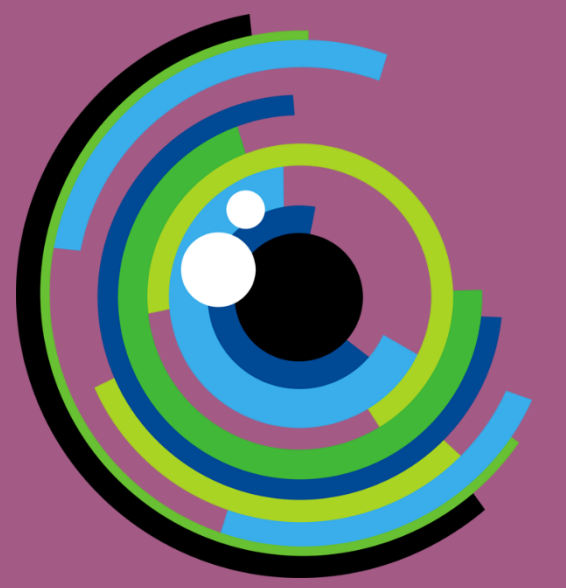




Cost Benefit Analysis of Red Light Cameras in Texas Cities



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Purpose and Objectives

The goal of red light cameras, the same as other traffic enforcement is to reduce the amount of crashes and the severity of them (Retting, 1999). Red light cameras should be treated as other health related policies.

In past studies, researches have based effectiveness solely on the fact if red light cameras reduced the number of accidents at the intersections, without taking into account the cost of collisions and the cameras themselves.

This project evaluates the cost benefit per injury or death avoided while accounting for ticket citation costs.

Methods and Measures

Data was collected from Texas Department of Transportation, which included pre- and post-activation data as well as street demographics. Pre-activation data was taken 18 months prior to the installation of a red light camera at the intersection. Post-activation data was reported from July 1, 2016 — June 30, 2017. Because of this, pre-activation data was divided by 1.5 to account for the longer reporting period.

The primary factor that determined which cities were chosen was based on the mean transportation time to work compared to the cities of Ventura County (see city comparison table), since commuting to work is the primary time where people consistently drive.

Cost Considerations

This study uses cost considerations from multiple sources to evaluate the cost-impact of red light cameras. This study will consider the perspectives of both the municipality and the citizens. The municipality costs include the cost of equipment, maintenance, property damage and hospitalization costs. The costs for citizens included the previously mentioned, as well as the cost of tickets. The cost of tickets pay for the cameras, the cost of tickets are used to reduce injuries and fatalities, meaning they are indirectly a part of the system cost.

The amounts below are annual costs and are per intersection or per collision.

- Equipment: \$60,000 & \$25,00 to install, 5 year contract —> \$17,000
- Maintenance: \$5,000/ month —> \$60,000
- Property damage for collision: \$3,200
- Injury or Fatality hospitalization: \$5,000/ night, usually 4 night stay —> \$20,000
- Tickets: \$75

Marseille (2014) established that the threshold for cost effectiveness is \$50,000 — \$150,000 per QALY gained for the World Health Organization. This is consistent with the thresholds of the Institute for Clinical and Economic Review. Thresholds provide a recognized benchmark for researchers to compare their cost impact with, allowing researchers to measure effectiveness from an economical and financial standpoint. Further, ICER's budget impact threshold for a new system that impacts health country wide is \$915 million dollars.

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References

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City Comparison

Comparison of Ventura County Cities to Texas Cities					
City	Mean value time to work (minutes) (2012-2016)	Land area in square miles (2010)	Medium income/household (in 2016 dollars)	Number of households (2012-2016)	Persons/ household (2012-2016)
Denton, TX	24	87.95	\$50,487	44,926	2.62
Ventura, CA	24.6	21.66	\$70,541	40,653	2.64
Oxnard, CA	24.8	26.89	\$61,709	50,839	4
Thousand Oaks, CA	25.8	55.03	\$101,045	45,873	2.76
Fort Worth, TX	26.8	339.82	\$54,876	279,426	2.86
Simi Valley, CA	29.5	41.48	\$91,196	42,209	2.97
Frisco, TX	29.7	61.8	\$117,642	48,664	2.99
Mesquite, TX	30.7	46.02	\$50,804	47,086	3.04

Results

Average Cost Considerations for Municipality (4)						
	Before			After		
Before	Cost	# of	Total	Cost	# of	Total
Camera	\$17,000	0	\$0	\$17,000	10.75	\$182,750
Camera Maintenance	\$60,000	0	\$0	\$60,000	10.75	\$645,000
Vehicle Cost/Collision	\$3,200	19.2	\$61,440	\$3,200	4.25	\$13,600
Injuries	\$20,000	16	\$320,000	\$20,000	7	\$140,000
Fatalities	\$20,000	0.33	\$6,600	\$20,000	0	\$0
TOTAL			\$388,040			\$981,350

Average Cost Considerations for Municipality & Citizens (4)						
	Before			After		
	Cost	# of	Total	Cost	# of	Total
Camera	\$17,000	0	\$0	\$17,000	10.75	\$182,750
Camera Maintenance	\$60,000	0	\$0	\$60,000	10.75	\$645,000
Vehicle Cost/Collision	\$3,200	19.2	\$61,440	\$3,200	4.25	\$13,600
Injuries	\$20,000	16	\$320,000	\$20,000	7	\$140,000
Fatalities	\$20,000	0.33	\$6,600	\$20,000	0	\$0
Tickets	\$75	0	\$0	\$75	51,322	\$3,849,150
TOTAL			\$388,040			\$4,830,500

Discussion

It was found that there are 270 cities larger than Ventura, so the average cost considerations were multiplied by 270 in order to evaluate the cost-impact of RLCs on a country wide level (Biggest, 2017). The cost of RLCs without taking into account tickets would cost \$264,964,500, which is below ICER's threshold for a new system that impacts health. This suggests that if RLCs were to be implemented to the top 270 largest cities, they would be high impact relative to the money spent. However, when accounting for citations, the cost for all 270 cities would be \$1,304,235,000. The cost impact greatly exceeds the ICER's budget impact threshold for a new system that impacts health, suggesting that the implementation of RLCs is not an ideal system to be implemented.

Municipality

- Reduced 9 injuries at cost of \$593,310
 - Cost of \$65,923 per injury avoided

Municipality & Citizens

- Reduced 9 injuries at cost of \$4,442,460
 - Cost of \$493,607 per injury avoided

Select City Evaluation

Denton

Municipality

- extreme case, where the cost of the camera and maintenance was actually lower than the cost before activation

Municipality & Citizens

- Reduced 9 injuries at \$549,250
 - Cost of \$61,028 per injury avoided accounting for tickets

Other Cities

- Did not save money, only saved injuries and collisions
- Still had more cost when considering tickets

Conclusions

Post implementation of red light cameras reduced the number of accidents in all of the cities evaluated in this study. They are a cost-effective tool in reducing hospitalization and death due to injuries when ticket cost is not factored into cost considerations. Red light cameras exceed budget impact thresholds when cost of tickets is included.

Limitations

- Data only included positive outcome cities
- No controls on the yellow signal timing
- Cost was assumed fixed amongst cities
- Cost of tickets were assumed to be charged to citizens and were not further calculated
- Did not account for spill over effect
- Only considered property damage and hospitalization costs

Further Research

- Larger sample size of cities that have pre- and post-activation data, as this study was only evaluated metro suburban high-density areas
- Cost-impact of spill over effect
- Conduct research on Oxnard, California
- Consider new aspects, such as political influence