

Lojack

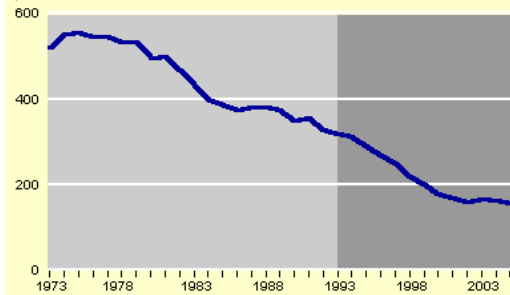
Background

- Transponder installed in cars that is turned on when car is stolen
- Recover 95% of stolen cars, compared to 60% for cars without Lojack
- One-time cost at installation
- Requires working in unison with local police authorities, so market entrance is city-by-city

- Starts in MA in 1986 and spreads to 12 cities by 1994
- Time period is difficult, because it is one of rapidly changing crime

Property crime rates

Adjusted victimization rate
per 1,000 households



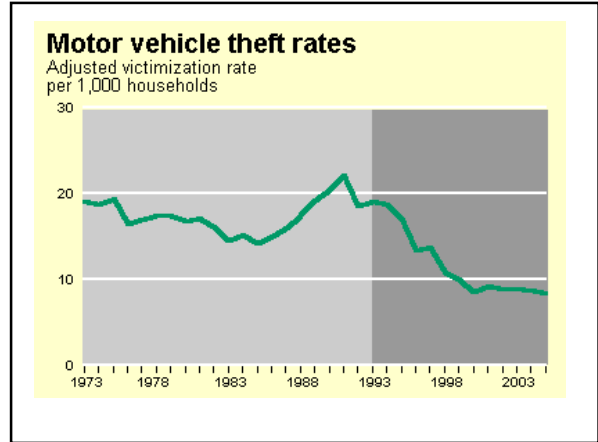
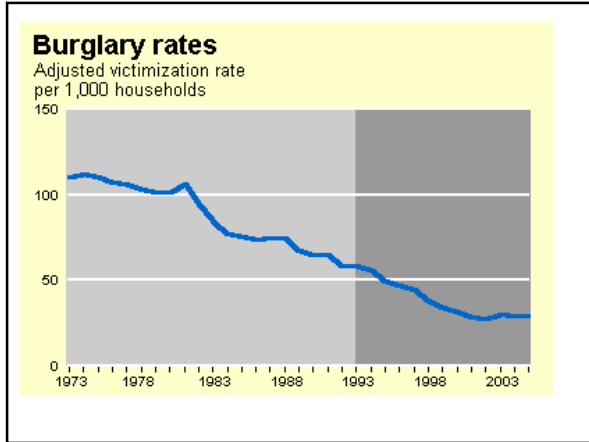


TABLE I
MARKETS SERVED BY LOJACK AS OF DECEMBER 1994

Market	Cities > 250,000 covered	Date of entry
Massachusetts	Boston	July 1986
South Florida	Miami	December 1988
New Jersey	Newark	March 1990
Los Angeles County	Los Angeles	July 1990
	Long Beach	
Illinois	Chicago	November 1990
Georgia	Atlanta	August 1992
Virginia	Norfolk	August 1993
	Virginia Beach	
Michigan*	Detroit	February 1994
New York	New York City	June 1994
Rhode Island	None	June 1994
Tampa/St. Petersburg	Tampa	July 1994
District of Columbia	Washington, DC	September 1994

- ### Dynamics
- Lojack installed in new cars, so market penetration is a function of
 - New car sales
 - Fraction of new cars w/ Lojack
 - After 5 yrs, only 2% of all cars have Lojack once it enters an area

Potential benefits

- Does not reduce your chance of having your car stolen, but
- Reduces your costs, given that your car is stolen
- Given previous point, will reduce your insurance costs

- Chance any car will have Lojack is low.
- If high volume chop shop, will encounter Lojack
- 50 cars annually, 3% market penetration, 78% chance get at least one car with Lojack
- With 100 cars, this rises to 95%

- Prob(at least one Lojack car) = $1 - \text{Prob}(\text{no Lojack cars})$
- Prob car does not have Lojack = 0.97
- All probs are independent
- Prob (non have Lojack) = $0.97^{50} = 0.22$

Externality

- What is externality?
- How does Lojack generate externalities?
- What does this imply about whether Lojack penetration is too high or low?

Data

- 57 cities with pop > 250,000
 - Why only larger cities?
- 1981-1994
- Collect data on local economic conditions, police, age distribution

TABLE II
SUMMARY STATISTICS

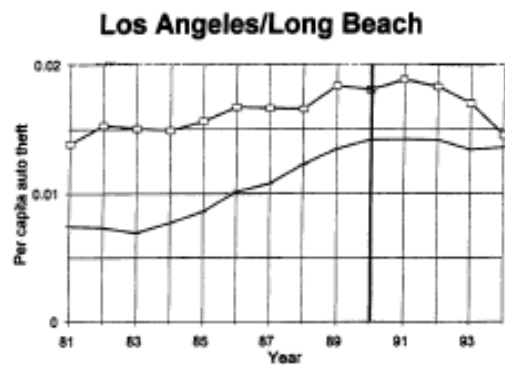
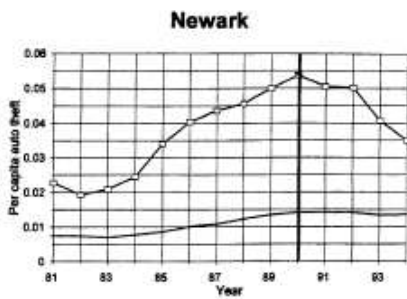
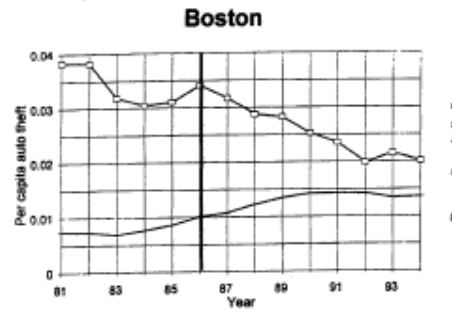
Variable	Mean	Standard deviation	Minimum	Maximum
<u>All cities in sample:</u>				
Lojack share				
(% of all vehicles)	.05	.33	0	4.95
Years of Lojack	.17	.85	0	9
City population	764,268	1,045,791	250,720	7,375,097
Auto theft per capita	.012	.008	.002	.054
Robbery, burglary, larceny per capita	.078	.021	.033	.156
Assault, rape, murder per capita	.008	.004	.001	.025
SMSA unemp.	6.3	2.1	2.2	15.9
State per capita real income (\$1994)	19,911	2,821	13,720	31,228
% Black	26.0	18.7	1.2	80.7
% Aged 0-17	26.3	2.0	19.7	31.7
% Aged 18-24	11.5	1.3	8.4	15.1
% Aged 25-44	31.4	2.1	26.1	36.4
Sworn officers per capita (×1000)	2.47	.96	1.32	7.81

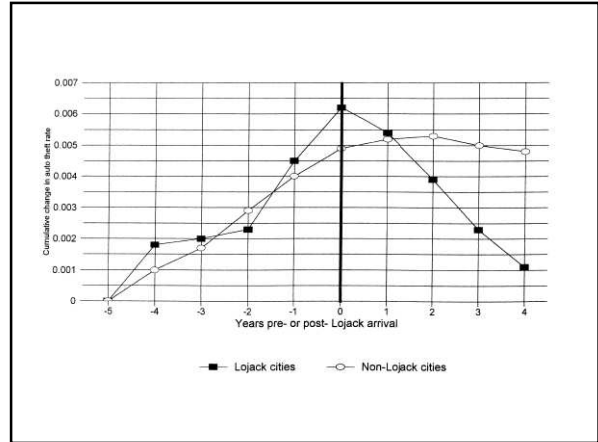
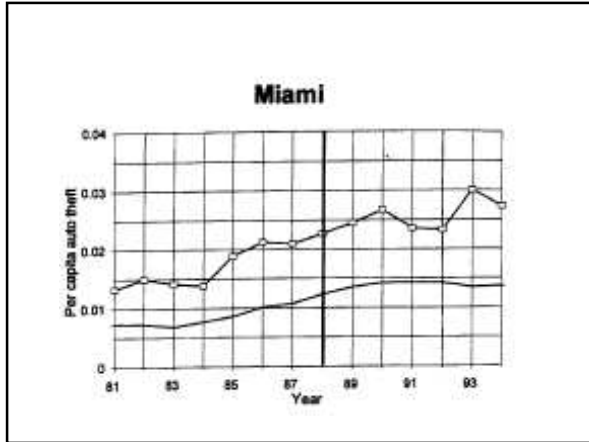
TABLE II
SUMMARY STATISTICS

Variable	Mean	Standard deviation	Minimum	Maximum
<u>Cities with Lojack coverage by 12/94</u>				
Lojack share				
(% of all vehicles)	.21	.67	0	4.95
Years of Lojack	.83	1.71	0	9
City population	1,402,239	1,959,315	257,617	7,375,097
Auto theft per capita	.018	.011	.002	.05
Robbery, burglary, larceny per capita	.0881	.025	.044	.156
Assault, rape, murder per capita	.011	.006	.001	.025
SMSA unemp.	6.5	2.1	2.7	15.9
State per capita real income (\$1994)	20,843	3,370	13,932	31,228
% Black	37.5	21.0	10.4	80.7
% Aged 0-17	24.9	2.2	19.7	31.7
% Aged 18-24	11.5	1.5	8.4	15.1
% Aged 25-44	32.0	2.3	26.1	36.4
Sworn officers per capita (×1000)	3.20	1.33	1.40	7.81

Mean Values

	All cities	W/ Lojack
Population	764,268	1,402,239
Car theft/pop	0.012	0.018
Unemp rate	6.3	6.5
Per capita inc	\$19,911	\$20,843
% black	26.0%	37.5%
%18-24	11.5	11.5





The form of the equations estimated in the basic specifications is as follows:

$$(1) \ln(AUTO_THEFT)_{it} = \beta LOJACK_{it} + X'_{it}\Gamma + \lambda_t + \theta_i + \epsilon_{it}$$

where I indexes cities and t corresponds to years. $AUTO_THEFT$ is the auto theft rate per capita, $LOJACK$ is one of the two Lojack proxies described earlier, and X is a vector of controls for SMSA

TABLE III
IMPACT OF LOJACK ON CITY AUTO THEFT RATES

Variable	(1)	(2)	(3)	(4)
Years of Lojack availability	-.109 (.013)	-.157 (.021)	-	-
Lojack share	-	-	-.242 (.031)	-.463 (.065)
Unemployment rate	.019 (.009)	.026 (.010)	.017 (.009)	.028 (.010)
State real per capita income (×1000)	.022 (.014)	.028 (.015)	.016 (.014)	.022 (.016)