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Influence of a Resource Sharing Strategy on Business Recovery

CRITICAL INFRASTRUCTURE RESILIENCE INSTITUTE
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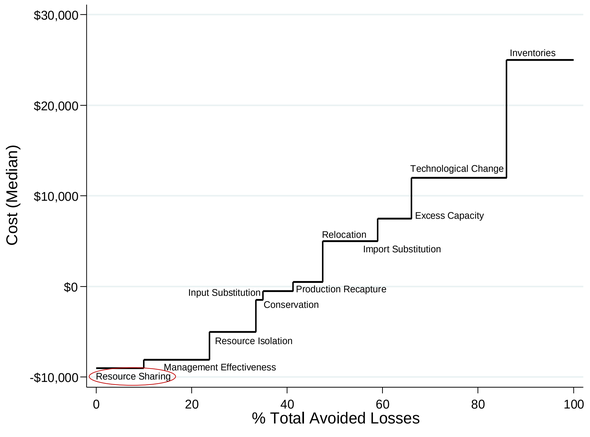
HOMELAND SECURITY CHALLENGE

- Businesses waste time and money when trying to figure out how to recover from a disaster → How to leverage on remaining resources to improve resilience?
- **Unfit strategies → Consequences on firms' own survival and recovery of communities and regions.**
- Characterize and measure strategic choice that can make firms more resilient to cope with natural disasters.
- Influence of a Resource Sharing strategy on business recovery.

APPROACH / METHODOLOGY



- Cost-effectiveness analysis to 111 firms in the NY/NJ area affected by Sandy.
- **A Resource Sharing strategy was the most cost-effective in avoiding losses, although only 35 businesses used this tactic → Why?**
- Understand strategic choice.
- Resource Dependence Theory (Pfeffer and Salancik, 1978; Bode et al. 2011).

- Multinomial Probit Model.
- Outcome variable represents the behavior of firms during recovery.
- Firms are able to self-select the use of any strategy based on their own performance maximizing analyses → Observed behavior of recovery is conditional upon unobserved factors that influence that choice.
- How to correct for potential biases? A two-stage technique or a Heckman model where the self-selection decision is modeled explicitly.

OUTCOMES / RESULTS

Probit Estimates for First-Stage Strategic Choice Model

Independent Variables	Model
Intercept	2.146**
	(-0.842)
Suppliers of Critical Raw Materials:	
No Critical Raw Material (Reference category)	
One Critical Raw Material (Large amount of competing suppliers)	0.572
	(0.487)
One Critical Raw Material (One or few suppliers)	0.929**
	(0.459)
Multiple Critical Raw Materials	0.651
	(0.445)
Supply of Critical Raw Materials:	
No Critical Raw Material or Substitutable (Reference category)	
Unsubstitutable Critical Raw Materials	-0.860*
	(0.516)
Property Damage:	
$0 (Reference category)	
Between $1 and $10,000	1.026**
	(0.498)
Between $10,001 and $50,000	0.927*
	(0.514)
Between $50,001 and $100,000	1.295**
	(0.546)
Between $100,001 and $500,000	1.089**
	(0.519)
More than $500,000	0.885
	(0.564)
% of Lost Expected Sales in Nov 2012:	
0% – 10% (Reference category)	
11% – 20%	0.368
	(0.554)
21% – 30%	0.202
	(0.562)
31% – 50%	0.322
	(0.568)
51% – 100%	0.856
	(0.556)
Ln Number of Employees	0.073
	(0.061)
Industry Codes:	
Agriculture, Mining and Construction (Reference category)	
Utilities, Transportation and Information	-0.414
	(0.635)
Manufacturing	-0.312
	(0.684)
Wholesale and Retail Trade	0.338
	(0.593)
Finance, Insurance and Real Estate	-1.001
	(0.800)
Others	0.377
	(0.546)
Single Location	-0.278
	(0.335)

Estimates for second-stage multinomial probit model of firms' recovery behavior (Reference category: Recovered to the SAME LEVELS as before Superstorm Sandy)

Independent Variables	Recovered somewhat but not fully	Recovered to levels BETTER than before Sandy
Intercept	-1.145	-0.006
	(1.347)	(1.246)
Resource Sharing	1.765	3.310***
	(1.298)	(1.257)
Correction for Self-selection	-0.735	-1.730**
	(0.815)	(0.773)
Property Damage:		
$0 (Reference category)		
Between $1 and $10,000	0.952	0.567
	(0.798)	(0.724)
Between $10,001 and $50,000	-0.349	-0.226
	(0.978)	(0.775)
Between $50,001 and $100,000	1.459*	0.413
	(0.867)	(0.831)
Between $100,001 and $500,000	-0.099	-0.306
	(0.890)	(0.828)
More than $500,000	1.309	-0.726
	(0.931)	(1.055)
Time in Business		
5 – 10 years (Reference category)		
11 – 15 years	-0.983	-0.842
	(0.841)	(0.675)
16 – 20 years	-0.861	-0.920
	(0.796)	(0.667)
21 – 25 years	0.477	-0.195
	(0.710)	(0.645)
More than 25 years	-0.388	-1.405**
	(0.695)	(0.635)
Ln Expected Sales prior Sandy	-0.036	-0.066
	(0.096)	(0.092)

→ The greater the firm's propensity to share resources based on its unobserved characteristics, the higher the likelihood of recovering to levels BETTER than before Sandy.

CONCLUSION

- Research shows that Resource Sharing is vital for resilience after natural disasters.
- DHS can play a key role in incentivizing Resource Sharing for facilitating recovery.
- **For DHS, this research not only provides a full assessment of costs of tactics but also a methodology to optimize business processes and increase the capacity of government to cope with natural disasters.**

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