Response to Comments by Mark Burkey Concerning Institute Criticism of Burkey and Obeng Study of Red Light Cameras

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These comments concern a response by Mark Burkey (2005) of the Economics Department of North Carolina A&T State University to recent critical reviews by the Institute (Insurance Institute for Highway Safety, 2005; Kyrychenko and Retting, 2004) that discuss flaws in Burkey and Obeng's (2004) evaluation of red light cameras in Greensboro, North Carolina.

Nothing in Burkey's (2005) response changes the fact that the publicly available Burkey and Obeng (2004) study contains significant methodological flaws, including a model that fails to account for installation of red light cameras at high-crash locations, and use of noncamera sites in the same city as controls. Burkey's response reviews his data and analysis in some detail in an effort to refute the Institute's criticism that his method does not properly account for the fact that red light cameras generally were installed at high-crash locations. The fact remains that no term in his model fully controls for differences between intersections selected for red light cameras and those not selected. Instead, his method relies on covariates to capture those differences. However, Burkey did not test to see if these covariates accomplished this critical function. While Burkey and Obeng take exception to the Institute's research and believe they have discovered the "true" effect of red light cameras, it should be noted that many researchers unaffiliated with the Institute have come to the conclusion that red light cameras reduce — not increase — crashes. The latest scientific evidence is provided in the form of a systematic review of red light camera studies conducted by the Cochrane Partnership in the United Kingdom (Aeron-Thomas and Hess, 2005). The authors concluded that red light cameras are effective in reducing injury crashes, but that the evidence is less conclusive regarding total collisions. The following comments respond to Burkey's rebuttal of the Institute's criticism.

Flawed Regression Model

One of the Institute's principal criticisms of the Burkey and Obeng (2004) study is its use of a model that ignores the fact that red light cameras generally were placed at high-crash locations. This error is important because the Burkey and Obeng study is not a traditional before-after analysis, but rather a correlation study, in which the authors attempted to correlate crash counts (before and after red light cameras were installed) with numerous intersection variables, including the presence or absence of a red light camera. This correlation analysis would be appropriate if red light cameras were randomly assigned, to avoid the bias resulting from placement of cameras at high-crash locations. Otherwise, it would come as no surprise if intersections selected for red light cameras were correlated with higher numbers of crashes than those where cameras were not installed.

In his rebuttal, Burkey (2005) dismissed this criticism and claims that "many high and low crash locations were chosen for RLC placement, and that many high crash locations were not chosen." However, data provided by Burkey support the Institute's criticism and not his argument. In the Burkey

and Obeng (2004) study, it is revealed that intersections selected for red light cameras had almost 3 times as many crashes before cameras were installed as intersections not selected for cameras. This is a significant bias. And according to data included in Burkey's rebuttal, 44 percent of the highest (top 25) crash locations in Greensboro received cameras whereas only 2.5 percent of the remaining intersections received cameras.

Burkey (2005) says that he has now conducted a new analysis using a Fixed Effect model, which could address problems associated with placement of cameras at high-crash locations. However, Burkey has not yet revealed the methodological details or results of the new analysis. The Institute is eager to review Burkey's revised analysis.

One should keep in mind that because Burkey and Obeng's (2004) analyses are confined to data for signalized intersections in Greensboro, it would be difficult — if not impossible — to develop a model that would produce a true estimate of the crash effects. This is due to the spillover effect of red light cameras to noncamera sites, which was another central point of the Institute's criticism.

Spillover Effect

In his rebuttal, Burkey (2005) dismisses the possibility of a spillover effect and claims the authors tested for spillover effects in Greensboro using different methods but did not find one. However, the range of methods is limited when one's data are confined to signalized intersections in the same community.

Burkey (2005) also questions the Institute studies demonstrating spillover effects, and he attempts to trivialize them by claiming the Institute examined "a total of 5 intersections without red light cameras for an average of 24 hours each." Here, Burkey is again inaccurate. In terms of the Institute's studies conducted in Oxnard, California (Retting et al., 1999a) and Fairfax, Virginia (Retting et al., 1999b), these employed designs that allowed for estimation of spillover effects of camera enforcement to intersections in the same city that were not equipped with red light cameras. In both cities, reductions in violations were observed at intersections not equipped with red light cameras, and the reductions were comparable in magnitude to those at camera-equipped sites. The studies clearly state that violation data at noncamera sites were collected for a total of 146 hours in both Fairfax and Oxnard.

Numerous researchers unaffiliated with the Institute have documented spillover effects of red light camera enforcement. These include studies in Brisbane, Australia (Arup Transportation Planning, 1992), Melbourne, Australia (Kent et al., 1995), and British Columbia, Canada (Chen et al., 2001). And in a recent international review of red light camera studies, Aeron-Thomas and Hess (2005) state the following: "As red light camera programs involve publicity campaigns and warning signs, behavior in general may be influenced, with drivers inclined to obey red lights at all signalized junctions thus reducing the risk of collisions at noncamera sites."

Other Studies of Red Light Cameras

Finally, Burkey (2005) suggests that readers "Consult researchers who do not have an agenda. Read any of the good comprehensive reviews of the red light camera literature by McFadden and McGee (1999), Maccubbin et al. (2001), McGee and Eccles (2003), and Milazzo et al. (2001)." These reviews (not all of which are "good and comprehensive") do not support (and in some cases, even contradict) Burkey's contention that red light cameras increase crashes. The following is a brief synopsis of the reviews and their findings.

- McFadden and McGee (1999) synthesized results from Federal Highway Administration funded demonstrations of red light camera technology. Their major conclusion was that implementation of a red light camera program "should translate into at least 20 and as much as a 60 percent reduction in violations." They reported reductions in crashes in Howard County (Maryland) and Polk County (Florida) when comparing crash data one year before and one year after red light running campaigns were implemented, but they also noted these simple comparisons were not statistically meaningful.
- Maccubbin et al. (2001) of Mitretek systems conducted a literature review of red light camera studies. For the most part, they simply summarized what others have said and did not provide a critical review of the literature. An exception involves some analysis by Mitretek of crash data provided by Howard County (Maryland). Their analysis indicated "statistically significant reductions in the total number of both right-angle and rear-end crashes at camera enforced intersections … The measured reductions were a 42.5 percent decline in right-angle collisions and a 29.5 percent reduction in rear-end crashes at the enforcement sites."
- McGee and Eccles (2003) summarized results from a project conducted for the Transportation Research Board in which they evaluated crash effects of red light camera enforcement. They concluded that "Based on the information that has been acquired and reviewed, it appears that (red light cameras) can be an effective safety countermeasure. The findings of several studies support that, in general, red light cameras can bring about a reduction in more severe angle crashes with, at worst, a slight increase in less severe rear-end crashes." They did state there was not enough evidence at the time to state this conclusively.
- Milazzo et al. (2001) developed a proposed framework for North Carolina officials to consider for addressing red light running problems, including engineering and enforcement countermeasures. The report concludes that "Automated enforcement cameras provide a non-intrusive, 24-hour surveillance method — not perfect, but highly reliable and very effective at observing violations. If implemented at appropriate locations under a framework that contains economic incentives that maximize safety, automated enforcement can continue to play a positive role."

- In addition to these reviews cited by Burkey, a systematic international review of red light camera studies sponsored by the Cochrane Partnership was recently published (Aeron-Thomas and Hess, 2005). For this project, two reviewers independently extracted data from 10 studies that met inclusion criteria and calculated a weighted intervention effect across trials. The authors concluded that red light cameras are effective in reducing injury crashes (a 16 percent effect was estimated), but that the evidence is less conclusive regarding total collisions.

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