Devoir de Vigilance

- Forced supply chain responsibility on firm performance

Yimin Wang
Joint work with Christian Durach (ESCP Berlin)

Department of Supply Chain Management
W. P. Carey School of Business
Prepared for SCAI Seminar

September 26^{th}, 2025


XPO
XPO
XPO
RENAULT TRUCKS

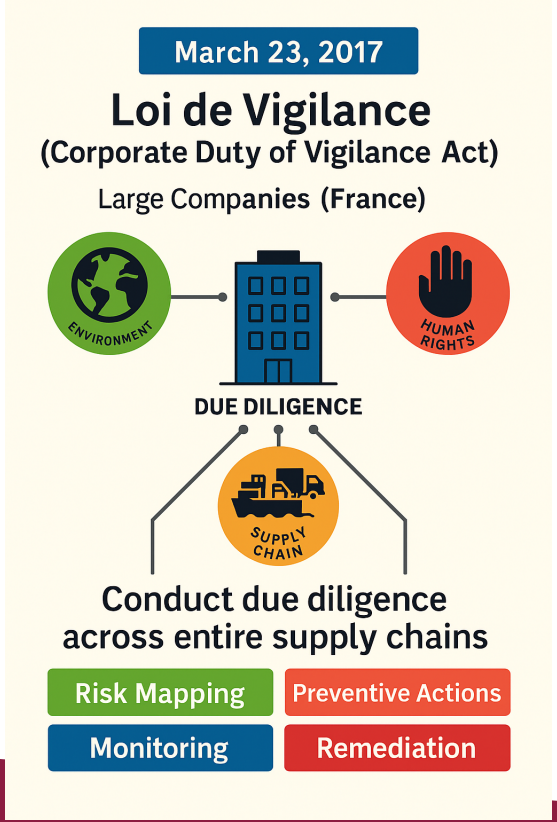
The Formal Notice

- In October 2019, the International Transport Workers' Federation (ITF) and the European Transport Workers' Federation (ETF) served formal notice on XPO Logistics Europe regarding worker safety and human rights
- Following the notice, XPO updated supplier codes of conduct, citing its compliance with *Loi de Vigilance*
- The XPO litigation illustrates a two-step enforcement procedure: a formal notice period followed by a potential lawsuit
- Other high-profile cases against major French companies like TotalEnergies, BNP Paribas, and La Poste have moved forward in French courts
- Recent rulings in 2024 by the Paris Court of Appeal have paved potential ways for more such litigation in the future

Outline

Loi de Vigilance

On March 23, 2017, the French Constitutional Council passed the Loi de Vigilance (Corporate Duty of Vigilance Act), mandating that companies conduct human rights and environmental due diligence across their entire supply chains

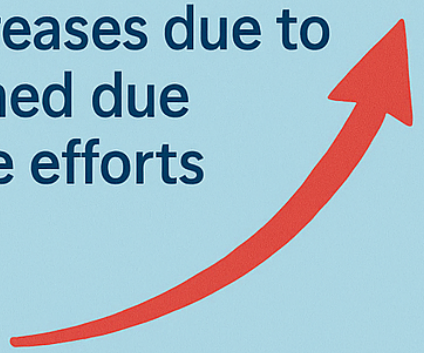


Increasing Due Diligence Laws

Other European countries introduced similar legislation

- Dutch's Child Labor Due Diligence Act (2019)
- Norway's Transparency Act (2022)
- Germany's Supply Chain Due Diligence Act (2023)
- EU's Corporate Sustainability Due Diligence Directive (CSDDD) (2027)

41% of executives anticipated significant cost increases due to heightened due diligence efforts



In Germany, there is intense debate over whether the German/EU due diligence acts impose excessive burdens on businesses and hinder competitiveness

However, executives also recognized potential opportunities, including enhanced company reputation and improved risk resilience, which could ultimately lower costs for product and service provision

Source: Handelsblatt Research Institute

Objective

To date, little empirical evidence on the actual cost implications

We explore the effect of forced compliance with the French Lois de Vigilance on firms' costs for product and service provision

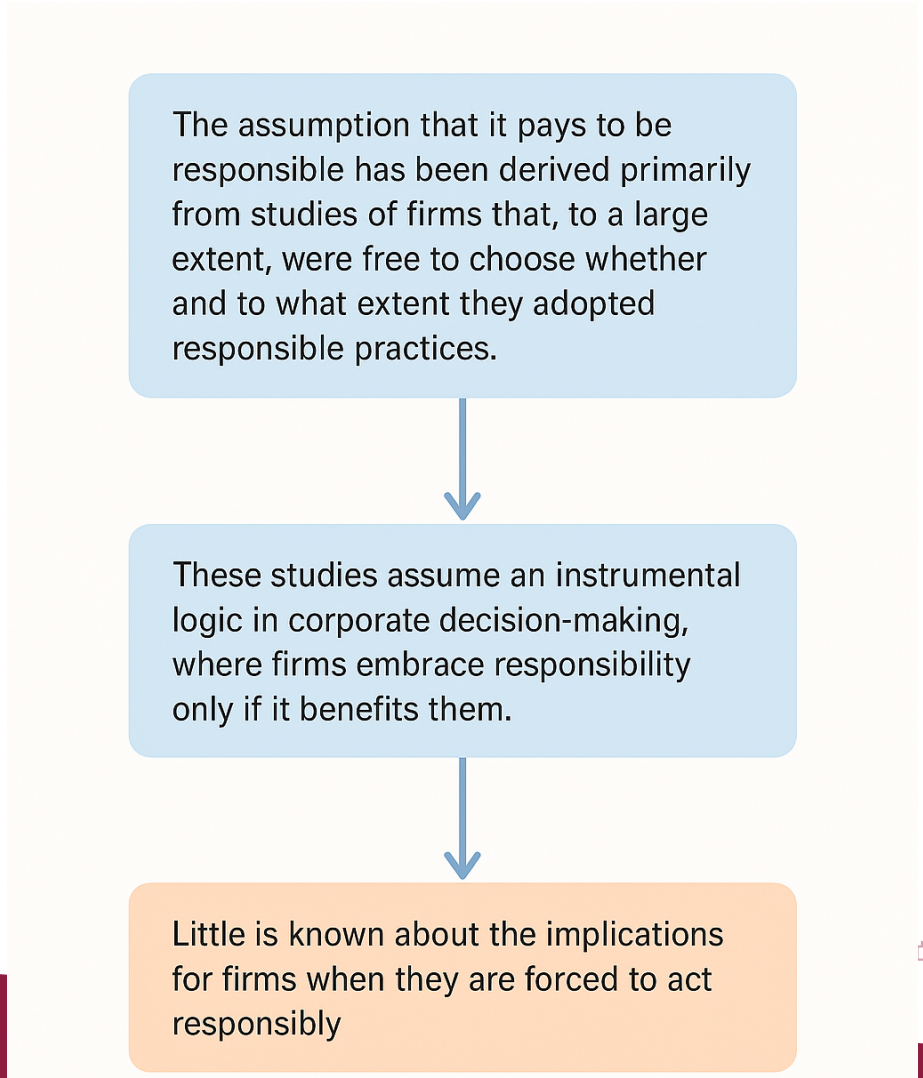
Offer policy guidance

Literature

Extensive research on the relationship between corporate social and environmental responsibility and financial performance - results are nuanced/mixed

- Albertini et al 2013. *Does Environmental Management Improve Financial Performance? A Meta-Analytical Review* Organization and Environment
- Trudel and Cotte 2009. *Does It Pay To Be Good?* MIT Sloan
- Stefan and Paul 2008. *Does It Pay to be Green? A Systematic Overview*. Academy of Management Perspective

Our Contribution



Model Basic Assumption

Basic Premise:

- Complying with the law may *increase costs*
  - For example, higher wages, better amenities, and additional safety and environmental protections
- Complying with the law may *decrease costs* or *improve sales*
  - For example, better training and safety protection, improved production and delivery processes, reduced quality variations and delivery risks
  - Customers may pay a price premium
- The law's impact is critically linked with a firm's supply base
  - Compliance at the *supply chain level*

Model Setup

Approximate the law's impact as a diffusion process

- Firm gradually works with its suppliers to comply with the law
- Let $1 - Y_1(t)$ denote the fraction of the suppliers that the firm has conducted risk mapping and mitigation plans by time t
  - Thus, at any instant of time t, the fraction of suppliers that are not yet mapped or monitored is given by $Y_1(t)$
- The rate of change in $Y_1(t)$ depends on (a) the number of suppliers not yet mapped and (b) the size of the firm's supply base

$$\underbrace{\frac{dY_1(t)}{Y_1(t)}}_{\text{rate of change}} = - \underbrace{\alpha}_{\text{base diffusion rate}} / \underbrace{\sqrt{s}}_{\text{supply base size}} + \underbrace{W(t)}_{\text{heterogeneity}} \tag{1}$$

Model Setup (cont'd)

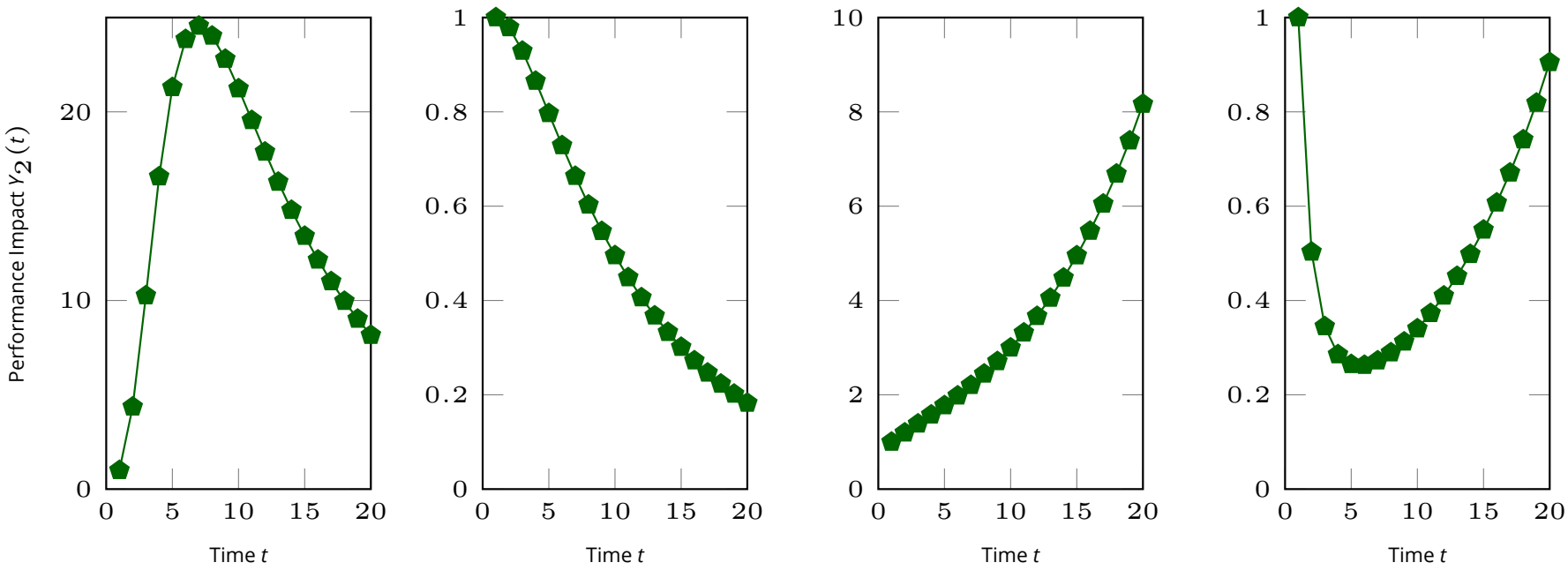
- Let $Y_2(t)$ denote the relevant performance of interest
  - For example, cost of goods sold (cogs), sales, or cogs/sales
- The rate of change in performance due to the law is influenced by compliance level and supply base size

$$\underbrace{\frac{dY_2(t)}{Y_2(t)}}_{\text{rate of change}} = \underbrace{\beta * Y_1(t)}_{\text{compliance impact}} - \underbrace{\gamma * \sqrt{s}}_{\text{supply base impact}} + \underbrace{W(t)}_{\text{heterogeneity}} \tag{2}$$

- Would like to estimate α, β, γ, and standard deviation of $W(t)$

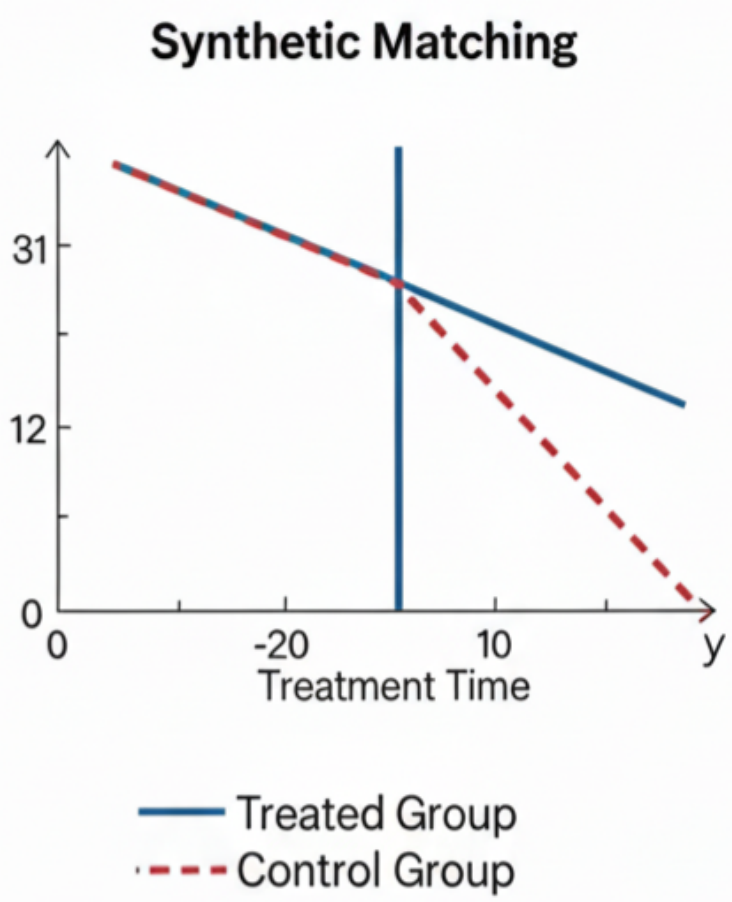
Model Behavior

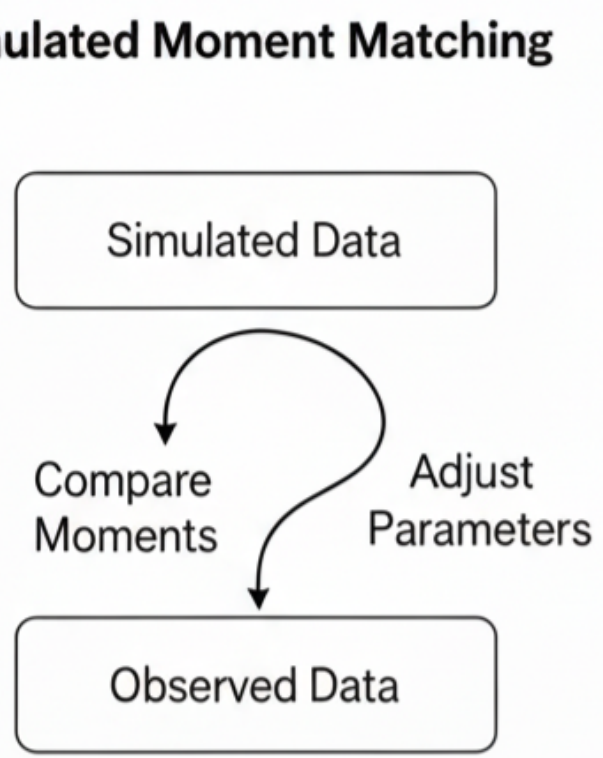
Eqs (1) and (2) together describe flexible diffusion processes



Note. The figure is obtained by numerically solving the ordinary differential equations (1) and (2) simultaneously. The initial parameter values are scaled at $Y_1(0) = 1$ and $Y_2(0) = 1$. The supply base number is scaled at $s = 1$. We fix $\alpha = 0.5$, and vary parameters (β, γ) as (2.0,0.1) for panel (a), (0.1,0.1) for panel (b), (0.0,-0.1) for panel (c), and (-1.0,-0.1) for panel (d).

Challenge: No Natural Control Group





Synthetic Matching

- Use firms in other EU countries to create synthetic firms that match French treated firms
  - We use firms in Germany, Italy, Portugal, Spain, Austria, and Belgium etc (Chen et al 2023)
- France also implemented the Sapin II anti-corruption law in 2017, affecting all companies with more than 500 employees.
  - Sapin II also relates to the supply chain partners of a firm
- Use generalized synthetic triple DDD

Generalized Synthetic Triple DDD

Aim to estimate the following DDD model

$$Y_{it} = \delta_{it}\text{Treat.Sapin}_i \times \text{Post}_t \times \text{Treat.LdV}_i + \alpha_{it}^{S}\text{Treat.Sapin}_i \times \text{Post}_t + \alpha_{it}^{L}\text{Treat.LdV}_i \times \text{Post}_t + \underbrace{\beta X_{it}}_{\text{covariates}} + \underbrace{\lambda_i F_t}_{\text{latent factors}} + \epsilon_{it}, \quad (3)$$

Unfortunately, not convenient to construct synthetic control groups

Convert to Synthetic DiD

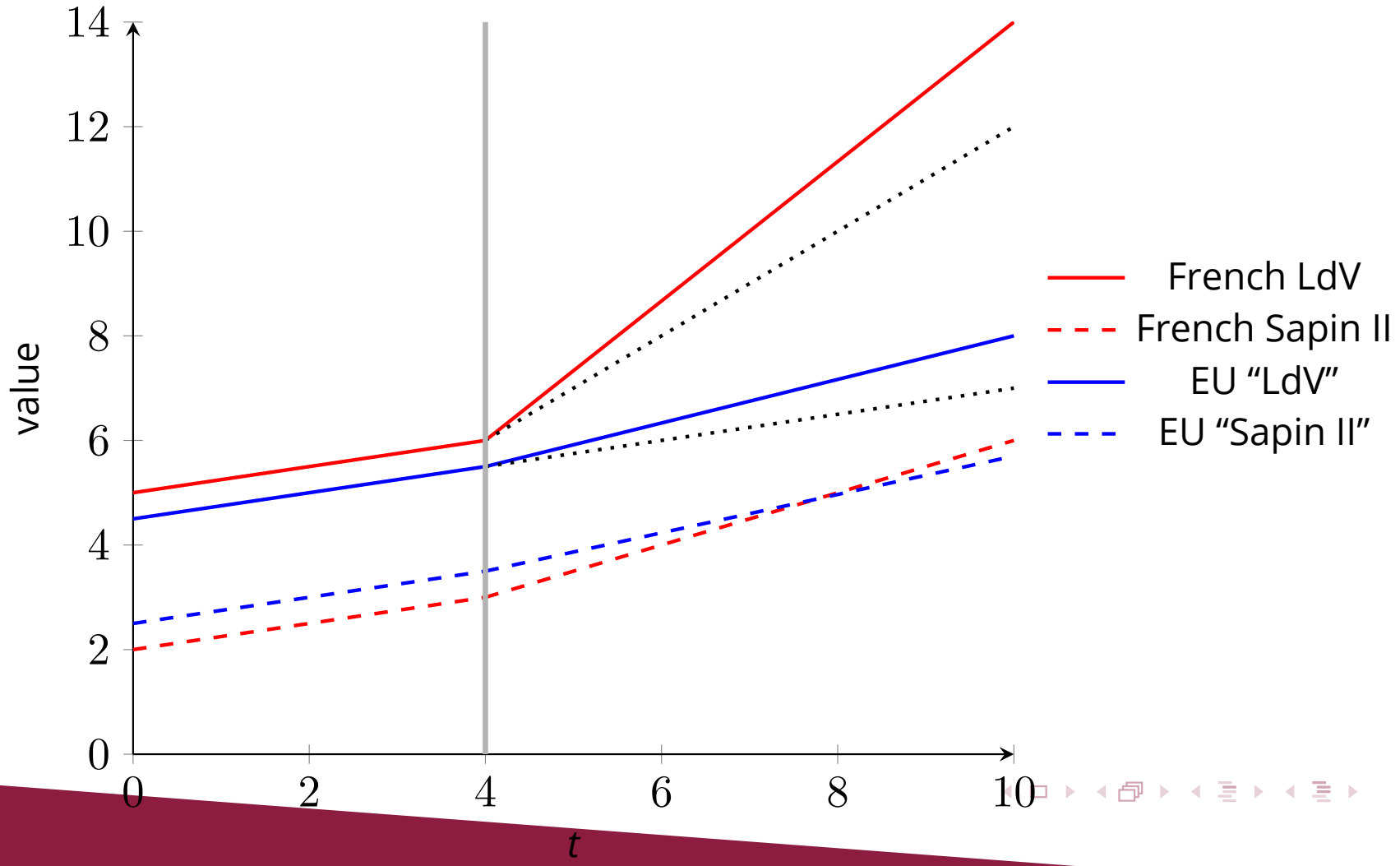
For firms exposed to the Loi de Vigilance ($\text{Treat.LdV}_i = 1$), define

$$\nabla Y_{it,j} = \underbrace{Y_{it}}_{\substack{\text{observed} \\ \text{performance}}} - \underbrace{Y^0_{it,j}}_{\substack{\text{expected performance} \\ \text{if not exposed to ldv}}}, \; j = 0, 1$$

- $Y^0_{it,j} \overset{\text{def}}{=} \mathrm{E}[Y_{it} | \text{Treat.LdV}_i = 0, \text{Treat.Sapin}_i = j, t = t], \; j = 0, 1$, is the expected outcome had the firms been exposed to Sapin II but not Loi de Vigilance
- $\nabla Y_{it,j}$ nets out the effect of Sapin II
- To estimate $Y^0_{it,j}$, regress all firms with $\text{Treat.LdV}_i = 0$

$$\widehat{Y}^0_{it,j} = \widehat{\alpha} + \widehat{\beta} X_{it} + \theta_i + \gamma_t + \epsilon_{it}, \tag{4}$$

A Schematic Illustration



Convert to Synthetic DiD (cont'd)

Estimate the following DiD

$$\nabla Y_{it,j} = \theta_{it}\text{Treat.Sapin.LdV}_i \times \text{Post}_t + \beta X_{it} + \lambda_i F_t + \epsilon_{it}, \tag{5}$$

where θ_{it} is the estimator for δ_{it} in the DDD specification.

Data

- We identify the list of treated firms based on Ibanet et al. (2020)[1]
- Firm level financial information from CompuStat, 2006-2023
- Firm level supply chain information from FactSet, 2006-2023

	Control (EU)		Treated (FR)	
n	6312		1583	
cogs/at (mean (SD))	0.63	(0.44)	0.54	(0.38)
sale/at (mean (SD))	0.94	(0.51)	0.81	(0.43)
cogs/sale (mean (SD))	0.64	(0.18)	0.63	(0.22)
log(at) (mean (SD))	9.39	(1.90)	9.55	(1.90)
log(emp) (mean (SD))	2.87	(0.99)	3.69	(1.15)
ch/at (mean (SD))	0.08	(0.07)	0.1	(0.07)
lt/at (mean (SD))	0.68	(0.18)	0.66	(0.17)
ebit/at (mean (SD))	0.06	(0.06)	0.06	(0.05)
wcap/at (mean (SD))	0.1	(0.15)	0.06	(0.13)
invt/sale (mean (SD))	0.12	(0.11)	0.11	(0.14)
ROA (mean (SD))	0.03	(0.06)	0.03	(0.04)
MktShr (mean (SD))	0.01	(0.02)	0.01	(0.02)
HHI (mean (SD))	952.13	(1486.12)	1022.61	(1467.61)

First Impression

Note. The lines at the top represent firms with 5,000 or more employees whereas the lines at the bottom represent firms with less than 5,000 employees. The bold smooth lines are generated using locally estimated scatterplot smoothing (loess). Firms with less than 5,000 employees in France and neighboring countries share similar trends in sales, cost of goods sold, and cost of goods sold per unit sales. In contrast, firms with more than 5,000 employees in France and neighboring countries exhibit diverging trends in sales and cost of goods sold per unit sales after the implementation of the law in 2017.

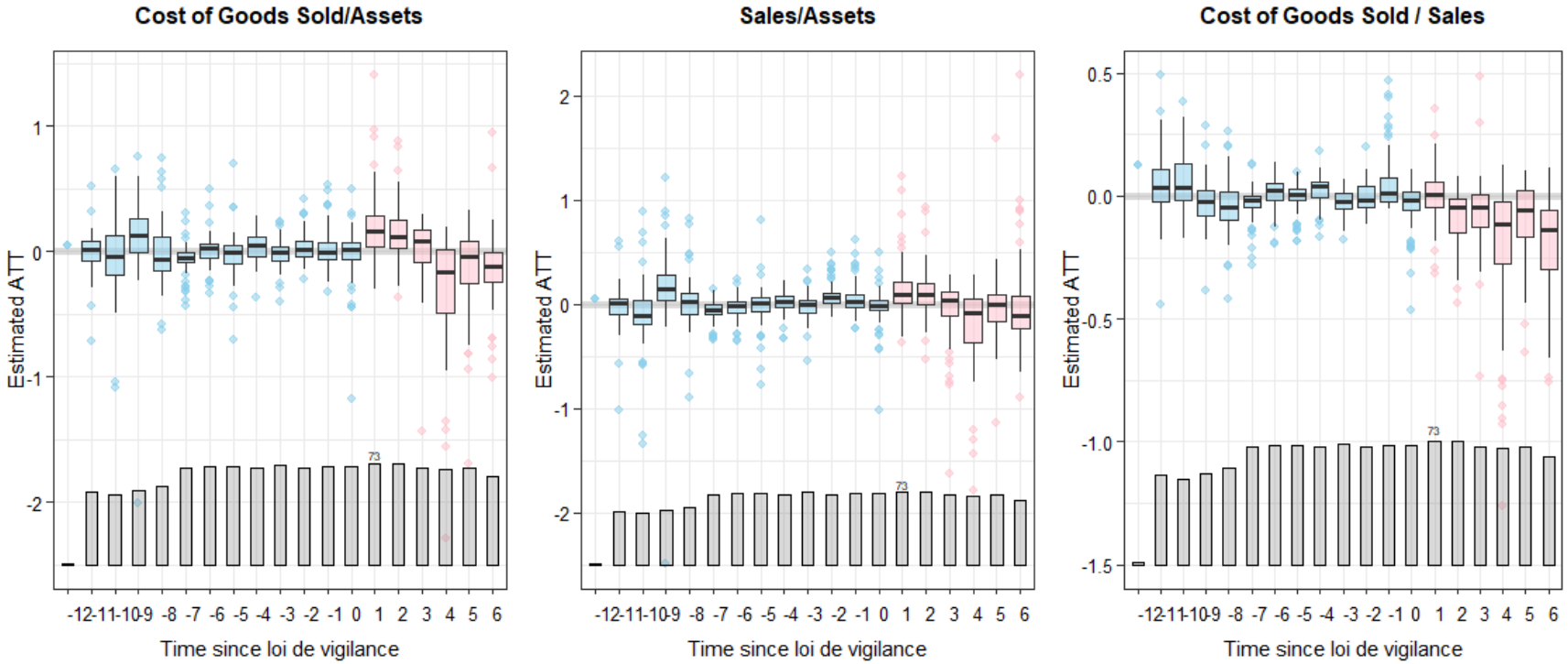
Results

Table 1: Average Treatment Effect (ATT) on cogs/at, sale/at, and cogs/sale

	cogs/at			sale/at			cogs/sale		
period	ATT	S.E.	p.value	ATT	S.E.	p.value	ATT	S.E.	p.value
1	0.1869	0.0801	0.0196*	0.1384	0.0706	0.0499*	0.0007	0.0666	0.9919
2	0.1435	0.1058	0.1750	0.1017	0.1008	0.3131	-0.0941	0.0396	0.0174*
3	0.0214	0.1068	0.8413	-0.0629	0.1218	0.6057	-0.0742	0.0495	0.1334
4	-0.2851	0.1603	0.0754+	-0.2110	0.1773	0.2341	-0.2160	0.0838	0.0099**
5	-0.1469	0.1583	0.3534	-0.0264	0.1838	0.8858	-0.1038	0.0584	0.0753+
6	-0.1300	0.1368	0.3422	-0.0136	0.1669	0.9349	-0.2021	0.0698	0.0038**
average	-0.0302	0.1069	0.7776	-0.0099	0.1166	0.9323	-0.1125	0.0464	0.0154

Note. Significance levels are indicated as + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ATT_t is the average treatment effect at time t relative to year 2017 when the due diligence law is implemented.

Box Plots



Note. The figure shows that the average treatment effect is in general not statistically significant for sales and cost of goods sold, but becomes statistically significant for the cost of goods sold per unit sales.

SMM Estimation

- Need to estimate six parameters: the initial values $Y_1(0)$ and $Y_2(0)$, α, β, and γ that governs the evolution of $Y_1(t)$ and $Y_2(t)$
- Use the observed mean and standard deviation of the treatment effect for 2018-2023 as matching moments. This yields $2 \times 6 = 12$ moments
- Use the ATT as an additional moment
- In total 13 moments to estimate the 6 parameters for each performance metric
- Use data from 2006-2017 to estimate the standard deviation of $W(t)$

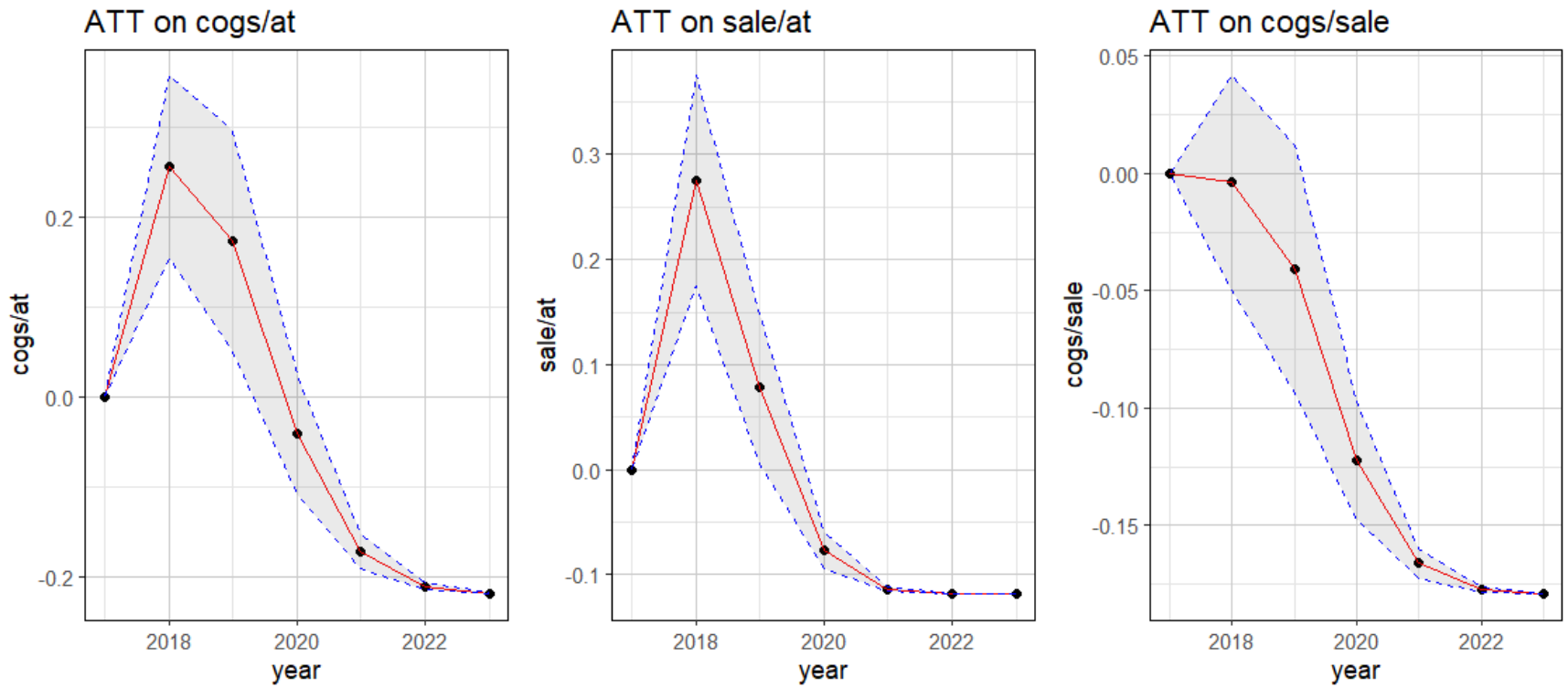
Table 2: Estimated parameter values for ODEs

	$Y_1(0)$	$Y_2(0)$	α	β	γ	offset	σ
cogs/at	2.5179	0.9061	0.3940	1.9287	2.3846	-0.1844	0.0004
sale/at	2.8431	0.9928	0.4850	2.0989	3.1332	-0.1060	0.0003
cogs/sale	2.5923	0.4584	0.3384	2.0967	3.0109	-0.0644	0.0008

Note. *offset* is the adjustment parameter satisfying $\mathrm{E}[Y_2(t)] + \textit{offset} = \textit{ATT}$ for each performance metrics. σ is the standard deviation per firm per year for the $W(t)$ function in the ODEs.

Estimated ODEs

Figure 1: SMM Estimated Average Treatment Effect (ATT) on cogs/at, sale/at, and cogs/sale



Note. The red line represents the simulated average treatment effect (ATT) due to the French law. The figure shows that the average treatment effect is initially increasing and then decreasing (in a relatively smaller scale) for sales and cost of goods sold, but the effect is negative and more significant cost of goods sold per unit sales.

Implications

- The average cogs/at is 0.59
- The estimated mean peak shock on cogs/at is 0.18 to 0.25, representing 31% to 40% increase in the cost of goods sold.
- Although firms eventually benefit from complying with the law, the initial cost shock can disrupt firms' cash flow and constrain working capital

Should the law be applied to firms with smaller or larger supply bases?

Simulated Impact on cogs/at

	Year					
Supply Base Size	1	2	3	4	5	6
1	764.7%	1055.9%	600.8%	185.4%	34.6%	0.7%
2	353.4%	298.4%	112.4%	19.6%	-2.3%	-5.5%
3	181.1%	89.6%	18.3%	-2.4%	-5.5%	-5.8%
4	99.4%	27.4%	-0.3%	-5.3%	-5.8%	
5	56.8%	6.8%	-4.5%	-5.8%		
6	33.1%	-0.7%	-5.5%	-5.8%		
7	19.2%	-3.6%	-5.7%	-5.8%		
8	10.7%	-4.8%	-5.8%			
9	5.3%	-5.4%	-5.8%			
10	1.9%	-5.6%	-5.8%			
11	-0.4%	-5.7%	-5.8%			
12	-2.0%	-5.8%				

Note. The table shows that the law should be applied to firms with a larger supplier base. In particular, for firms with a supply base size of 8 or more can generally experience smaller cost shocks and realize cost savings sooner.

Takeaways

- Incidentally, the median (treated) supply base is 9 - roughly aligns with the simulated recommendation
- However, the average (treated) supply base is less than 6 - resulting in much higher cost shocks for many firms
- Current law is based only on employee size - adding supply base size consideration
- Tradeoff targeting broader firms (smaller employee size/supply base size) versus lower short-term shocks on the cost
- Firms are eventually better off with forced supply chain responsibility - some form of subsidy can mitigate the short-term cost shocks

XPO LOGISTICS EUROPE SAS

XPO LOGISTICS EUROPE SAS has earned a **Gold Medal**, a recognition awarded to the **Top 5%** of companies assessed by **EcoVadis** in the 12 months prior to the medal issue date. It reflects the quality of the company's sustainability management system and demonstrates a commitment to promoting transparency throughout the value chain.
Learn more about EcoVadis Medals & Badges.

EcoVadis is recognized globally for trusted business sustainability ratings.

valid through **July 2026**

Evaluation areas

Environment

Labor and human rights

Ethics

Sustainable procurement