Public Service or Golden Goose?

Safety Cameras in Ireland
A Social Cost-Benefit Analysis

Derek Rafferty
Department of Transport, Tourism & Sport
MSc EPS- Trinity College

TRINITY COLLEGE DUBLIN

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Key Findings

- Safety Cameras Save lives- 23 per year
- The benefits of safety cameras outweigh their costs by more than 5 to 1.
- Fine income covers less than half of the system's overall operating costs
- Overall results still very positive even using more pessimistic assumptions about costs and benefits
- Safety cameras are clearly and unambiguously a cost-effective road safety measure- they are a public service.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Research Question

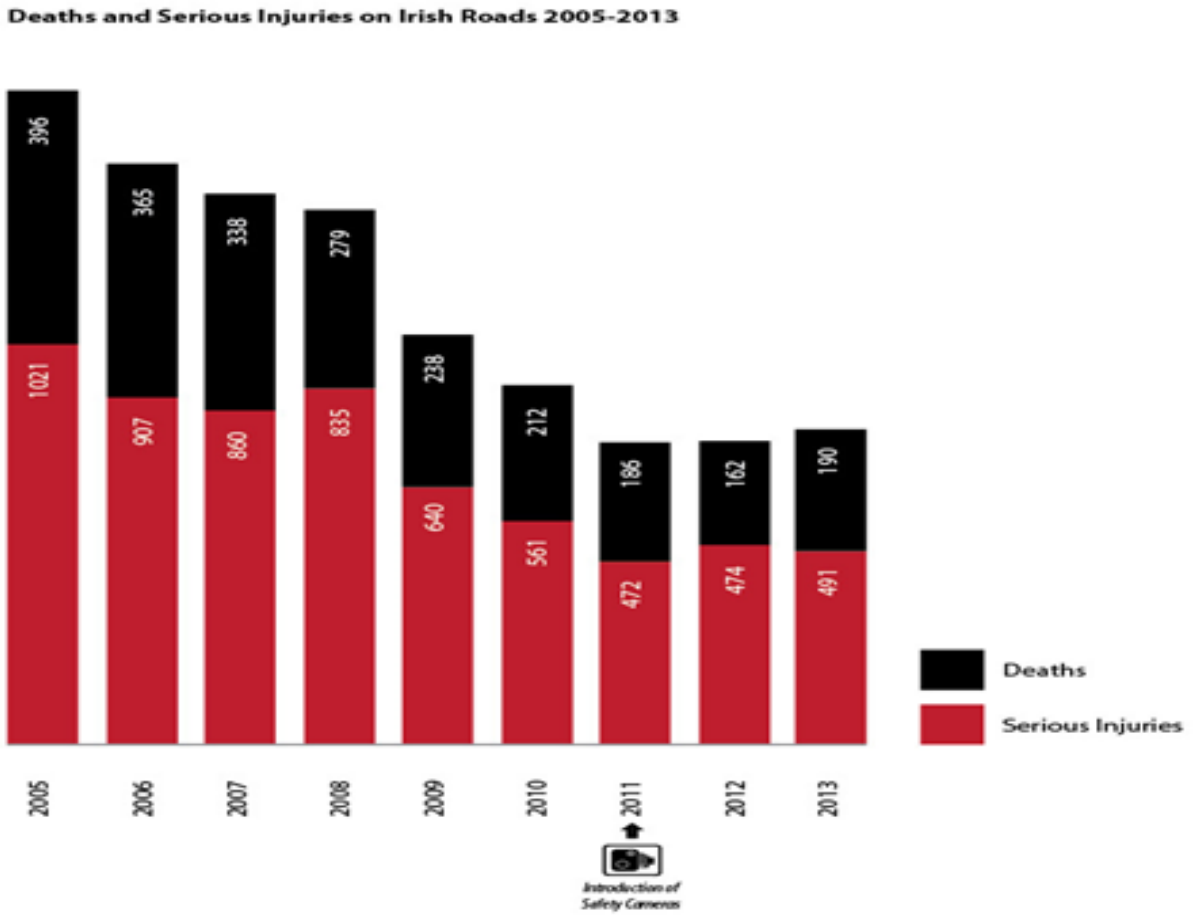
- *Are safety cameras a cost effective road safety intervention?*

Objectives

1. To establish the costs of speed cameras
2. To establish the benefits of speed cameras
3. To establish if speed cameras produce net benefits to society
4. To establish the resulting policy implications.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

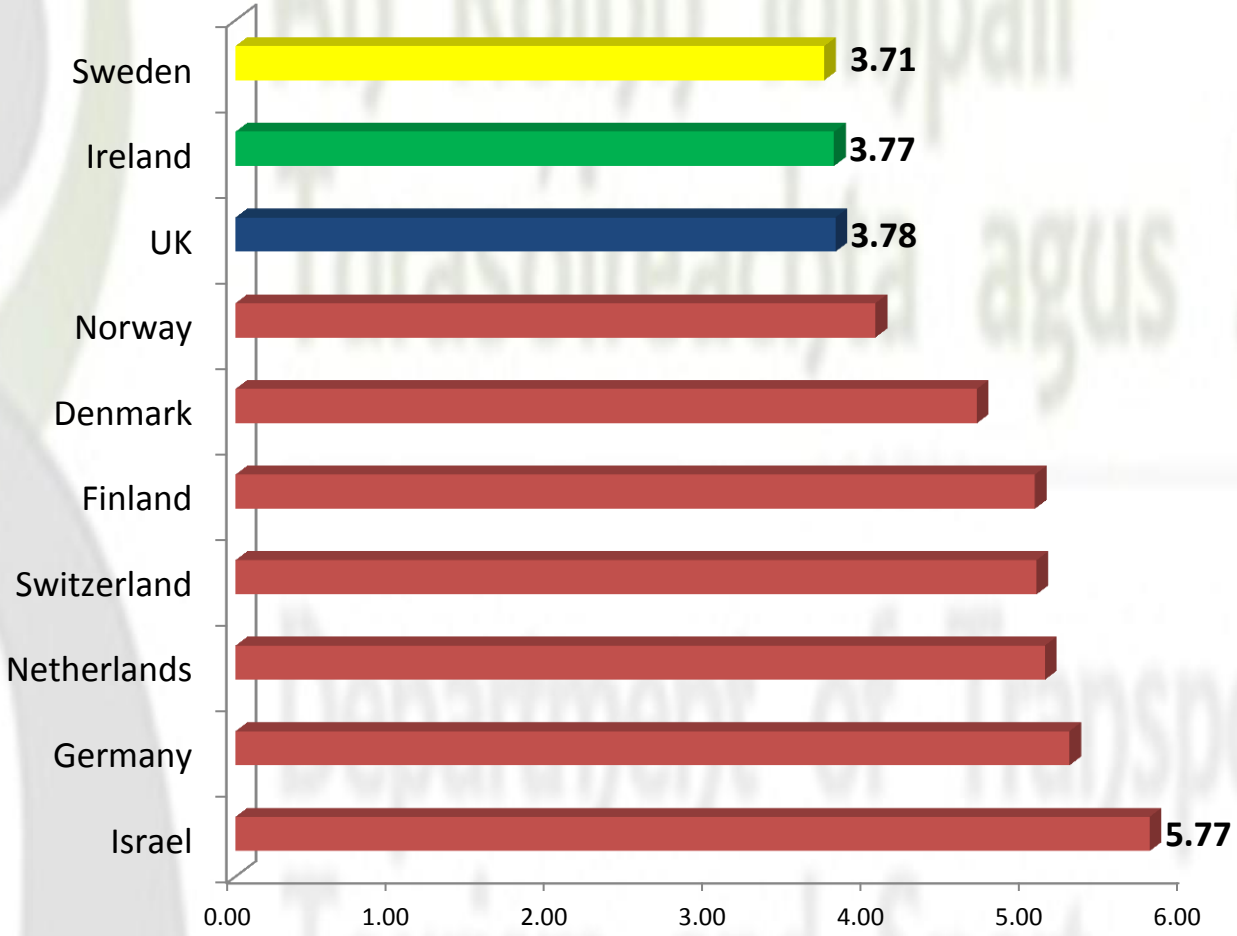
Road Deaths/Accidents in Ireland



An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

EU Road Safety

Road Deaths per billion vehicle kms travelled 2013



An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Methodology

- Data analysis of publically and non-publically available material supplemented by interviews (DTTAS, Gardai, RSA, DfT (UK), Transport Scotland).
- Identify all the key costs and benefits
- Scope: GoSafe cameras only.

Key:- To estimate the monetary benefits of a reduction in road deaths and injuries

Approach

- A “Before” and “After” study of camera sites and stretches of road.
- But not a naïve B&A study…
- Account taken of trend, seasonality, traffic and ‘regression to mean’

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Research Assumptions

- **Traffic**- Accidents are proportional to the traffic flow.
- **National Trend-** Camera sites would follow the national trend.
- **Data-** Using data for a period of six-years before the introduction of safety cameras eliminates or severely dilutes any possible RTM effects.
- **Engineering**- No major changes in the road layout or other road engineering methods between the periods.
- **Education** and publicity campaigns, particularly with respect to speeding, did not appreciably change.

Data

Costs	Source(s)
Purchasing, installing, operating and maintaining the cameras	GoSafe/ AGS
Costs to the courts and the Director of Public Prosecutions (DPP) resulting from the use of the cameras	Department of Transport (DoT)/ Courts Service
Associated road safety publicity campaigns	RSA
Benefits	
Savings in human life and injury, as well as those associated with reduced damage to property	DoT/ RSA
Savings experienced by An Garda Síochána (AGS) and emergency services as a result of attending fewer road accidents	DoT / AGS
Savings experienced by the health service as a result of dealing with fewer road accident victims	DoT
Fine income generated as a result of camera use	AGS
Improved traffic flow, reduced journey times and an 'improved environment'.	Author.

Costs

Cost	Value	Agency
Procurement and Operation	€16 million p.a.	GoSafe
Planning	€4,522 p.a.	AGS/NRA
Signage	103,677	NRA
Enforcement	149,988	AGS
Publicity	339,728	RSA/AGS
Court Time	N/A	Courts Service

<u>Fixed</u>

- Equipment , signage, planning.

<u>Recurring</u>

- Publicity , Maintenance, Operation (includes Admin) and

Benefits

- Decrease in deaths and injuries (DTTAS,RSA and Gardai)
- Fines and penalties (Gardaí)
- Wider social benefits- better traffic flow, improved environment and journey times (Estimated), freeing police time, sense of well-being etc

Cost of road deaths & injuries in Ireland

Accident Types	2002 Values (Market Prices)		2013 Values (Market Prices)	
	Per Casualty €	Per Accident	Per Casualty €	Per Accident
Fatal	2,018,126	15,882	2,679,353	21,086
Serious Injury	226,757	6,769	301,053	8,987
Minor injury	17,486	3,896	23,215	5,173
Damage Only	N/A	2,403	N/A	3,190

Table 12 Statistical Value of a Life in Ireland

Source: Adapted from *Department of Transport (2009).*

- €2.7 million per life saved
- €310k per serious injury prevented
- €28k per minor injury prevented.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Treatment Effect of Cameras on Road Safety

- *What would safety performance have been without the cameras?*

Need to isolate and account for 3 effects

- *Exposure Effect*- this is caused by the change in traffic volumes and patterns.
- *Trend effect*- what is the national trend?
- *Random Effect*- This occurs because of the phenomenon of RTM.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Exposure Effect- Adjusting for Traffic

- Lower traffic= lower deaths
- Traffic levels fell between the two periods.
- Traffic nationally was 3.14% lower
- But traffic at the sites fell by an estimated 5.7%

➢ *Lower traffic would have meant two less deaths per year for 2011-13*

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Adjusting for: Trend

- The three Es- Enforcement, Engineering and Education.
- Nationally deaths and injuries were falling anyway
- Expect the same at camera sites- but how much of a fall could we expect?

✓ ***Deaths would have fallen by 35% anyway- so 13 less people would have died at camera sites.***

The RTM phenomenon

- Safety cameras are installed at accident blackspots.
- But the high level of collisions may be due to an increase above typical levels which has occurred as a result of chance.
- If this is the case then it would be reasonable to expect the number of accidents to fall from this untypically high level upon next measurement. Such a change would be expected irrespective of whether a safety camera had been installed or not. This is what is known as the regression to mean (RTM). This bias must be corrected for to uncover the real benefit of the camera.

- Standard approaches to account for RTM

✓ Full Bayesian

✓ Empirical Bayes method

✓ Robust data usage

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Road Safety Results- Camera Sites

	Pre-Cameras	Post Cameras	Difference	Traffic Effect	Trend Effect	Difference
Deaths	59	20	39	2	13	24
Serious Injuries	108	36	72	4	24	44
Minor Injuries	820	452	368	21	29	318

Figures are average for the before and after periods
RTM is controlled through the use of extensive data sets
24 lives saved is valued at almost €65 million.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Overall CBA Results

Benefits	€
Accident Savings	80,070,395
Fine revenue	6,905,600
(a) Total Benefits	**86,975,995**
Costs	€
GoSafe Contract	16,000,000
Signage etc.	103,667
Planning	4,522
Enforcement	149,988
Publicity	339,728
(b) Total Costs	**16,597,905**
Net Benefits (a)-(b)	**70,378,090**
Benefit-Cost Ratio	**5.24**

Sensitivity Analysis- What if?

10 Scenarios modelled

What if…

- **The 'value of life figure' was halved?**

➢ Net Benefits= €30.3 million BCR= 2.83: 1

- **There were no fines for speeding?**

➢ Net Benefits= €63.5 million BCR= 4.82: 1

- **Every benefit was reduced by 25%?**

➢ Net Benefits= €48.6 million BCR= 3.93: 1

Key Findings

- Safety Cameras Save lives- 23 per year
- The benefits of safety cameras outweigh their costs by more than 5 to 1.
- Fine income covers less than half of the system's overall operating costs
- Overall results still very positive even using more pessimistic assumptions about costs and benefits
- Safety cameras are clearly and unambiguously a cost-effective road safety measure- they are a public service.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Conclusions

- Revenues don't cover costs but safety cameras are still an effective means of reducing road traffic collisions and related deaths and injuries in Ireland.
- They save lives on Irish roads and deliver a significant net benefit to Irish society.
- Continued expansion of the safety camera programme is a cost-effective way of contributing to the Government's ambitious targets in respect of road safety in Ireland over the coming decade.
- Safety cameras are a public service not a golden goose.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Thank You
Any Questions?

Derek Rafferty

MSc EPS

Department of Transport, Tourism & Sport

Public Transport Regulation Division

E-mail: derekrafferty@dttas.ie

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Public Service or Golden Goose?

Safety Cameras in Ireland
A Social Cost-Benefit Analysis

Derek Rafferty
Department of Transport, Tourism & Sport
MSc EPS- Trinity College

TRINITY COLLEGE DUBLIN

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport