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Mandatory Data Breach Disclosure and Insider Trading

Xi Chen, Bocconi University

Gilles Hilary, Georgetown University

Xiaoli (Shaolee) Tian, Georgetown University

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Research Question

## Does mandatory data breach disclosure affect corporate insiders' trading behavior?

Yes but not as anticipated !

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Summary of Main Findings

➤ Trading profits are **greater** after states require firms to disclose data breaches.

➤ The effect is concentrated among firms with a greater ex ante **breach risk** and those that do not increase **investment** after the passage of law.

➤ Firms that are located in states that implement **stricter** versions of the law and those that are exposed to a higher breach risk **increase investment** under the new legal regime.

➤ The **absence** of investment predicts breach risk, which is associated with more **idiosyncratic crashes**, then linked to the profitability of insider sales.

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Breaches Over Time

Source: IBM security and Ponemon Institute
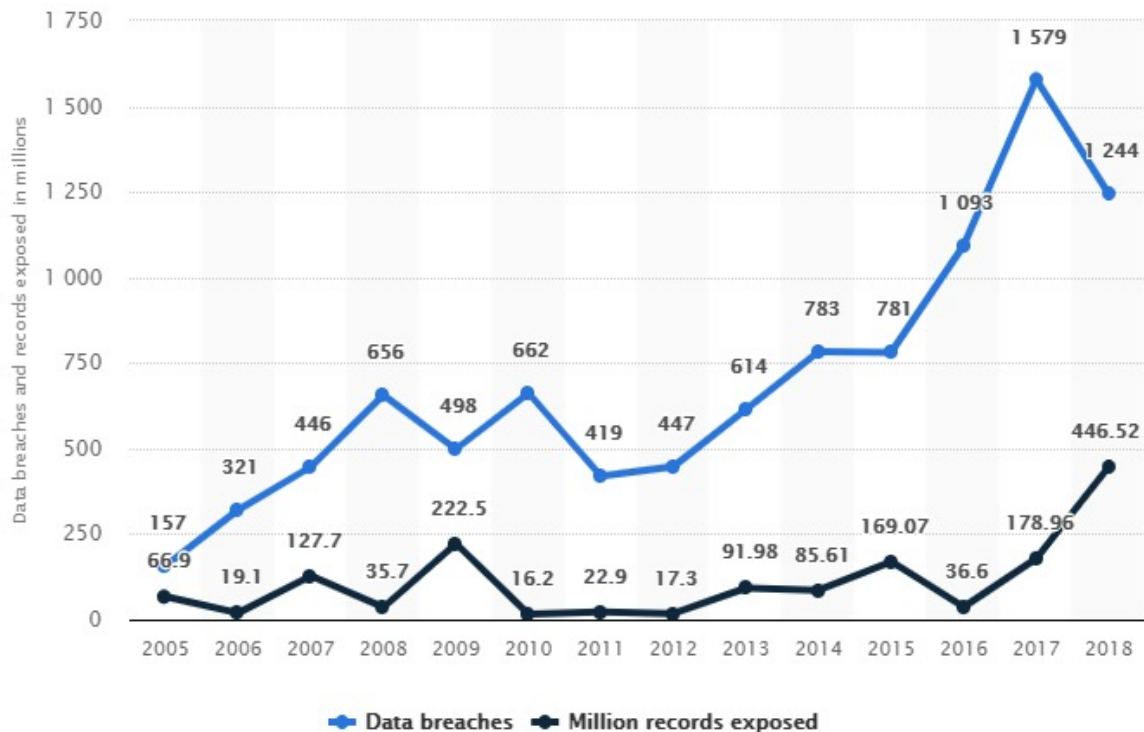
Motivation – SEC Guidance on Public Company Cybersecurity Disclosure (2018)

➢ **Yahoo:**

  ➢ SEC fines on failure to disclose

  ➢ Misleading disclosure on risk factors and 8-K.

➢ But forced disclosure regulations often induce unintended behaviors or other externalities (Dranove et al. 2003: Leuz et al. 2008).

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Motivation – SEC Guidance on Public Company Cybersecurity Disclosure (2018)

➢ Insider selling around data breaches (e.g. Equifax).

➢ Corporate insiders, including directors, officers and other insiders, must not trade a public company's securities while in possession of **material non-public** information regarding a significant cybersecurity incident.

➢ Public companies should have **policies and procedures** in place to guard against insider' trading behaviors and make timely disclosure of any related material non-public information.

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Related literature

➢ **Existence and determinants** of insider trading (e.g., Ke, Huddart, and Petroni 2003; Jin and Kothari 2008; Lin, Sapp, Ulmer, and Parsa 2020)

➢ **Effects or consequences** of insider trading (e.g., Ahern 2017; Piotroski and Roulstone 2005)

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Related literature

➢ **Disciplinary mechanisms** that can restrict insider trading

- ➢ when **trading regulations** are implemented (e.g., Brochet 2010)
- ➢ when firms set restrictions, such as **blackout** windows; (Bettis et al. 2000)
- ➢ when insiders are required to disclose their trading **faster** than before;
- ➢ when the media **disseminate**s the disclosure (e.g., Dai, Parwada, and Zhang 2015)

Our study does not focus on disclosed breach events in the post period. Rather, we investigate the impact of the **mandatory disclosure regulations** itself.

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Empirical Setting - Mandatory Data Breach Notification

➢ Limited pre-existing federal (SEC) mandated disclosure.

No complete privacy laws at federal level

- No GDPR equivalent
- Partial coverage (financial, health insurance, ….)

➢ Staggered, exogenous shocks on a high profile topic.

➢ Allows us to study spillover effects of mandatory disclosure.

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Empirical Setting - Mandatory Data Breach Notification

➢ Breach definition and coverage

➢ Required notification details

➢ Notification timeliness

➢ Penalties

➢ Enforcement

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Empirical Setting - Mandatory Data Breach Notification

Effective Year	States
2003	CA
2004	
2005	WA, AR, DE, GA, NY, NC, ND, TN
2006	WI, MN, MT, PA, PR, RI, OH, CO, CT, AZ, ID, IL, IN, NE, NV, NJ, LA, ME
2007	WY, DC, MA, MI, NH, HI, OR, UT, KS
2008	IA, OK, MD, WV,VA
2009	AK, MO, TX, SC
2010	
2011	MS
2012	VT
2013	
2014	FL, KY
2015	
2016	
2017	NM
2018	AL, SD

Predictions – Effects on Insider Selling

On the one hand, the mandated data breach disclosure may **prompt** opportunistic insider trading, particularly opportunistic sales.

➢ Existing studies often link the public revelation of bad news to opportunistic insider sales ahead of negative news announcements (e.g. Ke, Huddart, and Petroni 2003; Dechow, Lawrence, and Ryans 2016; Ryan, Tucker, and Zhou 2016).

➢ Mandating breach disclosures reveals adverse events that may not have surfaced otherwise.

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Predictions – Effects on Insider Selling

On the other hand, the mandated data breach disclosure may **not** lead to opportunistic insider trading (nor even to a **reduction** in insider trading)

➢ **Reputation costs or monetary** of public disclosure make firms invest more resources to reduce such incidents;
➢ **Transparency deters** opportunistic trading behaviors.
➢ **Investment** in breach protection

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Contributions

➢ Debate on compliance with the SEC cybersecurity disclosure guidance and **mandates** of cyber risk disclosure.

➢ Our study informs the SEC of how insider traders use cyber-related nonpublic information and how such behavior might be affected by other **noncapital market** disclosure regulations.

➢ Our findings also indicate that weak legal designs may **exacerbate** the problems and lead to **negative unintended** consequences.

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Data and Sample

➢ Thomson Reuters Insider Filings (Form 4)

➢ Insiders open market sales.

➢ 2000 to 2017

- Merge with COMPUSTAT/CRSP
- Remove state "NM" "AL" "SD"

➢ 28,039 firm-year observations

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Research Design - Difference in Difference

Sell Profits= α +

$\beta 1 \ Post$ +

$\Sigma \ \beta_2$ **Controls** +

$\Sigma \ \beta_3$ **Firm Fixed Effects** +$\Sigma \beta_4$ **Year Fixed Effects**+ε

(Bertrand and Mullainathan 2003; Armstrong, Balakrishnan, and Cohen 2012)

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Results – Effects on Insiders' Selling Behaviors

Variables	Sell Profits
Post	0.282***
	(0.104)
Loss	0.202***
	(0.069)
R&D Dummy	-0.057
	(0.186)
Book-to-Market Ratio	0.735***
	(0.116)
Size	0.869***
	(0.198)
Dividend	-0.014
	(0.695)
Return Volatility	33.198***
	(8.058)
Observations	28,039
R-squared	0.202
Firm FE	YES
Year FE	YES
Cluster at State	YES

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Results - Parallel Path Assumption

Variables	Sell profits
$Effective^{-2}$	0.248
	(0.184)
$Effective^{-1}$	0.095
	(0.248)
$Effective^{0}$	0.373**
	(0.175)
$Effective^{+1}$	0.426**
	(0.166)
$Effective^{+2}$	0.499**
	(0.211)
Controls	YES
Observations	28,039
R-squared	0.202
Firm FE	YES
Year FE	YES
Cluster at State	YES

Results –Ex Ante Data Breach Risk

	Relevance =1	*Relevance =0*	*Breach Risk=1*	*Breach Risk=0*
	Sell Profits	*Sell Profits*	*Sell Profits*	*Sell Profits*
Post	0.928***	0.099	0.576***	0.145
	(0.286)	(0.143)	(0.197)	(0.138)
	(1)	(2)	(1)	(2)
P-value: (1)-(2)	0.018		0.024	
Controls	YES	YES	YES	YES
Observations	4,613	12,305	13,522	14,517
R-squared	0.277	0.151	0.217	0.334
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Cluster at State	YES	YES	YES	YES

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Placebo and Robustness Tests

We consider routine sales

We consider insider purchases

We consider financial institutions

We exclude every individual state.

We restrict our sample to the post-SOX era.

We estimate the results at the trade level (using the effective dates).

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Results – Exhibit 21 Subsidiaries

Variables	*Sell Profits*	*Sell Profits*
Post 21	0.103**	
	(0.043)	
Post 21 Weight		0.540**
		(0.205)
Controls	YES	YES
Observations	19,845	19,845
R-squared	0.253	0.254
Firm FE	YES	YES
Year FE	YES	YES
Cluster at State	YES	YES

Results – Channels

Variables	Cyberinvest	Cyberinvest	Cyberinvest	Sell Profits
Strict Post	0.010*			
	(0.006)			
Weak Post	0.002			
	(0.006)			
Post Breach Risk		0.018***		
		(0.005)		
Post Relevance			0.022*	
			(0.012)	
Post no Breach Risk		-0.002		
		(0.006)		
Post no Relevance			0.004	
			(0.006)	
Post No Invest				0.355***
				(0.116)
Post Invest				-0.239
				(0.329)
Controls	YES	YES	YES	YES
Observations	28,039	28,039	16,918	28,039
R-squared	0.533	0.533	0.483	0.202
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Cluster at State	YES	YES	YES	YES

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Results – Channels

Variables	Breach	Ncskew	Ncskew	Ncskew	Sell Profits
No Cyberinvest	0.018** (0.009)				
Breach		0.191*** (0.067)			
Relevance			0.033** (0.017)		
Breach Risk				0.049*** (0.013)	
Post High Ncskew					0.542*** (0.168)
Post Low Ncskew					-0.002 (0.112)
Controls	YES	YES	YES	YES	YES
Observations	20,752	20,752	16,918	28,039	28,039
R-squared	0.241	0.197	0.013	0.012	0.202
Firm FE	YES	YES	NO	NO	YES
Year FE	YES	YES	YES	YES	YES
Cluster Firm/State	YES	YES	YES	YES	YES

Conclusions

➢ Mandated data breach disclosures have **prompted** insiders to sell their shares to avoid future losses

➢ Firms that are located in states in which the laws are relatively stricter have experienced an increase in **cyber security investment**.

➢ In essence, these different results suggest that strong laws incentivize firms to take **corrective actions** to minimize the risk of data leakages.

➢ Mandatory disclosures had some **negative consequences** on the integrity of financial markets.

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Thank you !

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