

The indirect effect of import competition on corporate tax avoidance

Baptiste Souillard¹

¹*ECARES, SBS-EM, Université Libre de Bruxelles*

European Winter Meeting of the Econometric Society
December 15, 2020



Solvay Brussels School
Economics & Management



Motivation



- ▶ Profits are subject to **taxation**
- ▶ To lighten this **burden**, firms adapt how they operate and invest
- ▶ Some **avoid taxes**, i.e., exploit technicalities of the law to save taxes
- ▶ Corporate tax avoidance has now become a **major policy concern**
 - Tax scandals, budget deficits, rise of inequalities, covid-19, etc
 - Profit shifting \approx \$100b annual loss in tax revenues for the US (Clausing, 2016)

What I do in this paper

- ▶ The role played by **competition** is an unresolved question in the literature (Marrelli and Martina, 1988; Goerke and Runkel, 2011)
- ▶ To provide answers, I build on 2 distinct strands of research
 - **Economics**: impact of the China shock → massive shock + quasi-natural experiment (e.g., Autor et al., 2013; Pierce and Schott, 2016)
 - **Accounting**: measurement of corporate tax avoidance (e.g., Hanlon and Heitzman, 2010; De Simone et al., 2019)
- ▶ I study the effect of **Chinese import competition** on tax avoidance of US-headquartered public manufacturing firms using data on their **financial statements**

Preview of the results

- ▶ The paper documents a **positive** and **causal** effect of import competition on corporate tax avoidance
- ▶ This effect is specific to **multinational enterprises** (MNEs) and passes through intangible assets: \uparrow import competition \Rightarrow \uparrow intangible assets \Rightarrow \uparrow profit shifting
- ▶ This effect is a **side one**: it seems that MNEs invested in intangibles to escape competition in the first place
- ▶ The findings carry **policy implications**:
 - they suggest that the China shock contributed 17 percent to the decline in the average effective tax rate of US-listed firms observed between 1990 and 2005 (Dyreng et al., 2017)
 - they help understand the recent backlash against large firms and globalization (Helpman, 2017; Ravallion, 2018; Rodrik, 2018)

Related literature

This paper lies at the intersection of 2 strands of research:

► Literature on **corporate tax avoidance**

- Growing evidence of profit shifting activities (Beer et al., 2020)
 - Channels: e.g., Egger et al. (2010), Griffith et al. (2014), Alstadsaeter et al. (2018), Davies et al. (2018), Laffitte and Toubal (2019)
 - Macro estimates: e.g., Crivelli et al. (2016), Clausing (2016), Cobham and Jansky (2018), Tørsløv et al. (2018), Laffitte et al. (2020)
- Determinants of tax dodging (Alm et al., 2019; Wang et al., 2020)
 - Internal drivers: e.g., Desai and Dharmapala (2009), McGuire et al. (2014), Higgins et al. (2015), Khan et al. (2017), Souillard (2020)
 - External factors: e.g., Marrelli and Martina (1988), Goerke and Runkel (2011), Hoopes et al. (2012), Dyreng et al. (2016), Edwards et al. (2016), Tian et al. (2016), Cen et al. (2017)

► Literature on the **China shock**

- Labor markets: e.g., Autor et al. (2013), Mion and Zhu (2013), Utar and Ruiz (2013), Utar (2014), Acemoglu et al. (2016), Pierce and Schott (2016)
- Firm behavior: e.g., Iacovone et al. (2013), Bloom et al. (2016), Hombert and Matray (2018), Chakraborty and Henry (2019), Amiti et al. (2020)

Outline of the talk

- ➊ Introduction
- ➋ Data
- ➌ Causal effect
- ➍ Mechanism
- ➎ Conclusion

Outline of the talk

① Introduction

② Data

③ Causal effect

④ Mechanism

⑤ Conclusion

Sources and key variables

Firm-level data and tax avoidance variables

The **firm-level** data come from Compustat

- ▶ Compustat consists of balance sheets, income statements, and cash flows of publicly listed firms in North America since 1950
- ▶ I construct 4 firm-year indicators of corporate tax avoidance:
 - ratio of income taxes to pre-tax income (ETR)
 - ratio of non-deferred income taxes to pre-tax income (ETR2)
 - ratio of cash income taxes paid to pre-tax income (CASHETR)
 - ratio of cash income taxes paid to operating cash flows (CFM)
- ▶ These variables are complementary and the most prevalent in the accounting literature [▶ Table](#)

Sources and key variables

Industry-level data and import competition variable

I supplement Compustat data with **industry-level data** at the 4-digit SIC level from the NBER-CES Manufacturing Industry Database and Schott (2008)

- ▶ NBER-CES: annual output, employment, etc from 1958 to 2011
- ▶ Schott (2008): annual bilateral US exports and imports from 1972 to 2005
- ▶ The import competition variable is the penetration ratio of US imports from China:

$$IMP_{ijt} = IMP_{jt} = \frac{Imports_{jt}^{China, US}}{Output_{jt}^{US} + Imports_{jt}^{World, US} - Exports_{jt}^{US, World}}$$

Firm i mostly active in sector j in year t

- ▶ This ratio varies both over time and across sectors

▶ Example

Sample

Focus on US-listed manufacturing firms between 1990 and 2005

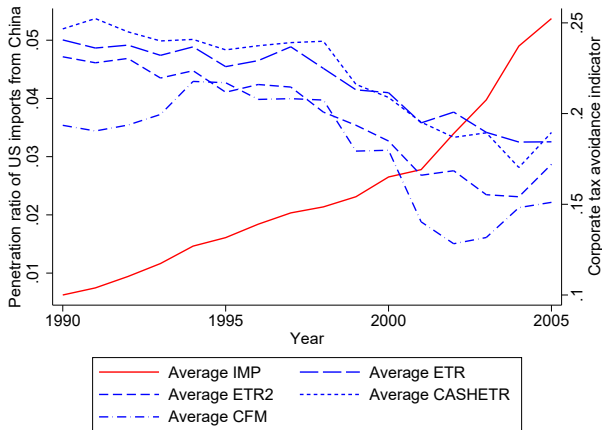
I use a subsample containing only **US-headquartered** firms operating **between 1990 and 2005** in **manufacturing**

- ▶ Headquartered in the US for comparability
- ▶ 1990s: start of the boom of China's exports [▶ Graph](#)
- ▶ 90 percent of China's exports were manufacturing products

The unbalanced sample includes 5,739 firms operating in 218 industries

First evidence on import competition and corporate tax avoidance

Figure 1 – Import competition and corporate tax avoidance: macro-level evidence [► Table](#)



► The positive correlation also holds at the industry-level [► Graph](#) [► Table](#)

Outline of the talk

- 1 Introduction
- 2 Data
- 3 Causal effect**
- 4 Mechanism
- 5 Conclusion

Econometric model

Benchmark specification

I assess the effect of import competition on corporate tax avoidance by regressing:

$$CTA_{ijt} = \beta_0 + \beta_1 IMP_{jt} + \beta_2 X_{ijt} + \alpha_i + \delta_t + \epsilon_{ijt}$$

- ▶ CTA : corporate tax avoidance variable
- ▶ IMP : penetration ratio of US imports from China
- ▶ X : vector of control variables (e.g., sales, pre-tax income, tax loss carry forward, assets, profitability, leverage, foreign operations)
- ▶ α : firm-level fixed effects
- ▶ δ : year-level fixed effects

Baseline results

A positive effect of competition on corporate tax avoidance

Table 1 – Effect of import competition on corporate tax avoidance: baseline equation

	(1) ETR_{ijt}	(2) $ETR2_{ijt}$	(3) $CASHETR_{ijt}$	(4) CFM_{ijt}
IMP_{jt}	-0.20 ^a (0.03)	-0.18 ^b (0.07)	-0.18 ^a (0.04)	-0.26 ^a (0.06)
Controls	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
R ²	0.20	0.21	0.13	0.12
Nb. of obs.	23,097	22,286	16,688	16,584

Notes. Standard errors, in parentheses, are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Sensitivity tests

Exclusion of outliers, more controls, model specification, and falsification tests

The effect is

- ▶ robust to removing different types of **outliers**: extreme values of the right-hand side variables, firms with negative profits, entries and exits, firms involved in a merger/acquisition operation
- ▶ robust to extending the set of **covariates**: more globalization-related variables, finer sets of fixed effects
- ▶ consistent across **specifications**: 3-digit industry level, 4-year averages, 16-year differences
- ▶ corroborated by **falsification tests**: random industry, pre-period data

Endogeneity issues

Lagged independent variables and IV strategy

- ▶ **Reverse causality** + “**bad controls**” (Angrist and Pischke, 2009)
 - Lagged right-hand side variables ▶ Table
- ▶ Isolate **supply-side** driven shocks of import competition
 - Share of imports from China in 8 other high-income countries (Autor et al, 2013; Iacovone et al., 2013; Chakraborty and Henry, 2019) ▶ Table
 - Identification relies on 3 (too strong?) assumptions

Endogeneity issues

Difference-in-differences approach

- ▶ Alternative: exploit the **granting of the PNTR** status by the US to China in 2000
 - Responsible for 1/3 of the growth of US expenditures in Chinese goods (Handley and Limao, 2017)
 - Treatment: difference between the NNTR and NTR tariff rates
 - Most of the variation comes from NNTR tariff rates, established in 1930

$$CTA_{ijt} = \beta_0 + \beta_1 \text{PNTR}_{jt} + \beta_2 X_{ijt} + \alpha_i + \delta_t + \epsilon_{ijt}$$

with $\text{PNTR}_{jt} = 1_{t \geq 2001} (\text{NNTR}_{j1999} - \text{NTR}_{j1999})$ [▶ Table](#) [▶ Parallel trends + placebo](#)

- Robust to the correction proposed by de Chaisemartin and D'Haultfoeuille (2020)

Outline of the talk

- 1 Introduction
- 2 Data
- 3 Causal effect
- 4 Mechanism**
- 5 Conclusion

What is behind this average effect?

Profit shifting of multinational firms via intangible assets

- ▶ **MNEs** can avoid taxes more easily than domestic firms: growing evidence in the literature that they **shift profits** towards low-tax countries
 - ⇒ Is the average effect driven by MNEs?
 - ⇒ Yes! ▶ Table
 - ⇒ Robust to the definition of an MNE (Exhibit 21 SEC files)
- ▶ The strategic location of **intangibles** and the use of intra-firm royalty payments constitute one of the dominant profit shifting channels (Heckemeyer and Overesch, 2017)
 - ⇒ Indirect effect of competition through intangible assets?
 - ⇒ Yes! ▶ Table
 - ⇒ Robust to the definition of an intangible (extended definition or focus on patents)

China shock → MNEs invested in intangibles → MNEs shifted more profits

Did MNEs invest in intangibles to shift more profits?

No, they did it to escape competition in the first place

- ▶ If MNEs invested in intangibles principally to shift more profits and save taxes, we should note more foreign direct investments of MNEs in tax havens after the shock
 - ⇒ Did MNEs intensify their network of subsidiaries in tax havens?
 - ⇒ No! ▶ Table
 - ▶ Alternatively, investments in intangibles could help firms upgrade and thus escape competition
 - ⇒ Is the negative impact of the China shock on sales mitigated by intangibles?
 - ⇒ Yes! ▶ Table
- ⇒ The increase in corporate tax avoidance is a **“side” effect** of import competition

Outline of the talk

- 1 Introduction
- 2 Data
- 3 Causal effect
- 4 Mechanism
- 5 Conclusion**

Summary of the paper

- ▶ The effect of competition on corporate tax avoidance is theoretically unclear in the existing literature
- ▶ This paper attempts to fill this gap by investigating the effect of rising Chinese import competition on tax avoidance of US publicly listed firms
- ▶ The paper documents a **positive, causal, and statistically robust** effect of trade-induced competition on corporate tax avoidance
- ▶ The China shock prompted **MNEs** to invest in **intangibles** and these assets allowed them to **shift more profits** towards low-tax countries
- ▶ However, this effect is quite **indirect**: these intangibles primarily aimed at alleviating losses rather than saving taxes

Thank you for your attention!

Questions, comments, and suggestions are welcome:

baptiste.souillard@ulb.be

Full paper (with more robustness tests!):

www.baptistesouillard.com

Appendix

Corporate tax avoidance variables

Table 2 – Correlation between tax avoidance variables
(within firms)

	<i>ETR</i>	<i>ETR2</i>	<i>CASHETR</i>	<i>CFM</i>
<i>ETR</i>	1.00			
<i>ETR2</i>	0.53	1.00		
<i>CASHETR</i>	0.26	0.41	1.00	
<i>CFM</i>	0.20	0.27	0.64	1.00

Notes. This table reports the average Pearson's correlation coefficients between the four tax avoidance variables (within firms). For a firm-year observation to be included in the computation of a correlation coefficient, the two tax avoidance variables must lie in the [0,1] interval.

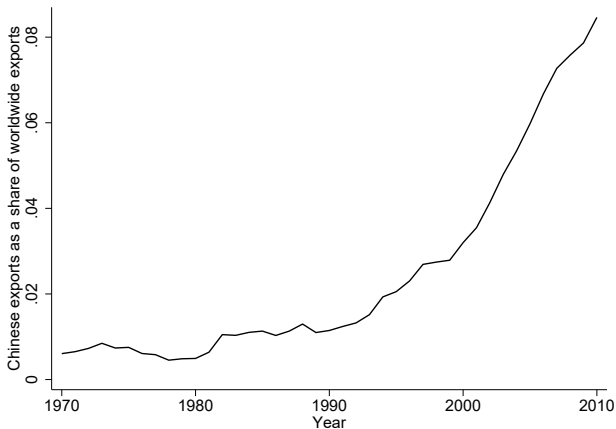
Import penetration ratio across sectors

- ▶ The penetration ratio of Chinese exports to the US of **hardwood veneer and plywood products** (SIC 2435) was 12 percent in 2005, i.e., about twice the average
- ▶ For **softwood veneer and plywood products** (SIC 2436), the import penetration ratio was **40 times smaller** in the same year (0.3 percent)

▶ Back

China's exports

Figure 2 – Exports from China between 1970 and 2010



Correlation (1)

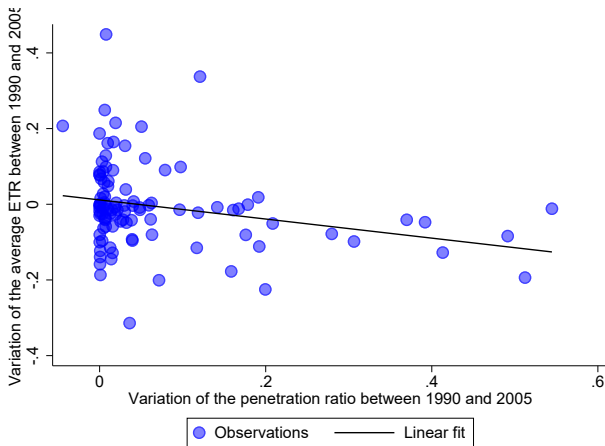
Table 3 – Import competition and corporate tax avoidance: macro-level regressions

	(1) \overline{ETR}_t	(2) $\overline{ETR2}_t$	(3) $\overline{CASHETR}_t$	(4) \overline{CFM}_t
\overline{IMP}_t	-1.36 ^a (0.13)	-1.76 ^a (0.22)	-1.73 ^a (0.20)	-1.62 ^a (0.39)
Controls	No	No	No	No
Nb. of obs.	16	16	16	16

Notes. Standard errors are in parentheses. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Correlation (2)

Figure 3 – Import competition and corporate tax avoidance: industry-level evidence



Correlation (3)

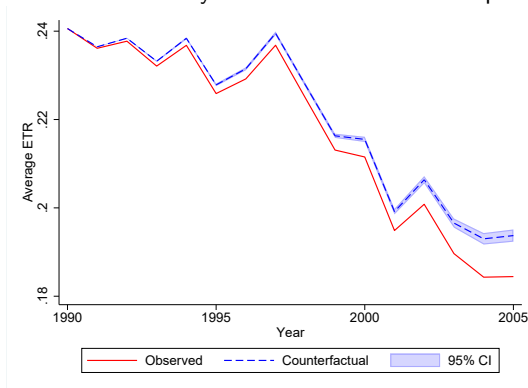
Table 4 – Import competition and corporate tax avoidance:
industry-level regressions

	(1) \overline{ETR}_{jt}	(2) $\overline{ETR2}_{jt}$	(3) $\overline{CASHETR}_{jt}$	(4) \overline{CFM}_{jt}
IMP_{jt}	-0.11 ^d (0.07)	-0.11 ^c (0.06)	-0.06 (0.06)	-0.12 ^d (0.08)
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Nb. of obs.	1,785	1,771	1,783	1,783

Notes. Standard errors, in parentheses, are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Baseline results

Figure 4 – Counterfactual analysis with back-of-the-envelope computations



- ▶ The average ETR would have been **0.93 percentage point** higher in 2005 if the penetration ratio of US imports from China had been constant
- ▶ The China shock contributed **17 percent** to the decline in the average ETR observed between 1990 and 2005 [▶ Back](#)

Robustness tests

Table 5 – Effect of import competition on corporate tax avoidance: robustness checks

	(1) <i>ETR</i>	(2) <i>ETR2</i>	(3) <i>CASHETR</i>	(4) <i>CFM</i>
<i>Baseline estimates</i>	-0.20 ^a	-0.18 ^b	-0.18 ^a	-0.26 ^a
<i>Panel A: exclusion of outliers</i>				
A1. Extreme values	-0.36 ^a	-0.30 ^a	-0.33 ^a	-0.43 ^a
A2. Negative profits	-0.15 ^a	-0.11 ^c	-0.17 ^a	-0.22 ^a
A3. Entries and exits	-0.22 ^a	-0.23 ^a	-0.17 ^a	-0.22 ^a
A4. Involved in M&A	-0.23 ^a	-0.19 ^a	-0.18 ^a	-0.27 ^a
<i>Panel B: more controls</i>				
B1. Trends in globalization	-0.17 ^a	-0.15 ^b	-0.19 ^a	-0.21 ^a
B2. Trends in globalization (USDIA included)	-0.20 ^a	-0.15 ^c	-0.18 ^b	-0.14 ^b
B3. State-year FEs	-0.20 ^a	-0.19 ^a	-0.16 ^a	-0.26 ^a
B4. State-year-MNE status FEs	-0.21 ^a	-0.18 ^a	-0.15 ^a	-0.27 ^a
<i>Panel C: alternative specifications</i>				
C1. SIC 3-digit industry	-0.15 ^a	-0.16 ^a	-0.10 ^b	-0.18 ^a
C2. 4-year periods	-0.30 ^a	-0.11	-0.17 ^c	-0.23 ^a
C3. 16-year differences	-0.18 ^c	-0.36 ^a	-0.16 ^c	-0.32 ^b
<i>Panel D: falsification tests</i>				
D1. Random industry	0.01	-0.02	-0.01	0.05
D2. Pre-period data	-0.11	-0.06	0.35	0.36

Endogeneity issues (1)

Table 6 – Effect of import competition on corporate tax avoidance: endogeneity

	(1) <i>ETR</i>	(2) <i>ETR2</i>	(3) <i>CASHETR</i>	(4) <i>CFM</i>
<i>Panel A: lagged controls</i>				
A1. One-year lags	-0.21 ^a	-0.16 ^b	-0.19 ^a	-0.30 ^a
A2. Two-year lags	-0.21 ^a	-0.14 ^d	-0.19 ^a	-0.27 ^a
<i>Panel B: 2SLS à la Autor et al. (2013)</i>				
B1. First-stage results: IMP_{jt} on instrument				
Point estimate				
F-statistic				
B2. Second-stage results: CTA_{ijt} on \widehat{IMP}_{jt}				
Point estimate				
<i>Panel C: PNTR as a quasi-natural experiment</i>				
Controls	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes

Notes. Standard errors are clustered at the 4-digit 1987 SIC industry and not reported for space.
^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Endogeneity issues (2)

Table 7 – Effect of import competition on corporate tax avoidance: endogeneity

	(1) <i>ETR</i>	(2) <i>ETR2</i>	(3) <i>CASHETR</i>	(4) <i>CFM</i>
<i>Panel A: lagged controls</i>				
A1. One-year lags	-0.21 ^a	-0.16 ^b	-0.19 ^a	-0.30 ^a
A2. Two-year lags	-0.21 ^a	-0.14 ^d	-0.19 ^a	-0.27 ^a
<i>Panel B: 2SLS à la Autor et al. (2013)</i>				
B1. First-stage results: IMP_{jt} on instrument				
Point estimate	0.63 ^a	0.63 ^a	0.62 ^a	0.63 ^a
F-statistic	32.65	33.16	29.12	30.23
B2. Second-stage results: CTA_{ijt} on \widehat{IMP}_{jt}				
Point estimate	-0.31 ^a	-0.28 ^b	-0.28 ^a	-0.37 ^a
<i>Panel C: PNTR as a quasi-natural experiment</i>				
Controls	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes

Notes. Standard errors are clustered at the 4-digit 1987 SIC industry and not reported for space.
^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Endogeneity issues (3)

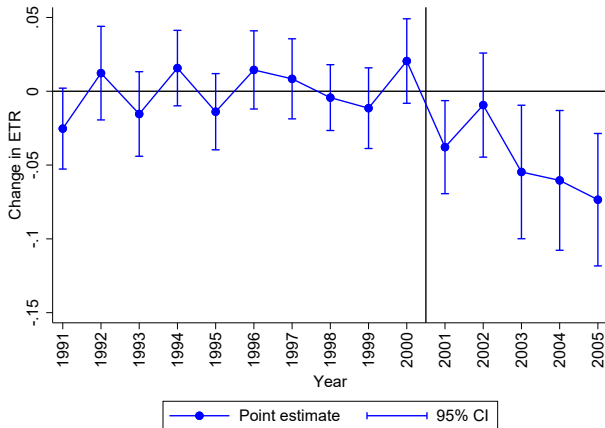
Table 8 – Effect of import competition on corporate tax avoidance: endogeneity

	(1) <i>ETR</i>	(2) <i>ETR2</i>	(3) <i>CASHETR</i>	(4) <i>CFM</i>
<i>Panel A: lagged controls</i>				
A1. One-year lags	-0.21 ^a	-0.16 ^b	-0.19 ^a	-0.30 ^a
A2. Two-year lags	-0.21 ^a	-0.14 ^d	-0.19 ^a	-0.27 ^a
<i>Panel B: 2SLS à la Autor et al. (2013)</i>				
B1. First-stage results: IMP_{jt} on instrument				
Point estimate	0.64 ^a	0.63 ^a	0.62 ^a	0.63 ^a
F-statistic	32.65	33.16	29.12	30.23
B2. Second-stage results: CTA_{ijt} on \widehat{IMP}_{jt}				
Point estimate	-0.30 ^a	-0.28 ^b	-0.28 ^a	-0.37 ^a
<i>Panel C: PNTR as a quasi-natural experiment</i>	-0.06 ^b	-0.08 ^c	-0.01	-0.07 ^d
Controls	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes

Notes. Standard errors are clustered at the 4-digit 1987 SIC industry and not reported for space.
^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Endogeneity issues (4)

Figure 5 – Pre-trends in *ETR* and dynamics of the effect



Mechanism (1)

Table 9 – Effect of import competition on corporate tax avoidance: mechanism

	(1) ETR_{ijt}	(2) ETR_{ijt}
$PNTR_{jt}$	-0.06 ^b (0.03)	-0.02 (0.03)
$PNTR_{jt} \times MNE_{ijt}$		-0.06 ^a (0.02)
Controls	Yes	Yes
Firm FEs	Yes	Yes
Year FEs	Yes	Yes

Notes. Standard errors are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Mechanism (2)

Table 10 – Effect of import competition on corporate tax avoidance: mechanism

	(1) <i>ETR_{ijt}</i>	(2) <i>ETR_{ijt}</i>	(3) <i>ETR_{ijt}</i>	(4) <i>ETR_{ijt}</i>	(5) <i>intangibles_{ijt}</i>
<i>PNTR_{jt}</i>	-0.06 ^b (0.03)	-0.02 (0.03)	-0.03 (0.03)	-0.03 (0.03)	0.02 (0.03)
<i>PNTR_{jt} × MNE_{ijt}</i>		-0.06 ^a (0.02)			0.04 ^c (0.02)
<i>intangibles_{ijt}</i>			0.02 (0.01)	0.04 ^a (0.02)	
<i>intangibles_{ijt} × MNE_{ijt}</i>				-0.06 ^b (0.03)	
Controls	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes

Notes. Standard errors are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Mechanism (3)

Table 11 – Effect of import competition on corporate tax avoidance: a side one?

	(1) $TAXHAVEN_{ijt}^{ext}$	(2) $TAXHAVEN_{ijt}^{int}$
$PNTR_{jt}$	0.04 (0.07)	3.15 (4.50)
$PNTR_{jt} \times intangibles_{ijt}$		
Controls	Yes	Yes
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
Nb. of obs.	28,443	4,641

Notes. Standard errors, in parentheses, are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.

Mechanism (4)

Table 12 – Effect of import competition on corporate tax avoidance: a side one?

	(1) $TAXHAVEN_{ijt}^{ext}$	(2) $TAXHAVEN_{ijt}^{int}$	(3) $sales_{ijt}$
$PNTR_{jt}$	0.04 (0.07)	3.15 (4.50)	-2,740.44 ^b (1,226.00)
$PNTR_{jt} \times intangibles_{ijt}$			1.44 ^b (0.70)
Controls	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
Nb. of obs.	28,443	4,641	30,141

Notes. Standard errors, in parentheses, are clustered at the 4-digit 1987 SIC industry. ^d $p < 0.15$, ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$.