

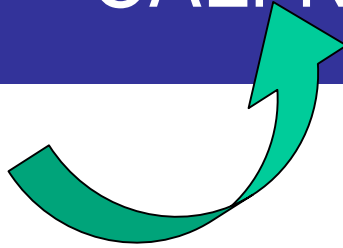
ROAD PRICING



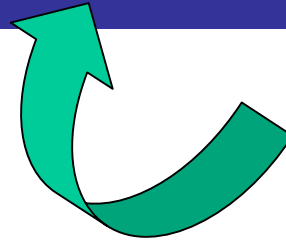
TRAFFIC DETECTION TECHNOLOGIES AND DRIVERS
RESPONSE EVALUATION,
A COMPARATIVE STUDY IN FRANCE AND CALIFORNIA

CALFRANCE COOPERATION

France



California



Research Projects :

- Wifi in the trains
- Intelligent Vehicle communicating with the infrastructure
- Road Pricing

Actual ETC systems :

- DSRC 8.5 GHz
- On motorways
- 7 M tags distributed.

ROAD PRICING IN FRANCE



Configuration of a DSRC toll lane

On development : Road User Charging systems

- On all roads
- On-Board Unit
- Technology : GPS / Galileo - GSM - DSRC
- For Trucks.

Ex : LKWMaut in Germany.

How electronic road-tolling works

London (Congestion charge)



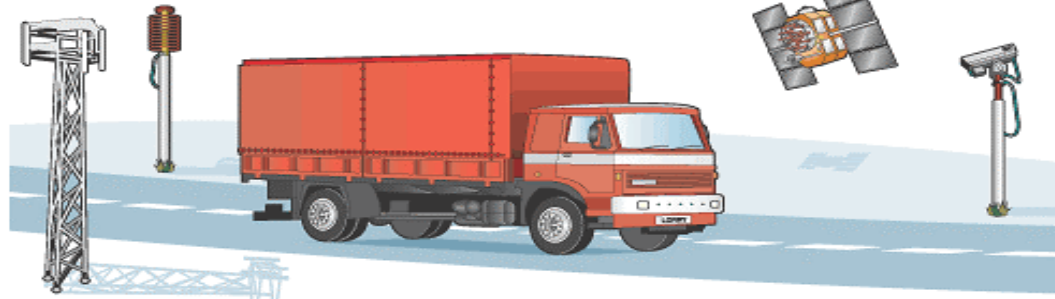
Roadside cameras record the number plate of every vehicle within the "congestion charge" zone. Drivers pay the £5 daily charge by phone or over the internet. Non-payers are issued with fines by post.

Switzerland (LSVA)



Microwave beacons activate and deactivate each truck's on-board unit (OBU) as it enters and leaves the country. The OBU determines distance travelled from the truck's tachograph. Satellite positioning (GPS) technology is used to verify the tachograph results. Both tachograph and GPS readings are stored on a smart card. The smart card is sent to the customs authority, which issues a bill.

Germany (Toll Collect)



Readings from microwave beacons, GPS, the tachograph and an on-board gyroscope are combined by the OBU to determine the truck's position. The OBU calculates the toll and informs a central data-centre via the mobile-phone network, so a bill can be issued. Roadside cameras ensure that all trucks are registered with the system.


Vehicles should be charged according to
:

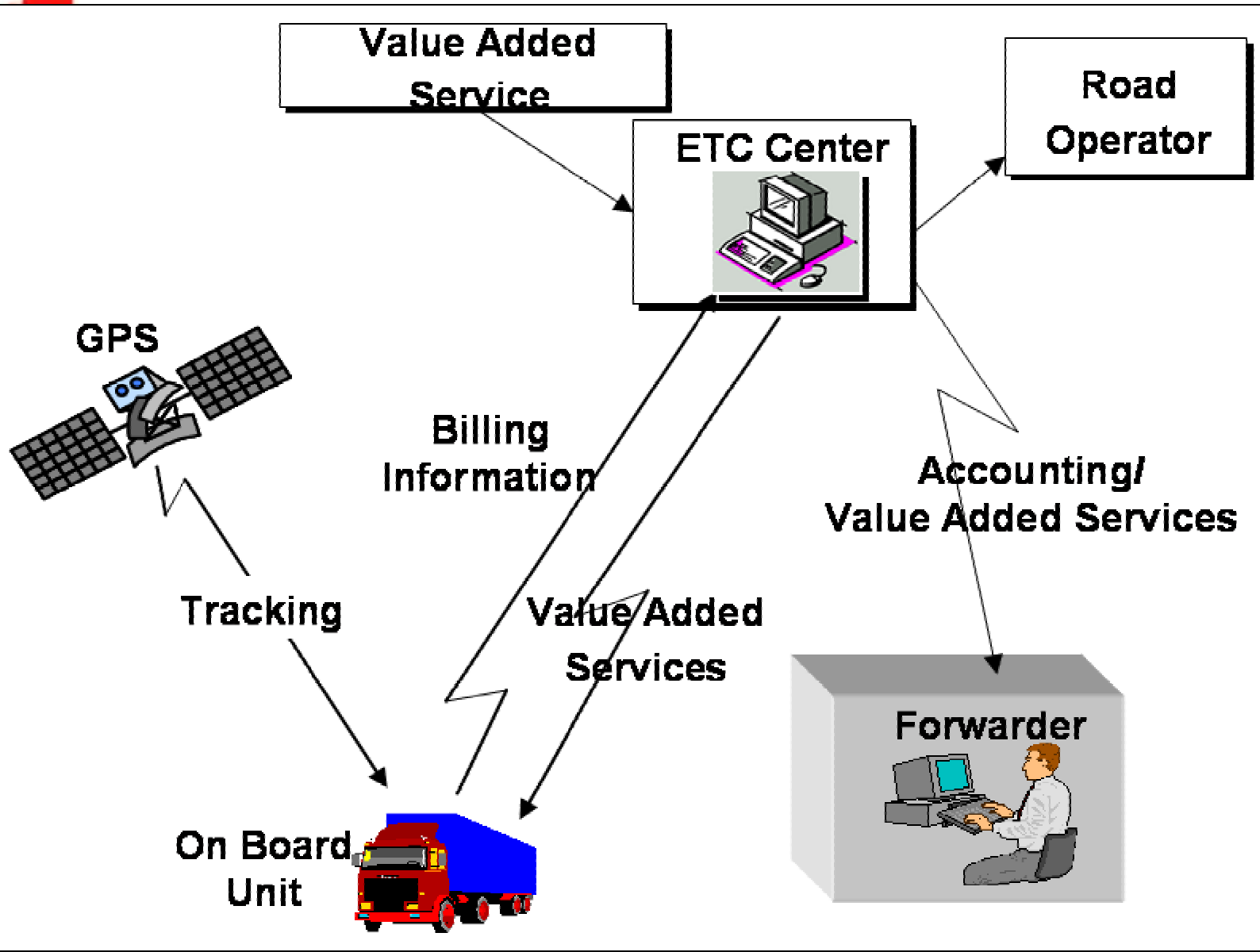
- The real congestion costs
- The real environmental costs
- The real marginal infrastructure costs including load effects

=> Dynamic Road Pricing would be a solution with :

- Technology : GPS/Galileo
- On Board Unit
- Added services on the OBU.

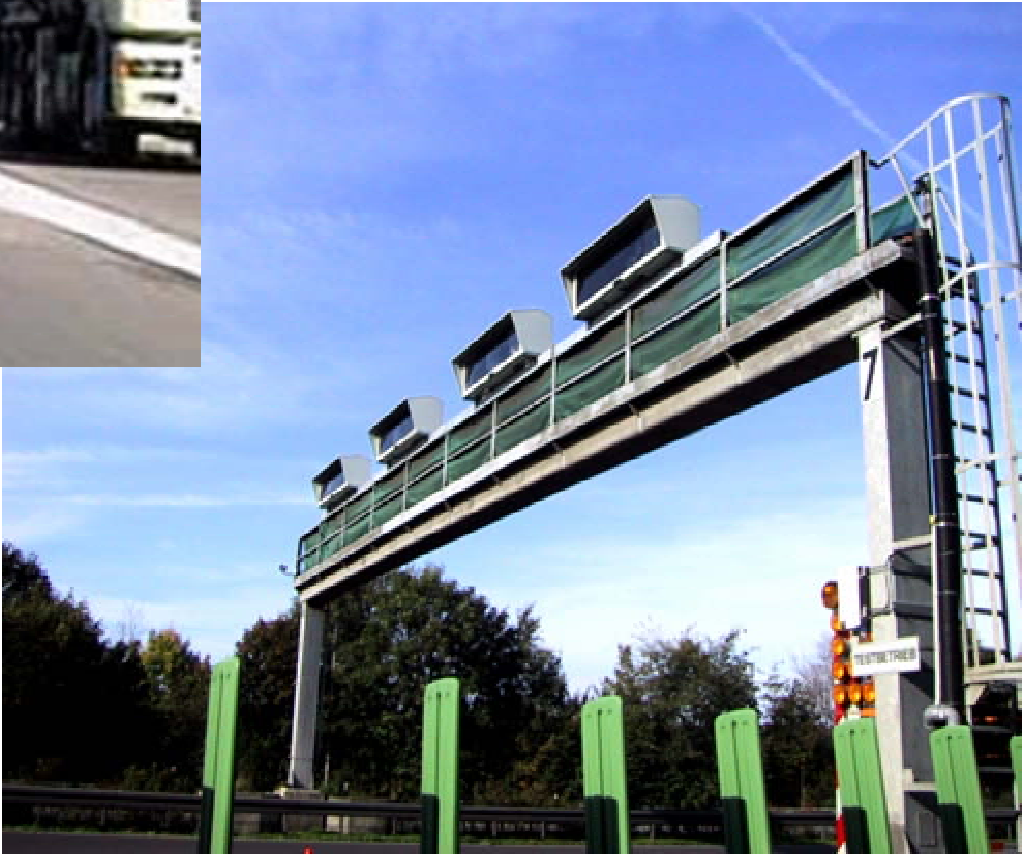
Average rate for Truck-Km Charges (40t) ; In : Road pricing Prospects for Australia, Chris Egger, 27th Australasian Transport Research Forum, Adelaide October 2004.

 Country	Charge	Charge basis	Euro cents equivalent per tonne/km	Euro cents equivalent Per km
Switzerland – applies to all roads	January 2004 January 2005	85% external cost recovery 15% road track costs	0.95 1.6	40 64
Austria – applies to motorways and select expressways	January 2004	100% road track costs and debt reduction	0.6	26
Germany – applies to motorways only	January 2005, Planned rate	100% road track costs	0.3 0.33	11 14
Australia:	Implicit 2002/03 rate based on 1998 Determination data factored up by the BTRE road construction and maintenance price index		0.22	15





Fixed (gantry) and mobile (vehicle) enforcement



ROAD PRICING IN CALIFORNIA

Experimental program on I 15 and project on SR 91 Express Lanes : real time measures and congestion pricing. Tolls for road use vary with the level of congestion.

=> Incentives for more efficient use of the network ;

=> Indicators of the potential need for road capacity ;

=> Revenue to enhance mobility.

Typical PM Peak Operations



On development : sensor system
assuring real time measures.

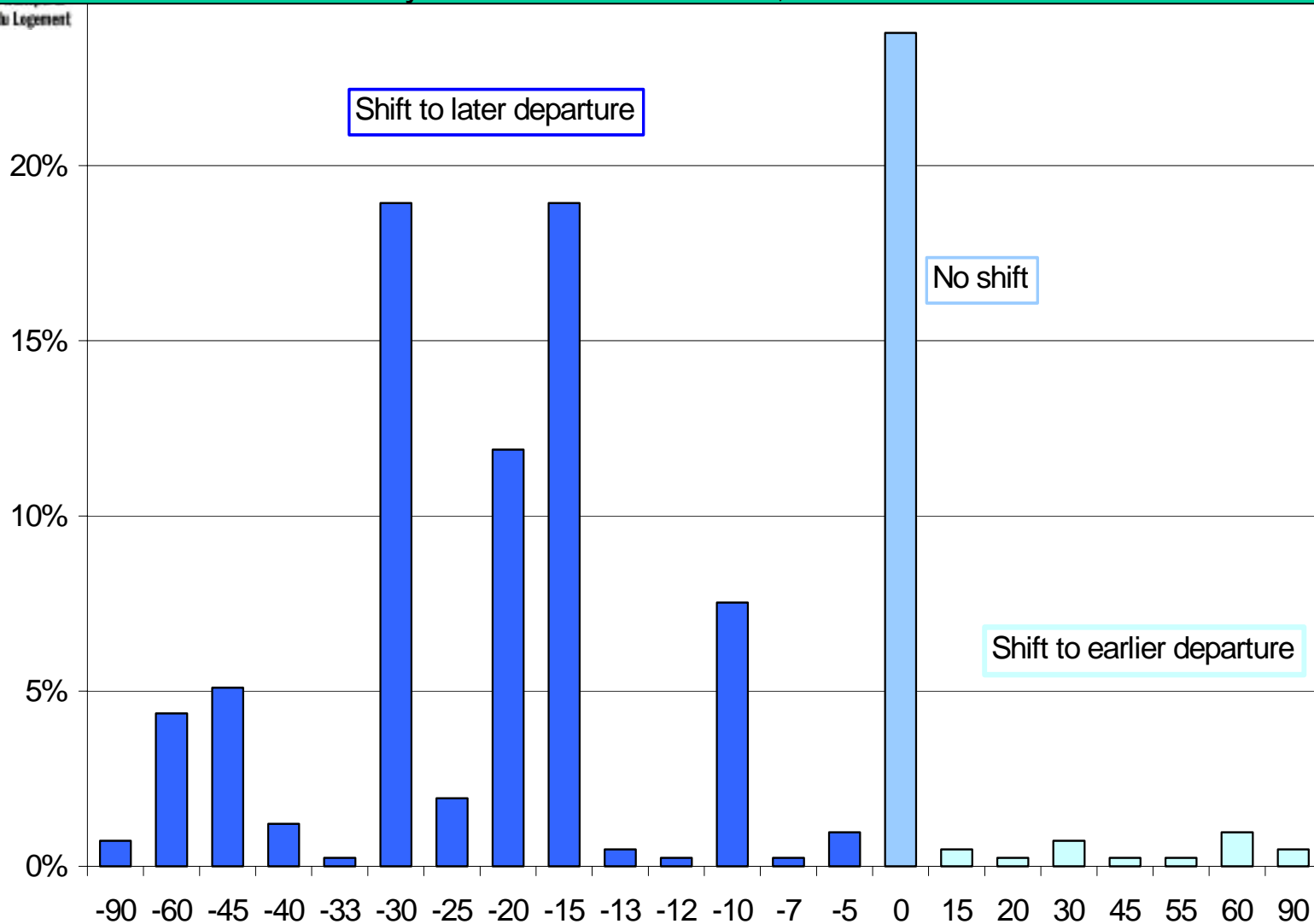
New Vehicle Detection System :

- Sensor Node : sensor, microprocessor, radio and battery
- Access point : radio, GPS receiver, radio.

DRIVERS' RESPONSE STUDY

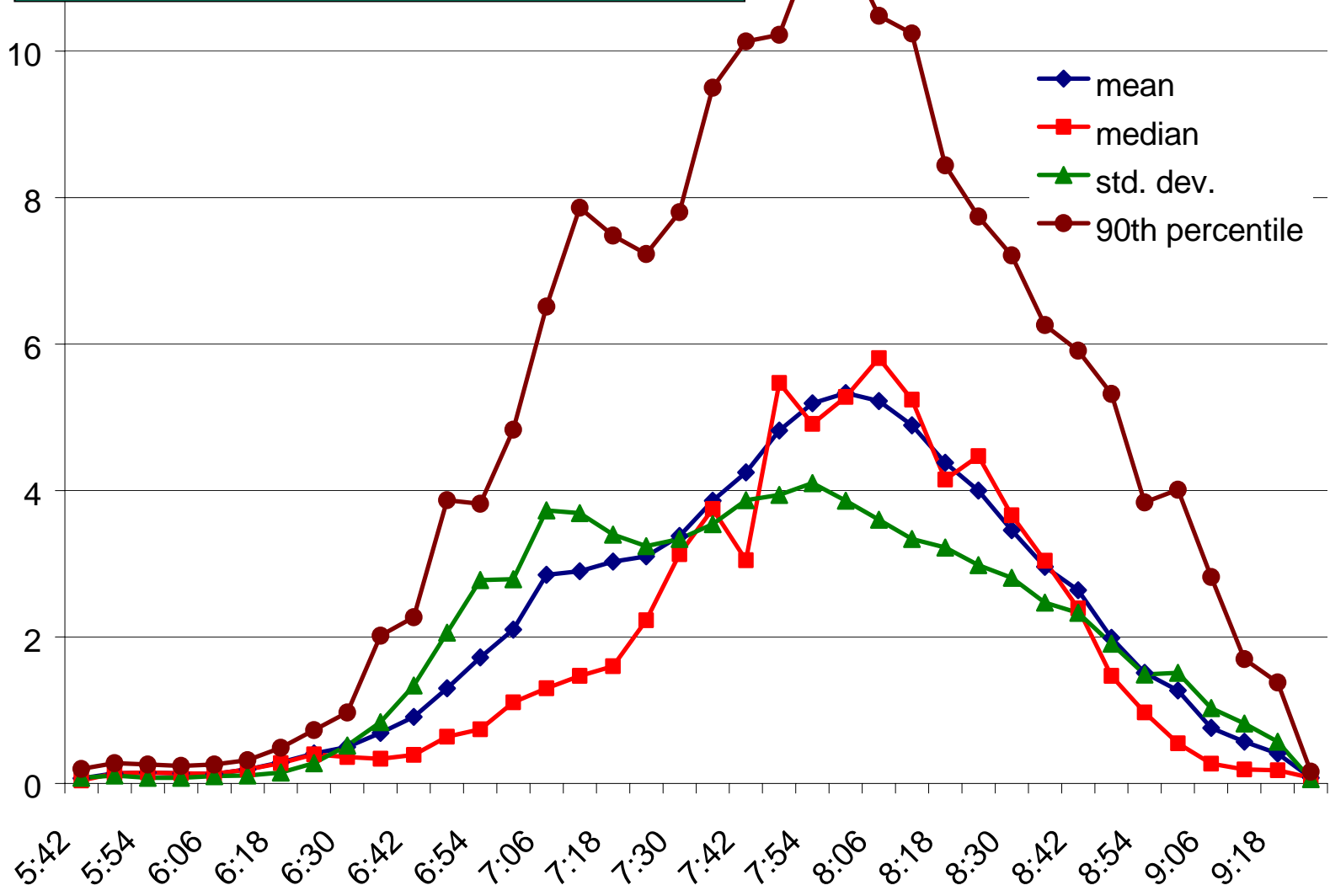
- Willingness to pay for
 - Travel on a less congested road
 - Save travel time
 - Reduce uncertainty ?
 - Perceptions of travel time savings ?
- => Opportunity to develop a model.

Responses to the question of how much earlier or later a San Diego FasTrak customer would leave home for their inbound trip on I-15 if they did not have FasTrak, autumn 1999

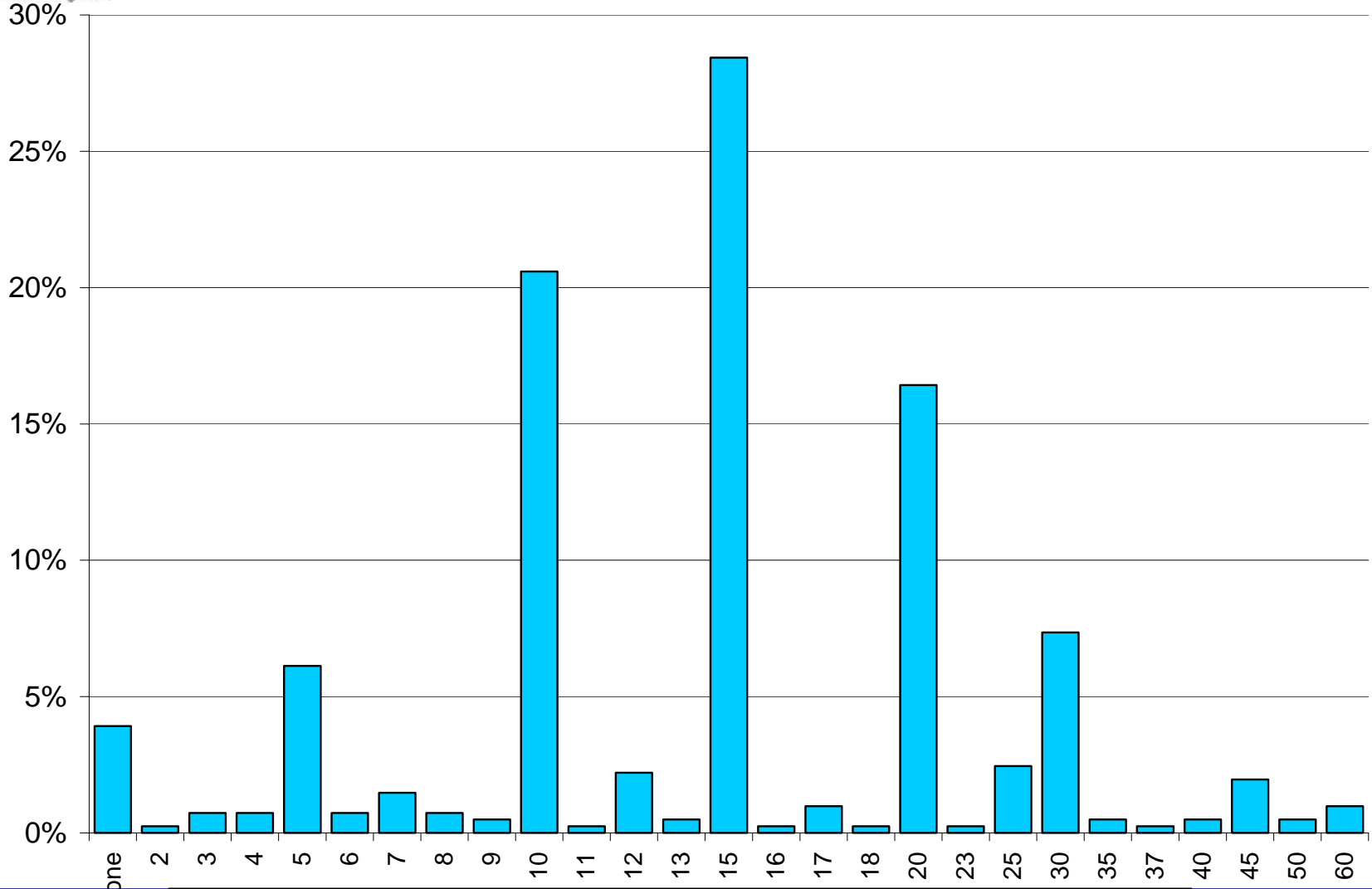




Time saved (minutes) by using Express Lanes versus regular lanes on I-15 in San Diego County



Responses to the question of how much time was saved
 on the inbound trip by using FasTrak on I-15
 in San Diego County, autumn 1999



DRIVERS' RESPONSE STUDY

- Sensitivity of vehicle travel to road tolls :

Price elasticity : -0.1 to -0.4

- Road toll : 3\$/trip

=> 25 % reduction of automobile commuting.

FURTHER RESEARCH

Cross-fertilization approach :

- California SR 91 :
 - Assessment of the infrastructure sensor technology
 - Study of the user response to dynamic road pricing policies
- France : Trucks
 - Approach on the added value services on OBU
 - Study of the performance of satellite technologies.