ECONOMIC IMPACT ANALYSIS OF TERRORISM EVENTS: RECENT METHODOLOGICAL ADVANCES AND FINDINGS

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Prepared for the OECD/ITF Round Table of 11-12 December 2008 on
Security, Risk Perception and Cost-Benefit Analysis

*The authors are indebted to Prof. Jiyoung Park and Qisheng Pan as well as other members of the CREATE economic impacts group.

1. In the War on Terror, all possible targets cannot be fully protected.

   Ideally, protection resources would be allocated to provide maximum aggregate security in light of budget constraints.

   Optimal decisions are difficult because the set of options is enormous.

2. Identifying and protecting the most obvious targets is a reasonable policy.

   Therefore, ranking likely targets in terms of their economic significance is an important step, even for heuristic choices.

3. We have developed and applied economic impact models that make it possible to study the business interruption effects at sub-metropolitan as well as sub-national levels.

4. This approach is important because

(i) there are no generic national targets (no generic airports, seaports, bridges, etc.)

(ii) most political interest is in specific local facilities and capabilities

(iii) many economic adjustments occur in response to business interruptions; spatial aggregation can cause positive and negative impacts to cancel each other

5. Our approach makes us a consumer of plausible hypothetical scenarios, and a producer of detailed impact estimates.

   This is the division of labor that we have tried to adopt with our colleagues at the Center for Risk and Economic Analysis of Terrorist Events (CREATE) at the University of Southern California (USC).

6. Three models.

A. The Southern California Planning Model (SCPM, Version 2) identifies simultaneous losses in economic activity and highway capacity. Economic equilibrium and highway network equilibrium are simultaneously achieved to reflect these losses of demand and supply in an economy of 3,000+ zones, 47 economic sectors and 25,000+ highway links. SCPM is for the Los Angeles area; similar models can be developed for other major metropolitan areas.

B. The National Economic Impact Model (NIEMO) is the first operational input-output model of the 50 U.S. states (and DC) -- and uses the same 47 economic sectors as SCPM.

C. TransNIEMO is being developed. It places the interstate trade identified by NIEMO on the national highway network. Network disruptions (including bridges and tunnels that are closed) cause traffic to be diverted to second-best routes. The higher transportation costs are identified and modeled to push up consumer prices. Household consumption is scaled back and a new economic equilibrium is achieved.

7. Selected applications.

A. Temporary closure of selected seaports, including ports of Los Angeles-Long Beach. SCPM as well as NIEMO were applied. SCPM could also model local plume effects from a dirty bomb attack.

TABLE 1. Example of SCPM estimated impacts

Studies	Scenarios	Impact Areas	Direct Output Loss ($Million)	Total Output Loss ($Million)	Direct Job Loss	Total Job Loss	Passenger Travel Cost Loss[a] ($Million)	Freight Travel Cost Loss[b] ($Million)	Total Travel Cost Loss ($Million)	Total Loss ($Million)
Port Closure	120-Day Closure of the Ports of Los Angeles and Long Beach[1, 2, 3]	City of Los Angeles	2,114	3,386	9,496	21,116				
		City of Long Beach	554	700	4,009	5,249				
		Los Angeles Region	7,564	12,179	34,831	76,850				
		Out of Region	14,256	21,892	64,401	135,316				
		Total	21,820	34,071	99,232	212,165	-207	117	-90	34,189

B. Attacks on various theme parks. As we have recently seen in Mumbai, terrorists (by definition) try to sow fear as well as damage to physical facilities.

TABLE 2: Example of NIEMO estimated impacts. Sum of Intra- and Interstate Impacts Associated with a 120-day Shutdown of the Ports of Los Angeles and Long Beach ($M)

Location	Impacts	Interstate Impacts Calculated via NIEMO							
	4,874.58		106.35	IN	209.76	NE	99.9	RI	19.14
Rest of CA	5,545.64	AK	12.17	IA	142.25	NV	51.6	SC	66.12
Direct Impact: Exports:	16,233.20	AZ	211.83	KS	126.21	NH	28.48	SD	26.52
Direct Impact: Imports	56,107.13	AR	100.69	KY	115.05	NJ	167.	TN	132.92
US Total	89,817.26	CO	123.88	LA	307.54	NM	26.1	TX	1,546.39
Rest of World	492.02	CT	63.28	ME	21.25	NY	216.38	UT	125.31
World Total	90,309.29	DE	20.04	MD	45.09	NC	130.76	VM	9.51
		DC	2.47	MA	86.01	ND	19.22	VA	66.99
		FL	123.19	MI	216.96	OH	303.19	WA	313.64
		GA	102.26	MN	133.34	OK	106.47	WV	41.75
		HI	21.31	MS	57.91	OR	198.81	WI	208.17
		ID	48.57	MO	141.71	PA	243.81	WY	25.71
		IL	279.47	MT	64.21				

TABLE 3. Example of NIEMO estimated impacts

Source of Economic Impact	Targets	Total Economic Impacts ($M)					Base-year, Duration, and Model
		Supply-side (or Imports)		Demand-side (or Exports)		Total	
		Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts		
Sea Ports Shut Down[1,2]	LA / LB,	14,222	0	4,115	4,921	23,258	2001, one-month, and demand-driven NIEMO
		3,219	0	3,141	3,690	10,050	
	NY / NW	6,700	0	4,694	5,430	16,824	
Theme Parks Shut Down[3]	Cluster A (FL)			14,185	10,736	24,921	2004, 18 months, and demand-driven NIEMO
	Cluster B (CA)			13,470	10,146	23,616	
	NV			11,944	8,991	20,935	
	FL (i)			11,884	8,974	20,858	
	CA (i)			11,933	9,006	20,939	
	OH (i)			11,886	8,988	20,874	
	OH (ii)			11,871	8,975	20,846	
	NJ (i)			11,866	8,949	20,815	
	CA (ii)			11,899	8,981	20,880	
	NJ (ii)			11,851	8,939	20,790	
	PA			11,836	8,941	20,777	
	VA			11,818	8,929	20,747	
	IL			11,839	8,942	20,782	

C. Attack on a major downtown Los Angeles office tower – including plume effects.

8. Limitations

Our models are useful for short-term impact analysis only. They contain no price adjustments.

There is work in progress to address this shortcoming.

FlexNIEMO (tested with post-Katrina data) identifies multiplier adjustments.

9. Conclusions

Our impact models can also be used for cost-benefit analysis purposes.

The economic value of a highway link (including, for example, a bridge or tunnel) can only be assessed once a realistic re-routing of traffic and the resulting economic effects have been identified.

This requires the use of models that include representations of actual highway networks.