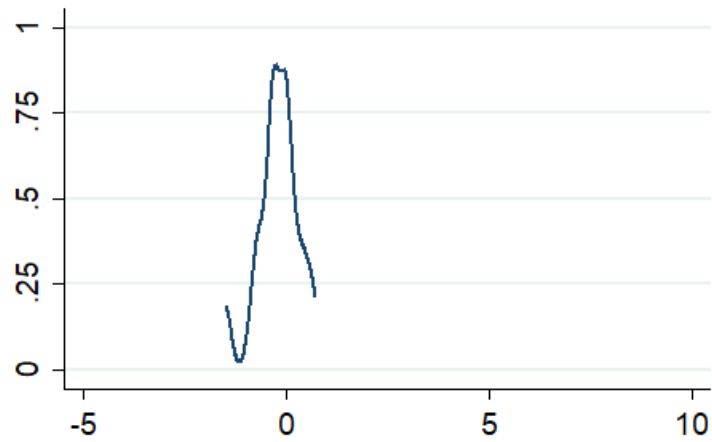
# Sector-level Results: Direct Effects on Firms (%)



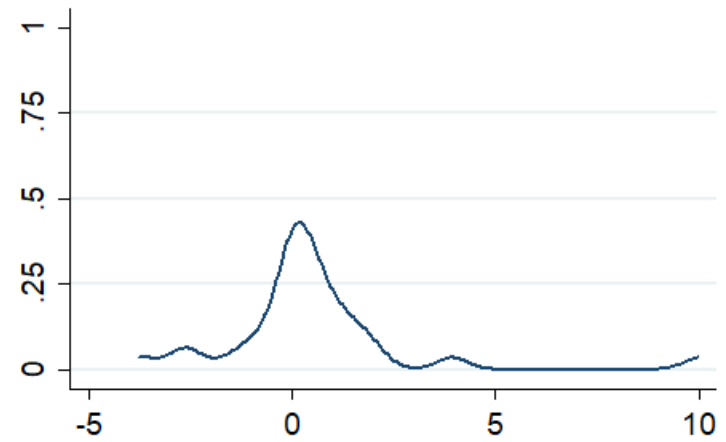
(a) U.S. tariff effects on U.S. firms



(b) U.S. tariff effects on Chinese firms

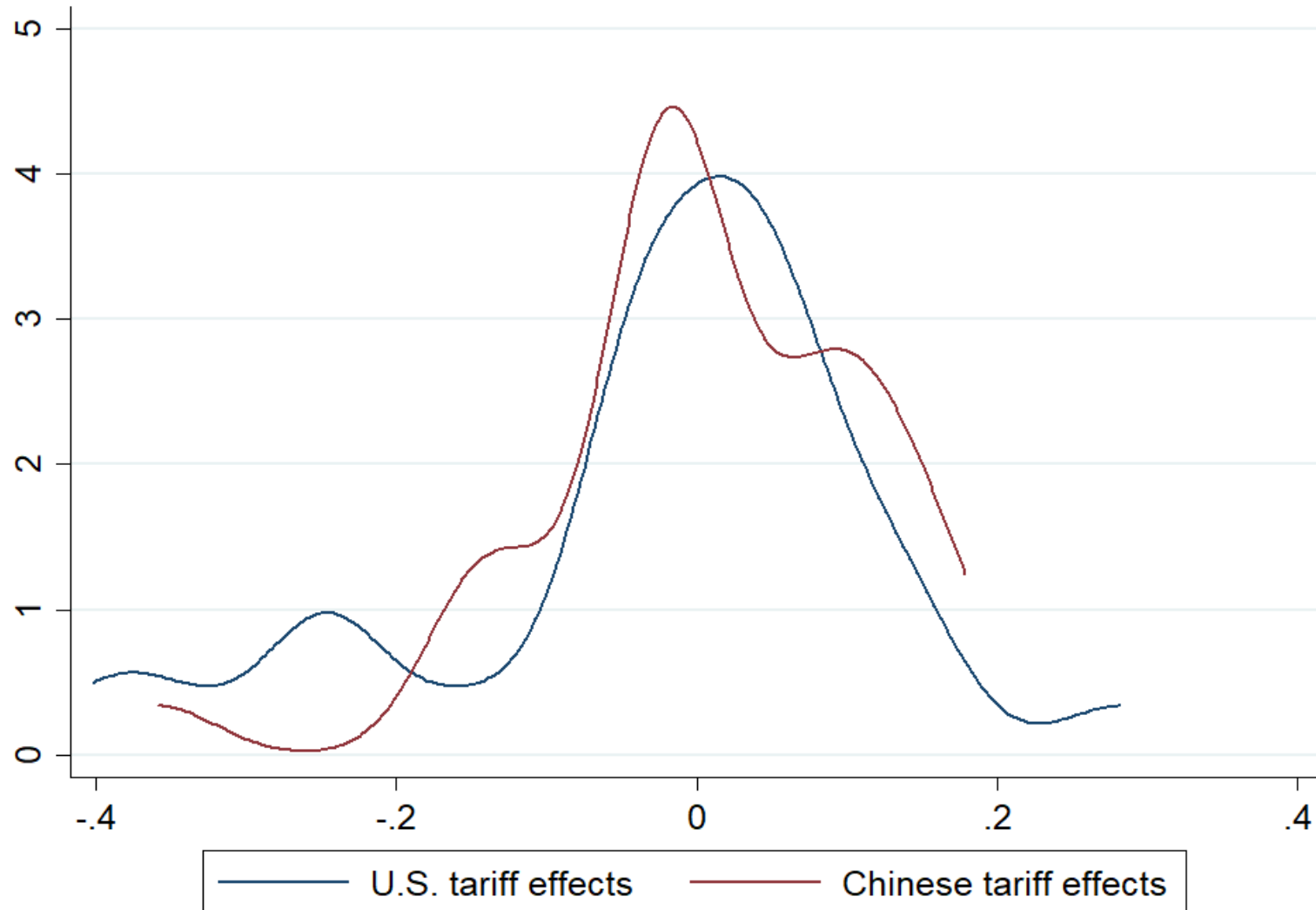


(c) Chinese tariff effects on Chinese firms



(d) Chinese tariff effects on U.S. firms

# Sector-level Results: Indirect Effects on Firms (%)



# Summary of Previous Two Figures

***Observation 5: Direct effects*** (sector-level parameters x tariff changes) on stock-market returns in percent **vary** to a large extent. Direct effects **tend to be negative**. Nontrivial **mass of «own» effects are negative** (U.S. on U.S. even more so than China on China).

## Summary of Previous Two Figures Cont'd

***Observation 6: Indirect effects*** (sector-level parameters x tariff changes) on stock-market returns in percent also **vary** largely but somewhat less than direct ones.

Large **mass of indirect effects is also negative.**

Clear that **global value chains** affect trade-war effects.

# Conclusions

Actions by U.S. and China hurt stock prices on average not only in targeted countries but also at home.

They indirectly affect stock prices through global value-chain linkages in the U.S., China, and in third economies, which do not directly participate in the “trade war”, as well as in untargeted sectors.

Our analysis is systematic but it has its **limitations**:

- relatively **short-run reactions** at stock markets;
- many interesting **margins of economic activity** (employment, investment, firm entry, trade, etc.) cannot yet be addressed.

**Thank you for your attention!**

**Table. Summary statistics of sector-based coefficients**

Window	Explanatory Variable	No. of coeff.	Min	P25	P50	P75	Max
<b>(0,0)</b>	DirectTariff <sub>USA,USA</sub>	2	-16.38	-16.38	-13.04	-9.70	-9.70
	DirectTariff <sub>USA,CHN</sub>	14	-46.97	-21.36	-11.93	-5.48	13.98
	DirectTariff <sub>CHN,CHN</sub>	4	-10.08	-7.80	-3.71	4.60	11.08
	DirectTariff <sub>CHN,USA</sub>	6	8.37	8.51	25.38	48.28	104.84
	IndirectTariff <sub>USA</sub>	6	-266.84	-92.35	39.38	300.41	464.83
	IndirectTariff <sub>CHN</sub>	7	-140.23	-61.73	-41.91	8.25	156.62
<b>(-1,+1)</b>	DirectTariff <sub>USA,USA</sub>	1	-24.39	-24.39	-24.39	-24.39	-24.39
	DirectTariff <sub>USA,CHN</sub>	15	-98.09	-40.38	-22.77	-11.71	30.58
	DirectTariff <sub>CHN,CHN</sub>	4	-30.30	-29.08	-20.28	0.11	12.92
	DirectTariff <sub>CHN,USA</sub>	5	-127.79	-46.89	-1.54	16.27	110.26
	IndirectTariff <sub>USA</sub>	11	-1122.03	-282.39	-45.14	83.38	1244.06
	IndirectTariff <sub>CHN</sub>	13	-271.39	-132.99	-87.53	112.28	362.52
<b>(-1,+3)</b>	DirectTariff <sub>USA,USA</sub>	1	-2.90	-2.90	-2.90	-2.90	-2.90
	DirectTariff <sub>USA,CHN</sub>	15	-138.33	-54.98	-30.17	17.36	53.02
	DirectTariff <sub>CHN,CHN</sub>	3	-65.41	-65.41	-31.21	-27.06	-27.06
	DirectTariff <sub>CHN,USA</sub>	4	-140.93	-102.83	-33.46	33.68	69.54
	IndirectTariff <sub>USA</sub>	10	-852.28	-390.87	-119.02	134.42	1241.54
	IndirectTariff <sub>CHN</sub>	17	-364.84	-219.51	-114.58	24.19	618.08
<b>(-1,+5)</b>	DirectTariff <sub>USA,USA</sub>	3	-29.68	-29.68	-4.22	83.79	83.79
	DirectTariff <sub>USA,CHN</sub>	14	-185.96	-65.20	-32.76	2.90	68.15
	DirectTariff <sub>CHN,CHN</sub>	5	-94.45	-20.85	-18.41	-12.78	-0.02
	DirectTariff <sub>CHN,USA</sub>	5	-168.15	-73.67	-4.11	32.20	118.81
	IndirectTariff <sub>USA</sub>	11	-1047.39	-511.10	30.41	234.23	1708.54
	IndirectTariff <sub>CHN</sub>	17	-469.05	-275.01	-155.34	47.22	731.44
<b>(-1,+7)</b>	DirectTariff <sub>USA,USA</sub>	3	-4.67	-4.67	40.40	106.38	106.38
	DirectTariff <sub>USA,CHN</sub>	14	-221.50	-74.26	-38.72	4.77	84.45
	DirectTariff <sub>CHN,CHN</sub>	4	-96.92	-57.00	-8.56	13.08	26.20
	DirectTariff <sub>CHN,USA</sub>	2	-98.82	-98.82	-51.83	-4.84	-4.84
	IndirectTariff <sub>USA</sub>	10	-1460.79	-675.07	-32.79	326.52	1767.43
	IndirectTariff <sub>CHN</sub>	18	-586.72	-325.61	-171.12	60.04	876.21
<b>(-1,+10)</b>	DirectTariff <sub>USA,USA</sub>	3	-58.80	-58.80	-6.01	176.76	176.76
	DirectTariff <sub>USA,CHN</sub>	14	-309.21	-101.08	-66.40	5.48	119.62
	DirectTariff <sub>CHN,CHN</sub>	3	-113.16	-113.16	-25.38	-0.03	-0.03
	DirectTariff <sub>CHN,USA</sub>	4	-130.47	-67.99	19.85	111.51	177.81
	IndirectTariff <sub>USA</sub>	7	-819.68	-739.58	58.03	497.70	1979.26
	IndirectTariff <sub>CHN</sub>	18	-766.33	-386.11	-247.45	90.81	1046.07