28 November – 1 December 2004

# Xth Accident Compensation Seminar 2004

Institute of Actuaries of Australia

Ernst & Young

KPMG

PricewaterhouseCoopers

IAG Insurance Australia Group

28 November – 1 December 2004

Xth Accident Compensation Seminar 2004

# Determinants of Claim Frequency in CTP Schemes

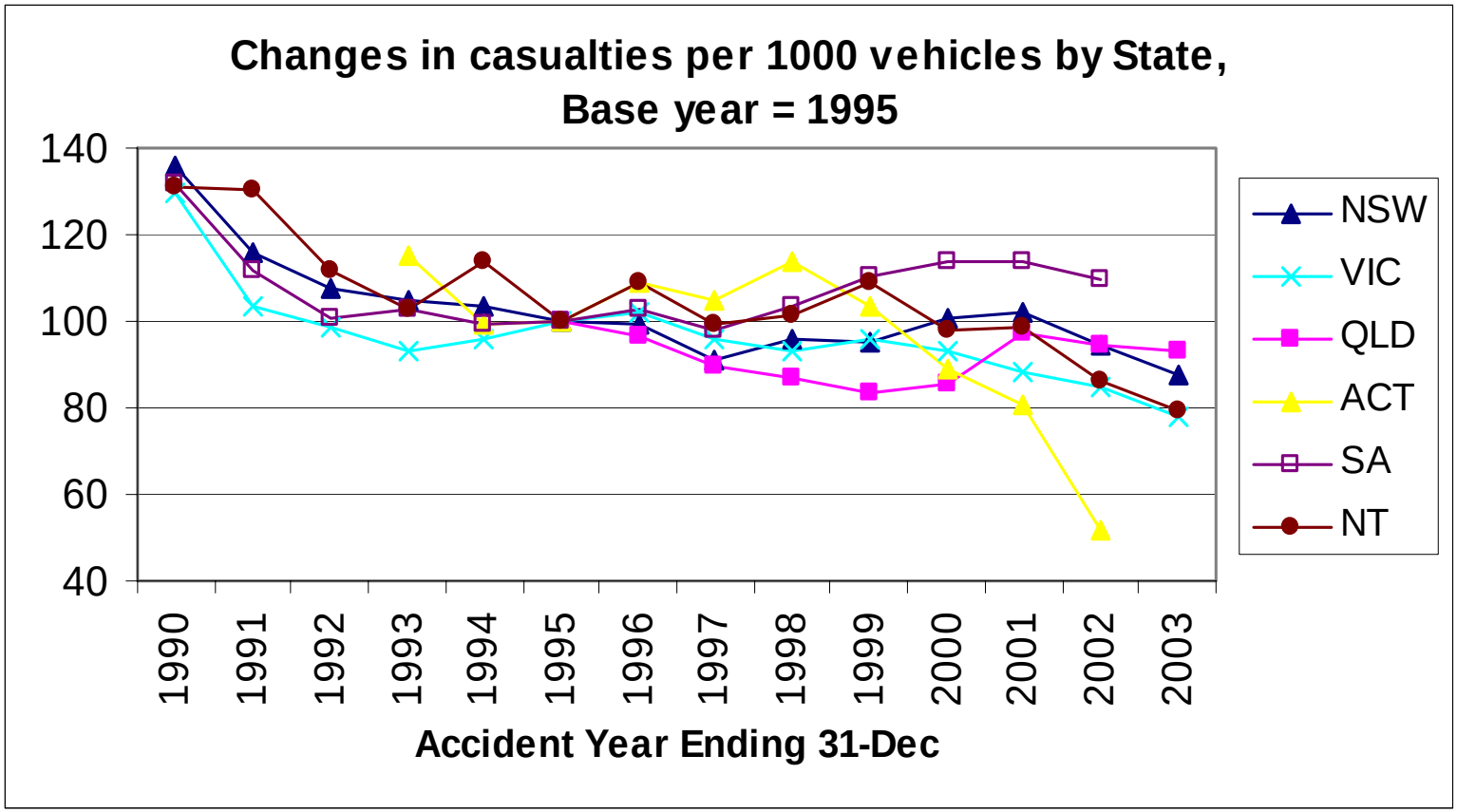
**Raewin Davies, Jack Jiang and Rosi Winn**

Institute of Actuaries of Australia

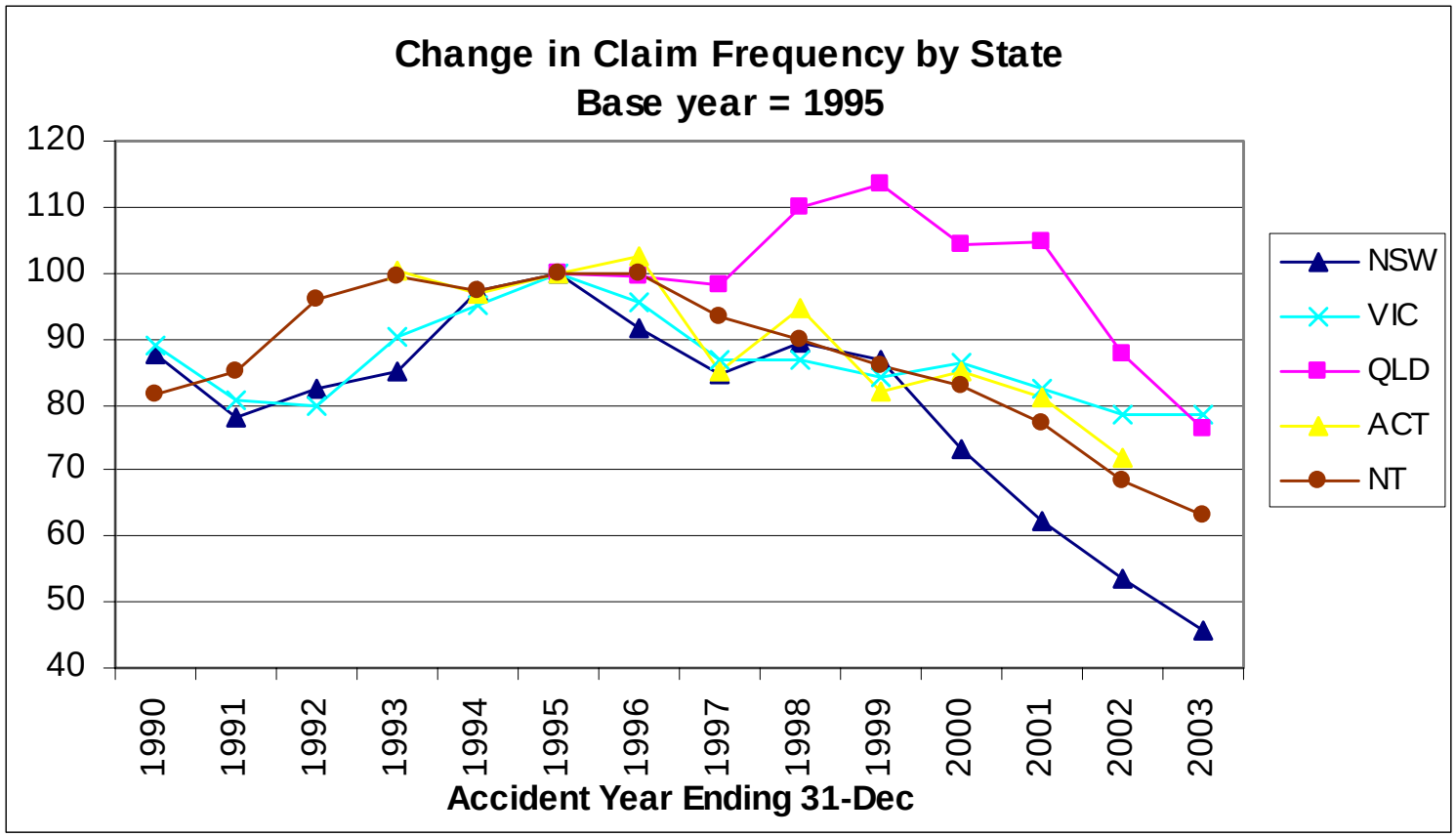
# Background

- A reducing trend in casualty rates for most states and territories over the past decade
- This contributes reduction in CTP claims for most states
- Developed a framework to analysis the ‘drivers’ of reductions in both casualty rates and claim frequency

# Casualties by State



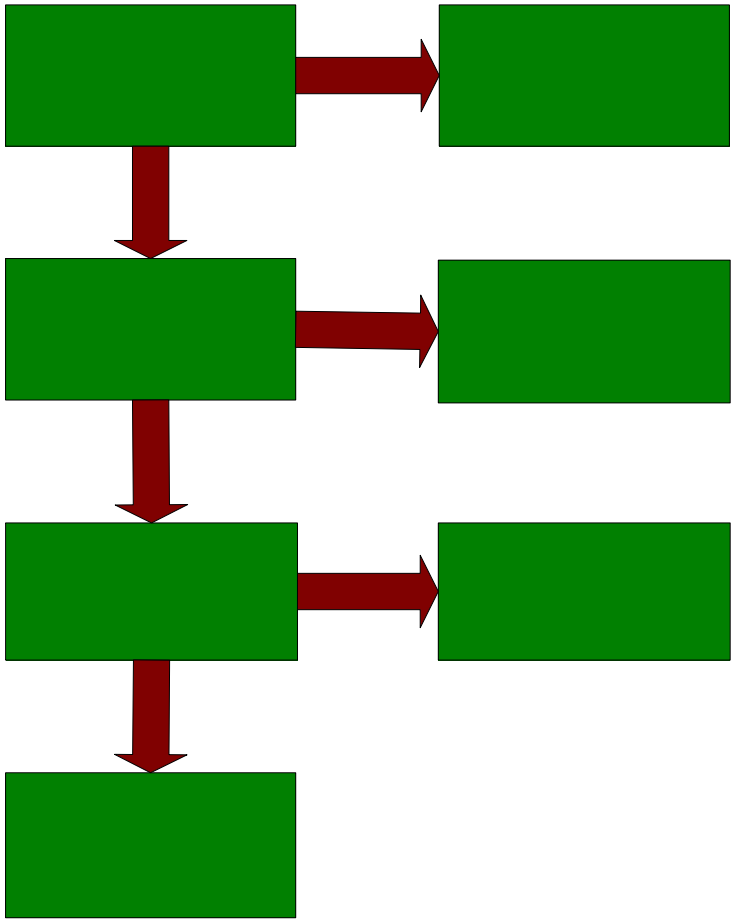
# Claim Frequency by State



# General Framework

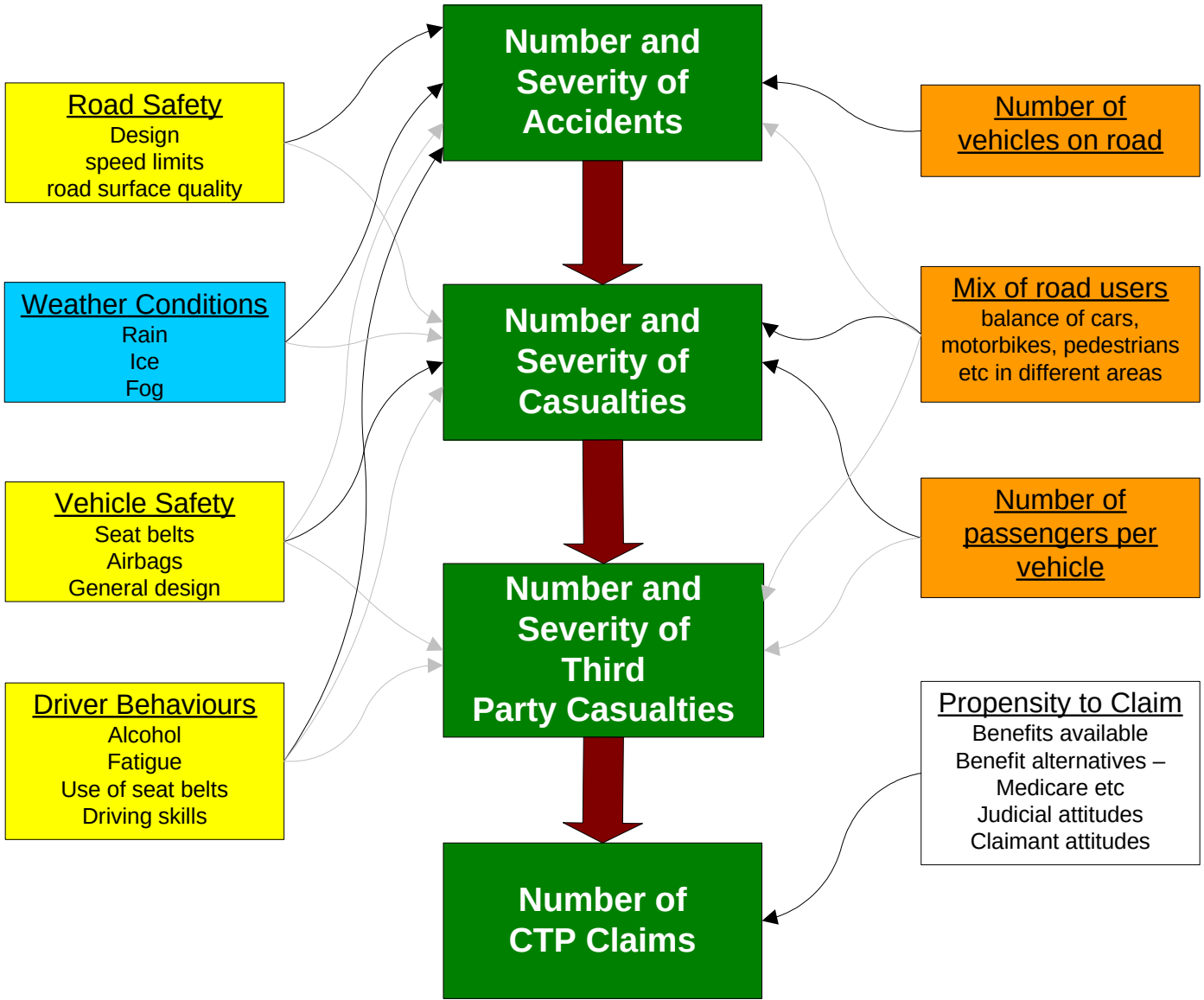
- Development of a CTP claim
- Factors influencing transport accident claims

# Development of a CTP claim

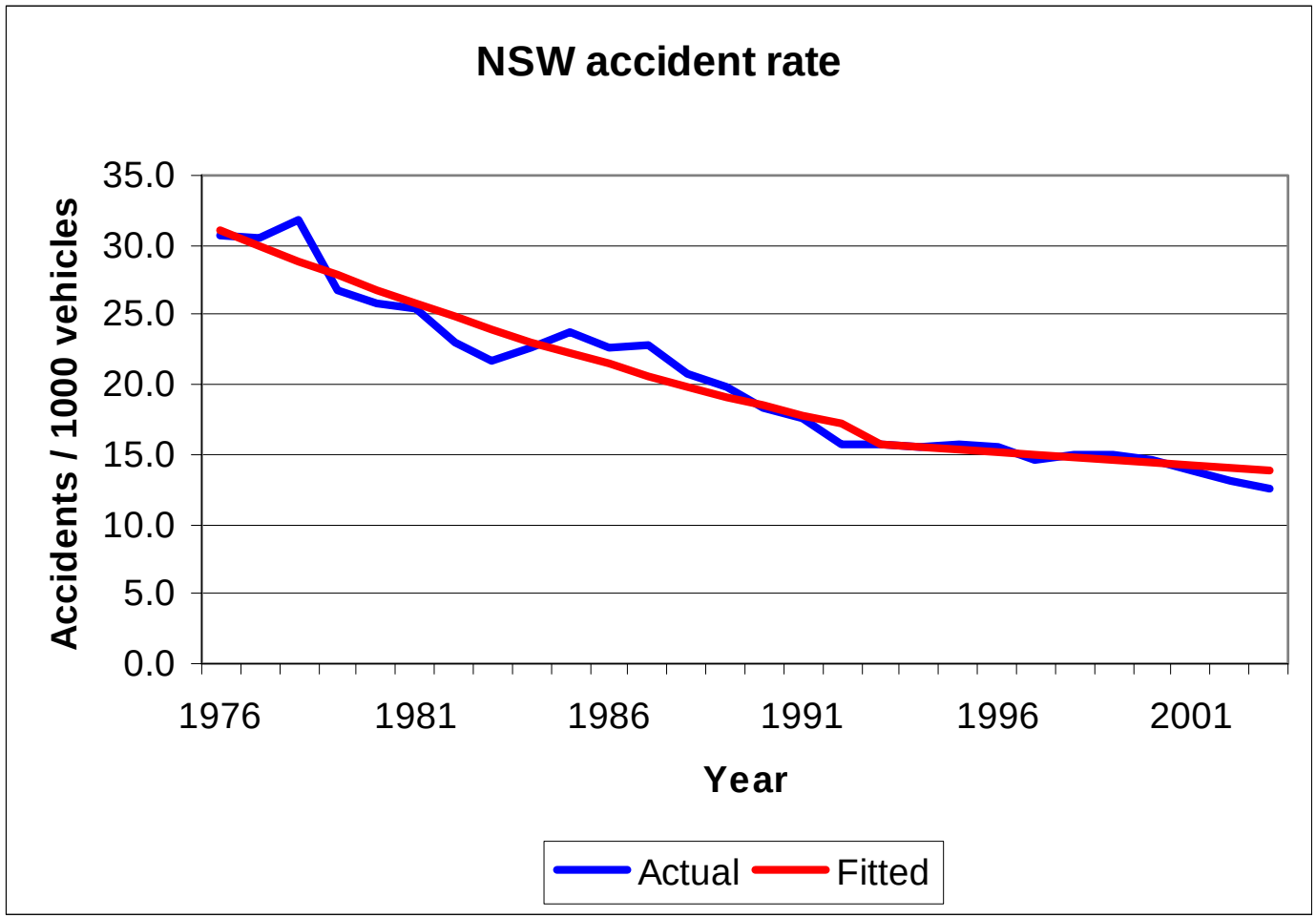


* Based on an at-fault scheme design

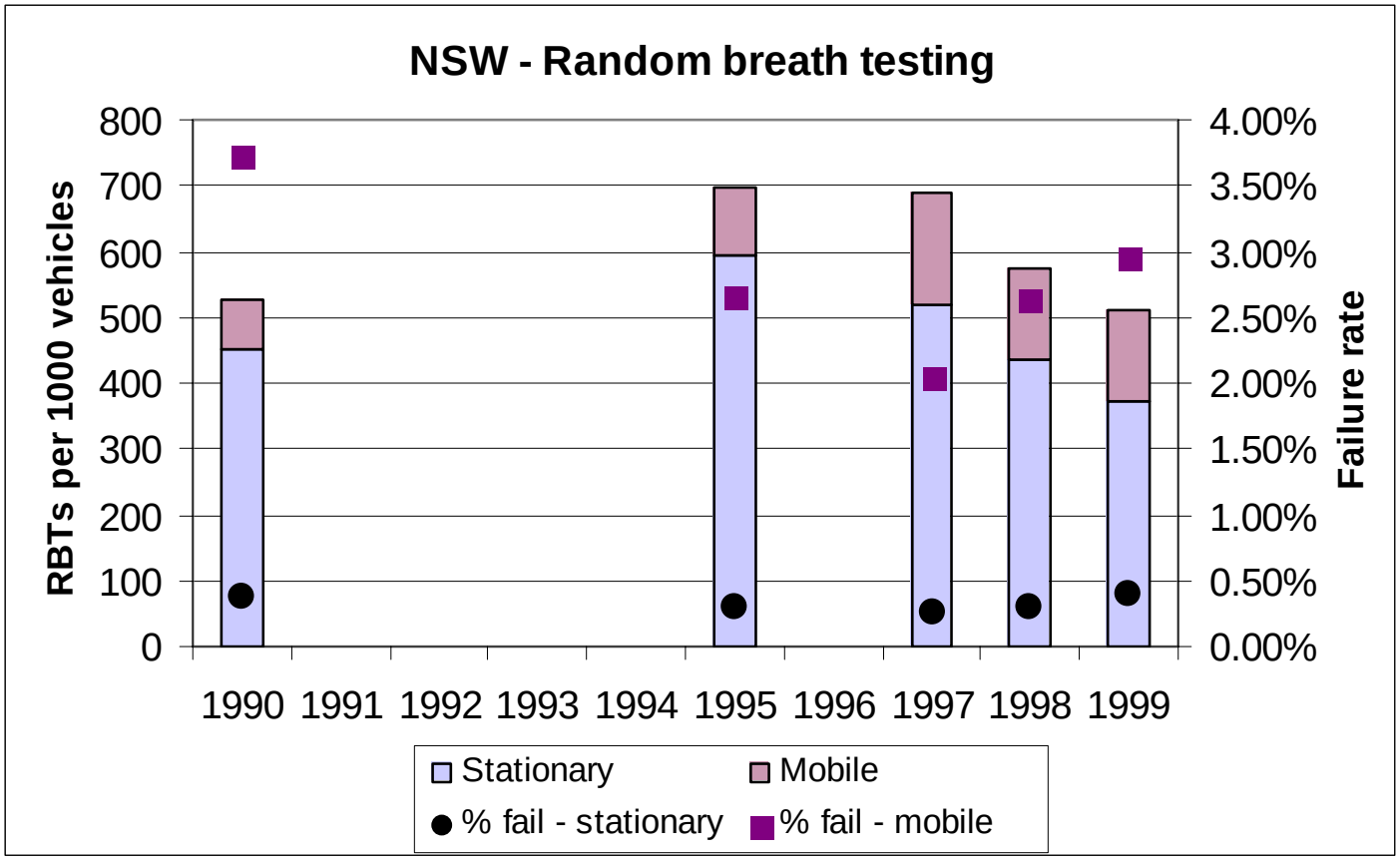
# Main factors



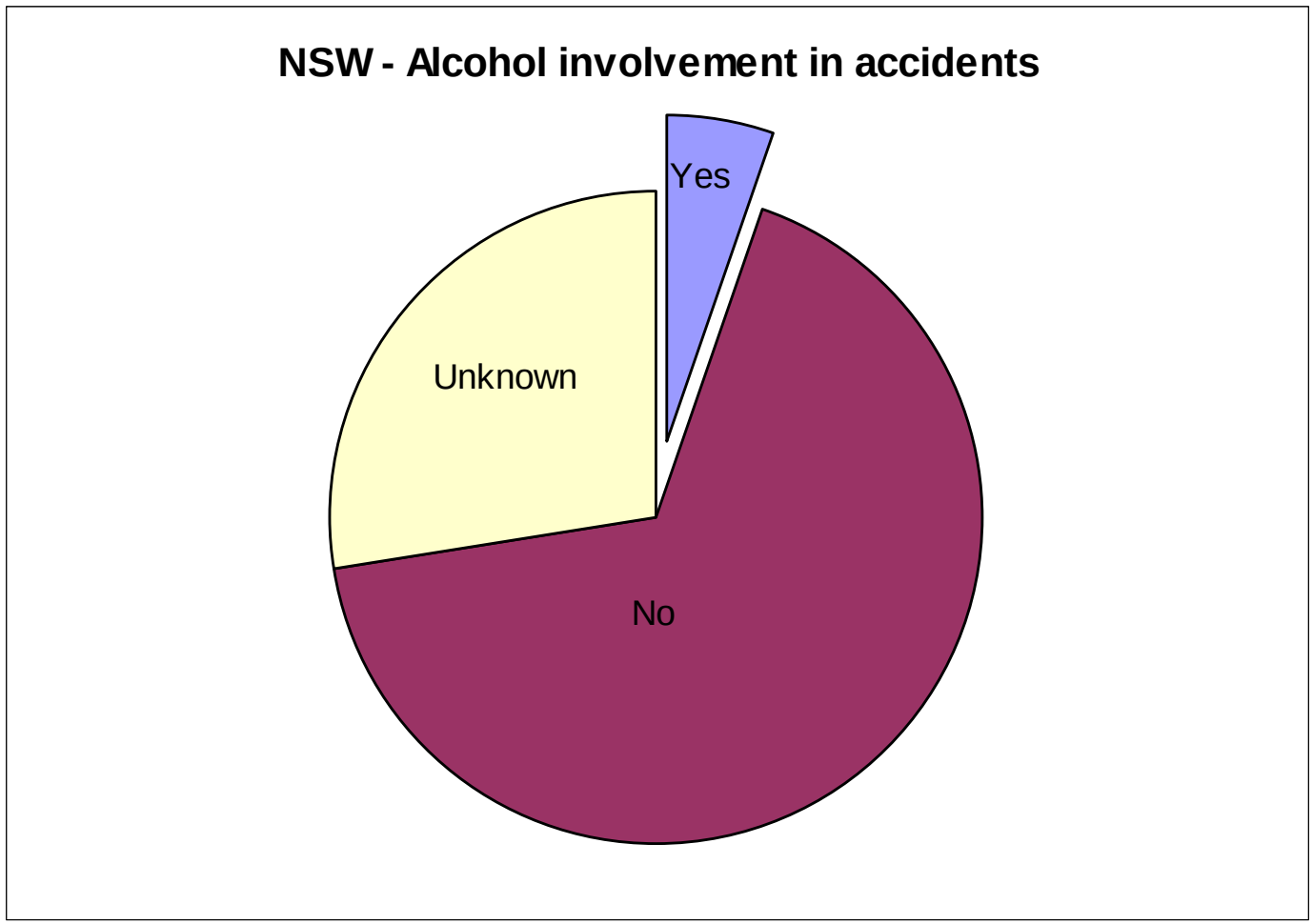
# Accidents


NSW accident rate
Accidents / 1000 vehicles
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1976
1981
1986
1991
1996
2001
Year
Actual
Fitted

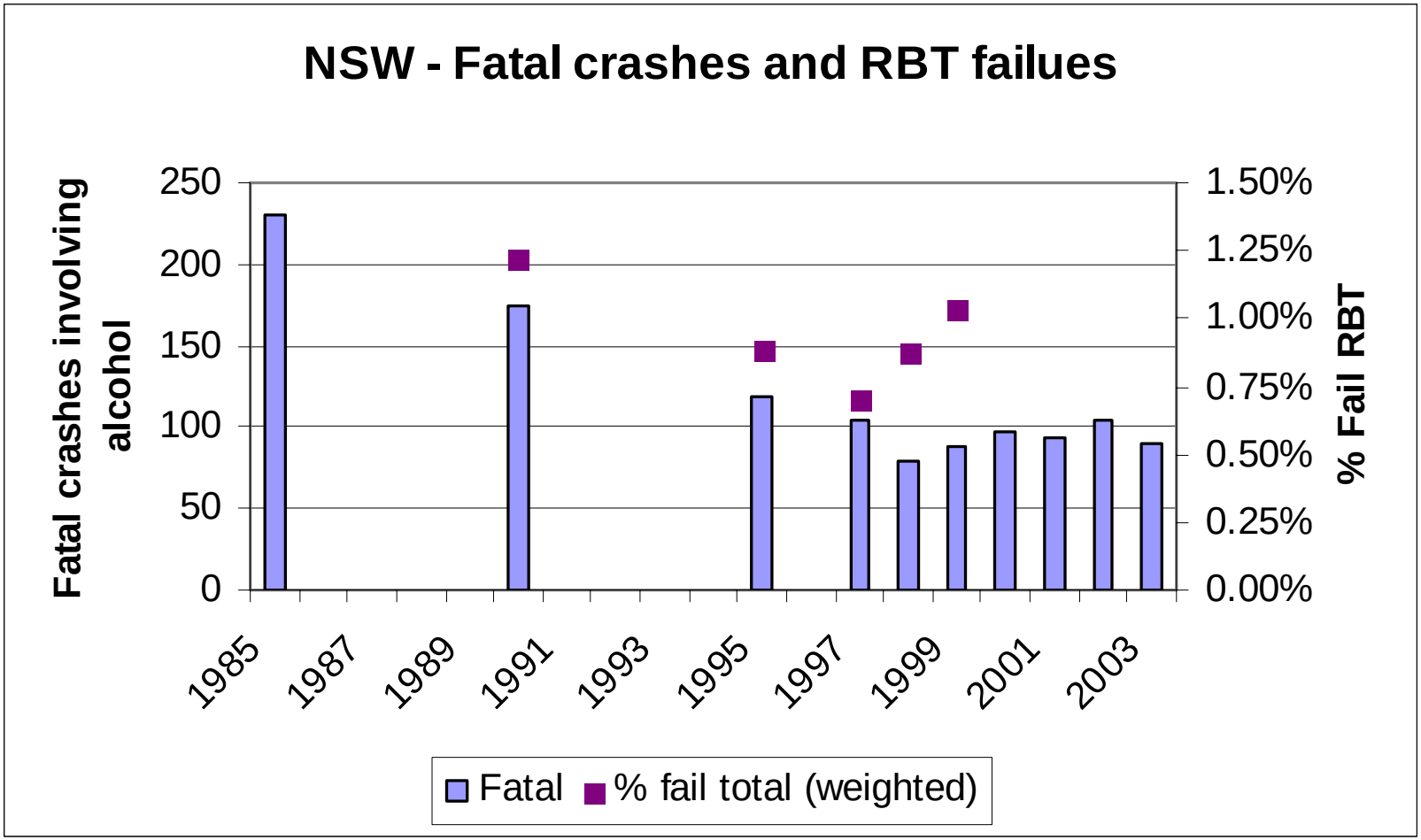
# Influence of Alcohol



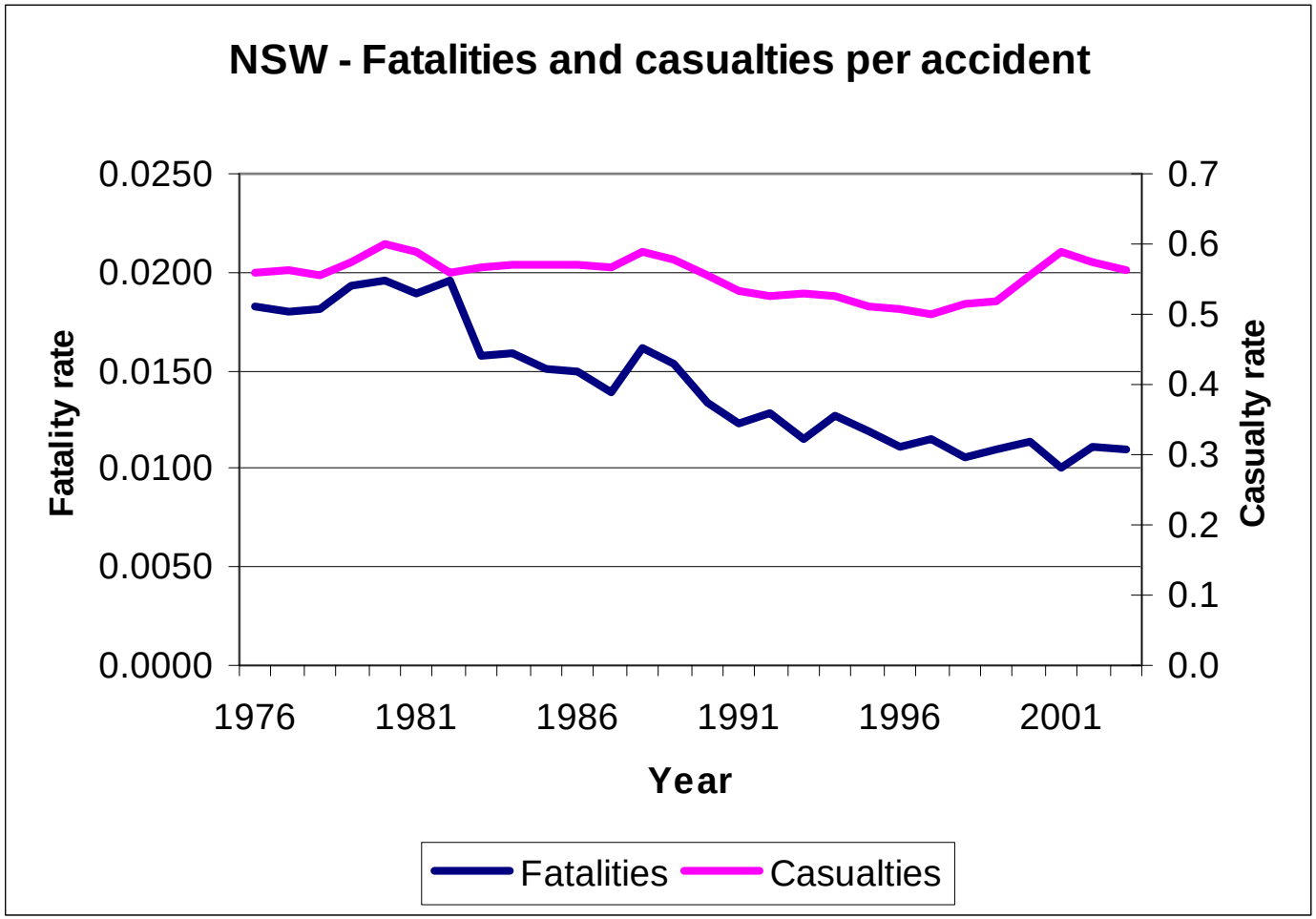
# Influence of Alcohol



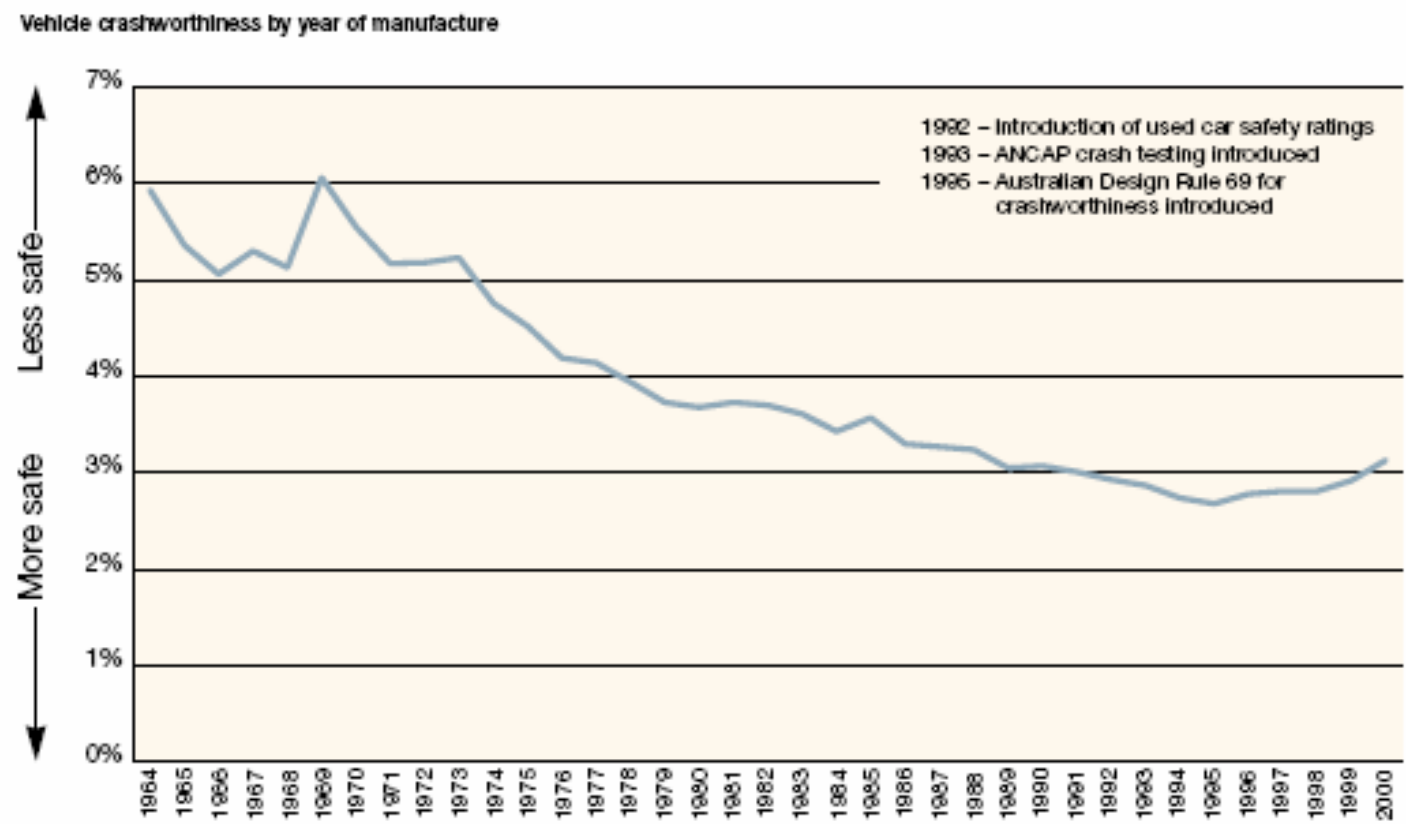
# Influence of Alcohol



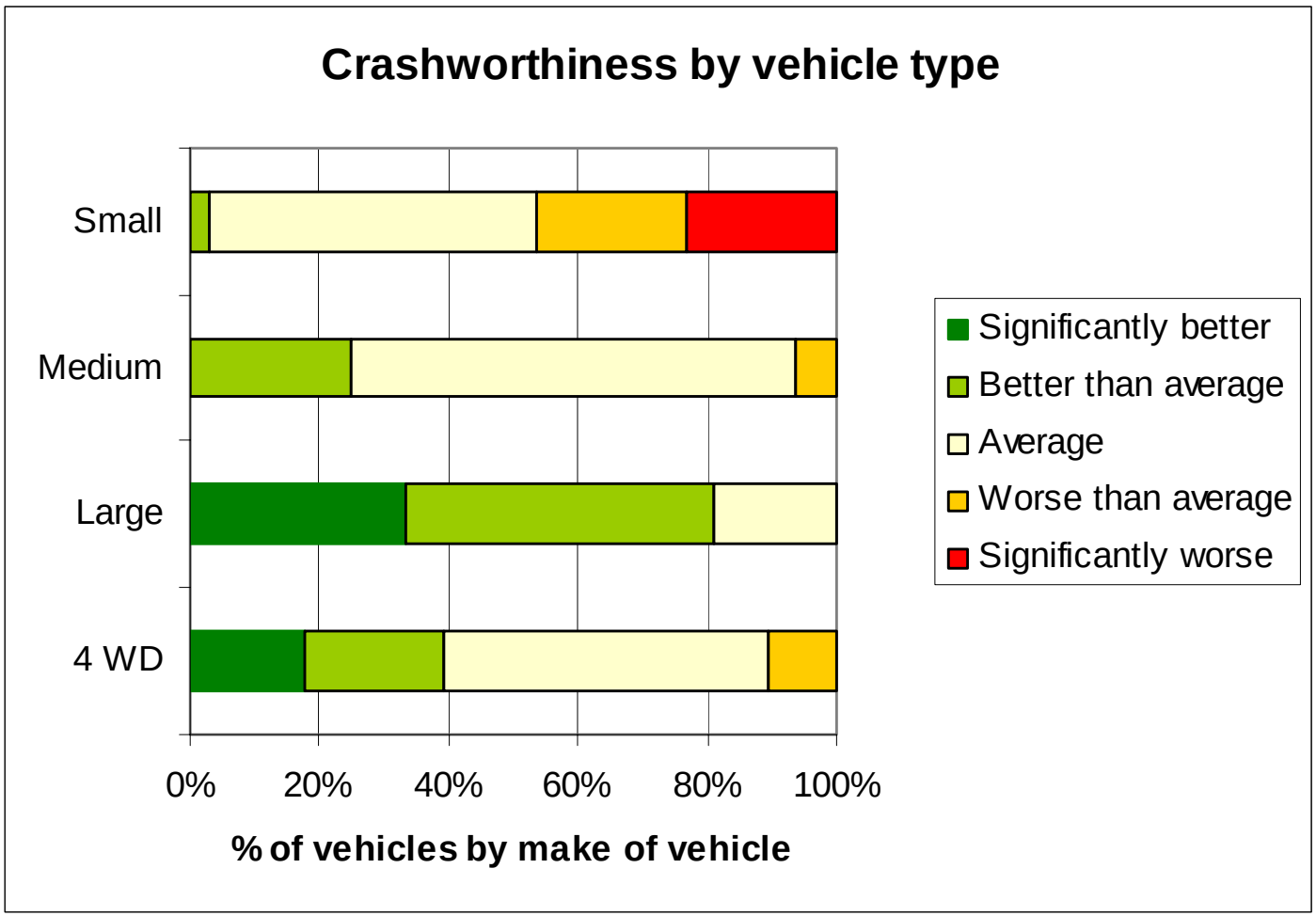
# Casualties


NSW - Fatalities and casualties per accident
Fatality rate
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
Casualty rate
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1976
1981
1986
1991
1996
2001
Year
Fatalities
Casualties

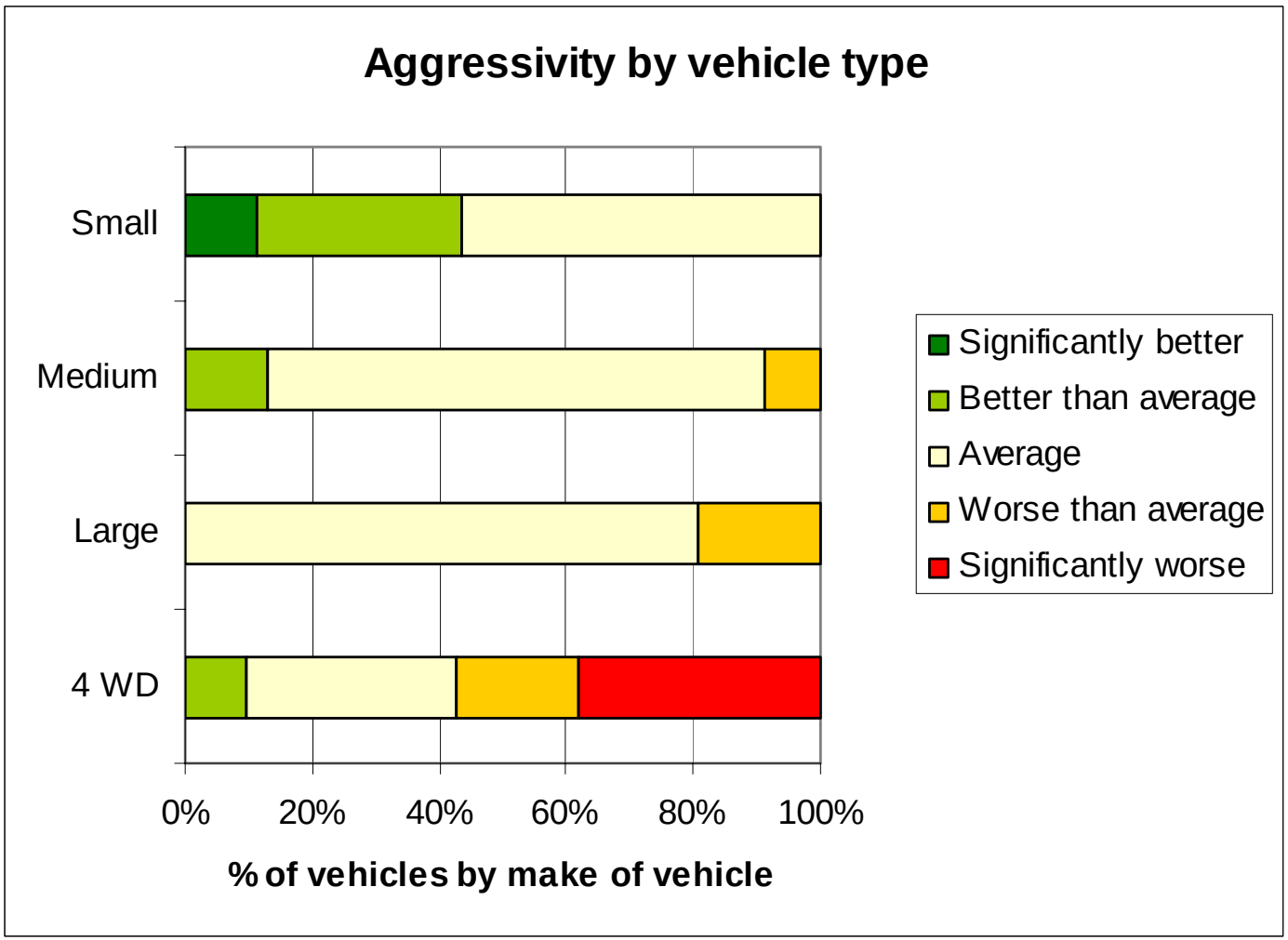
# Car Safety Measures



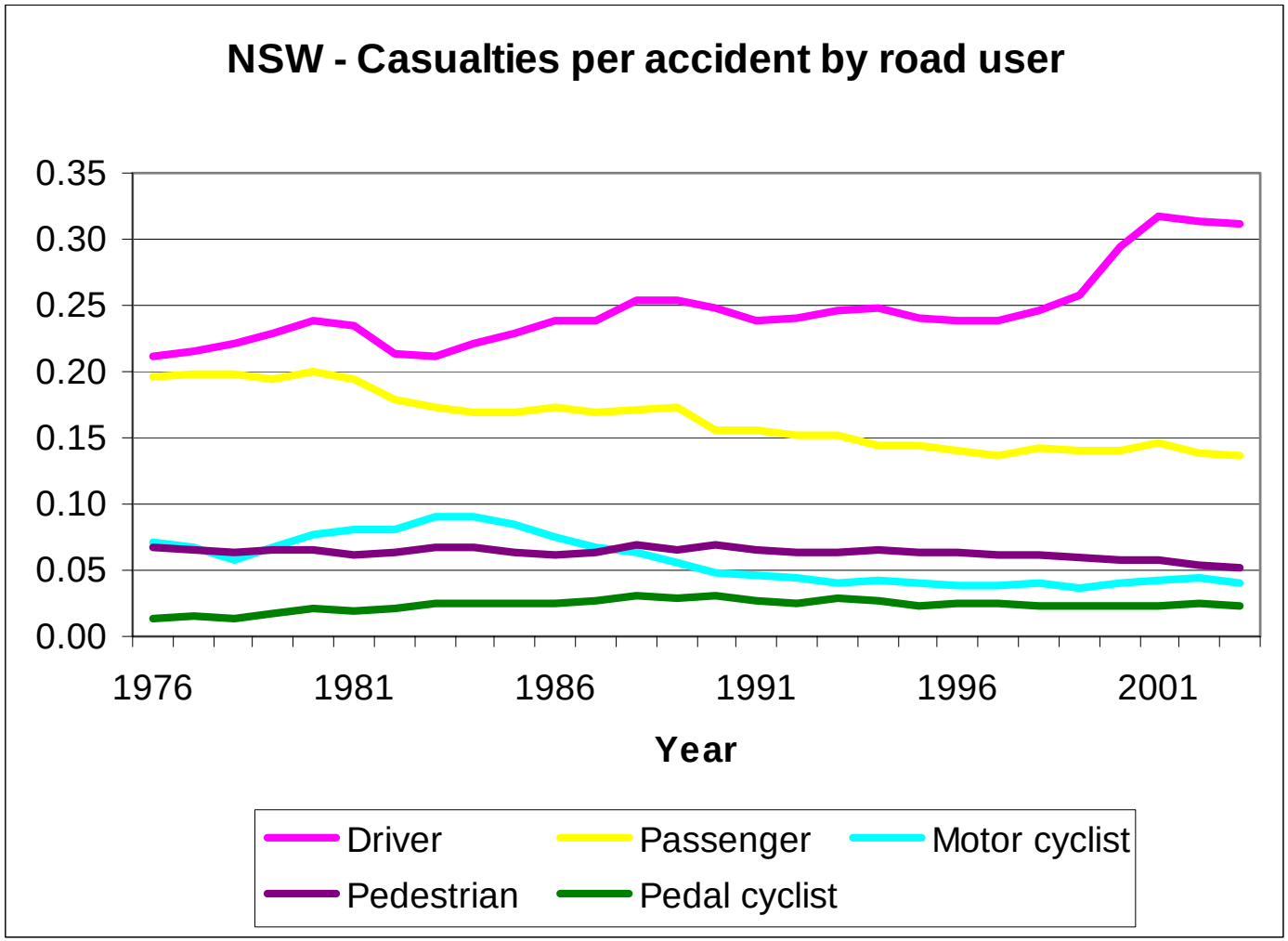
# Car Safety Measures



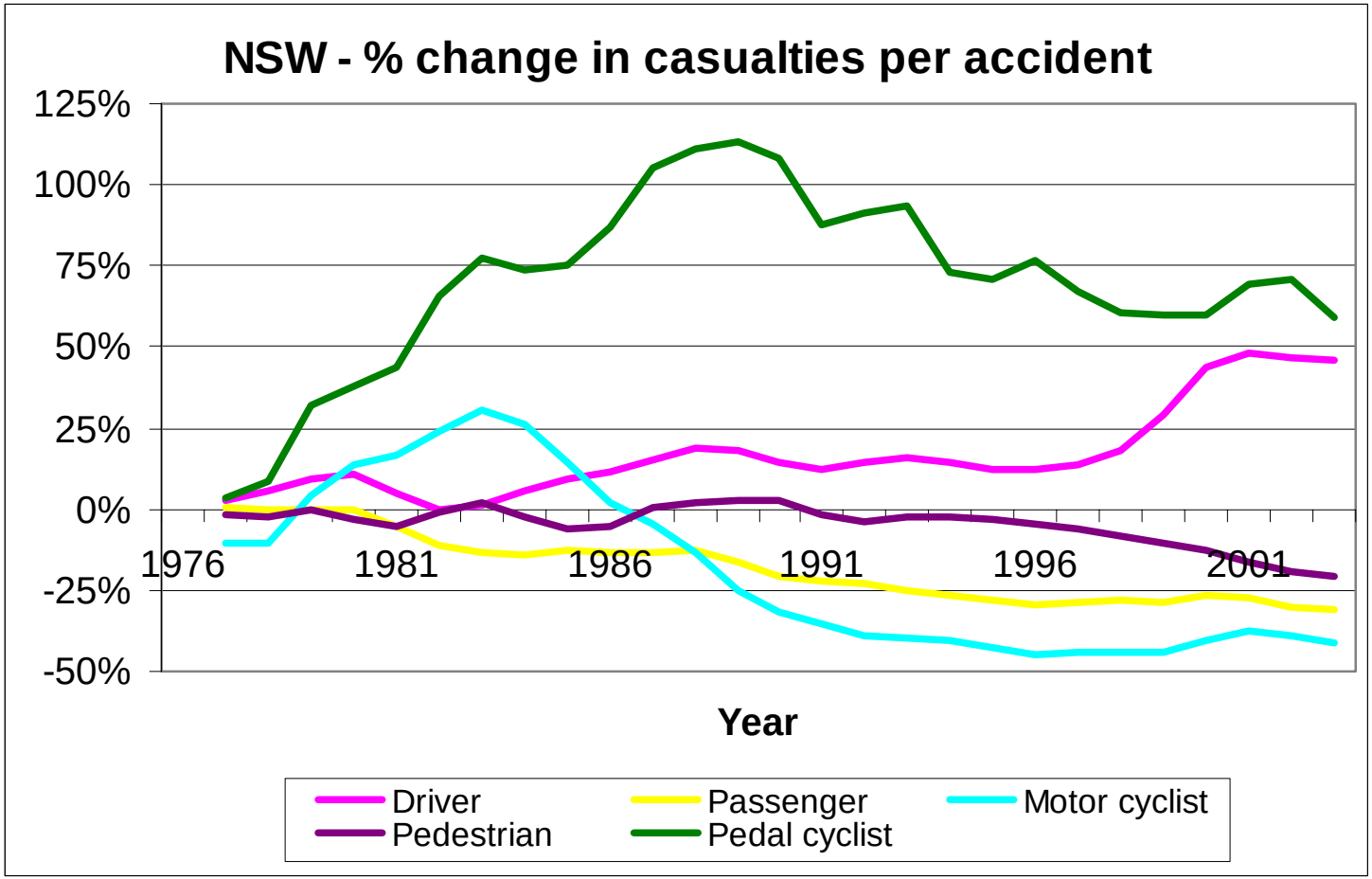
# Car Safety Measures



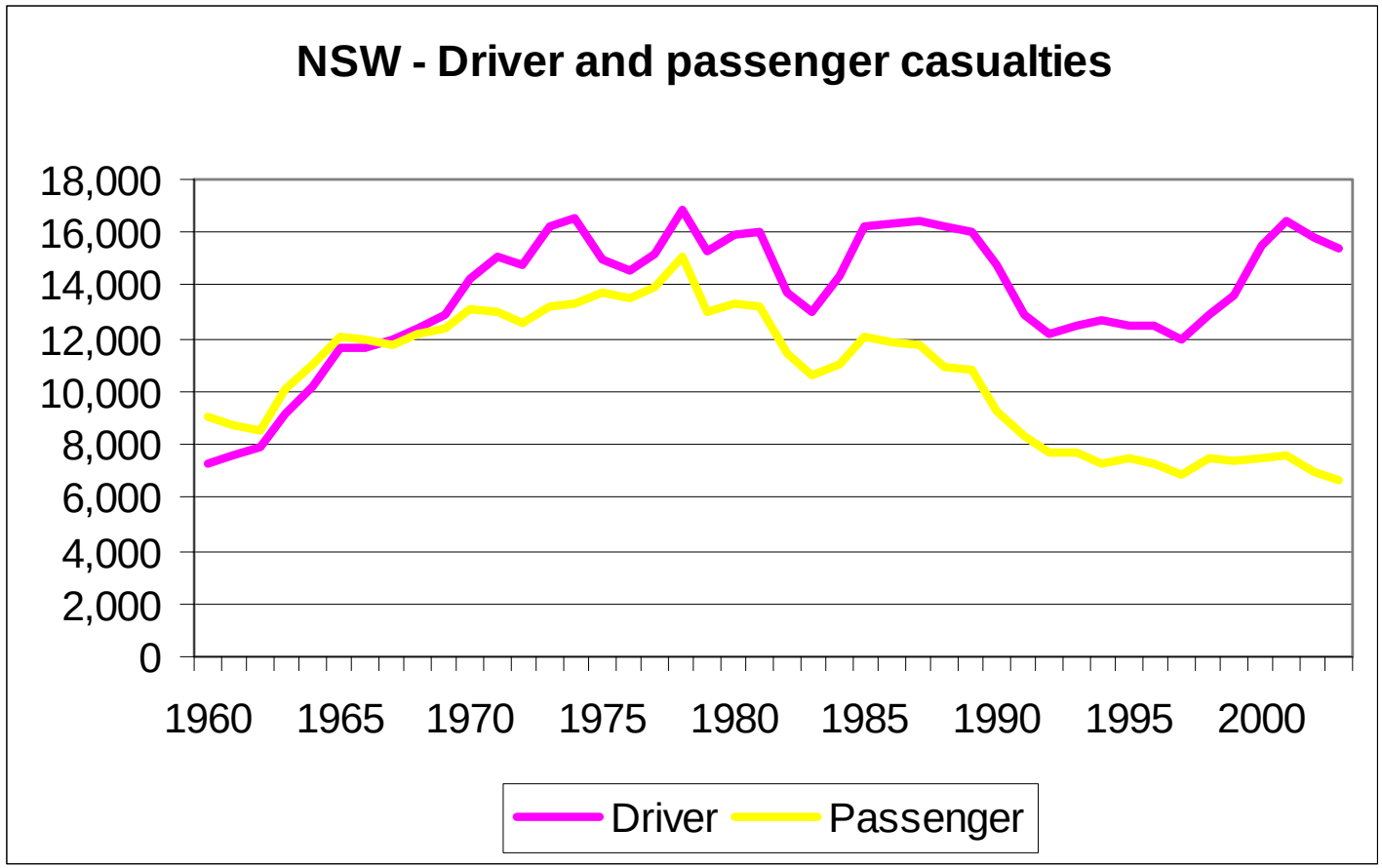
# Casualties per accident by road user



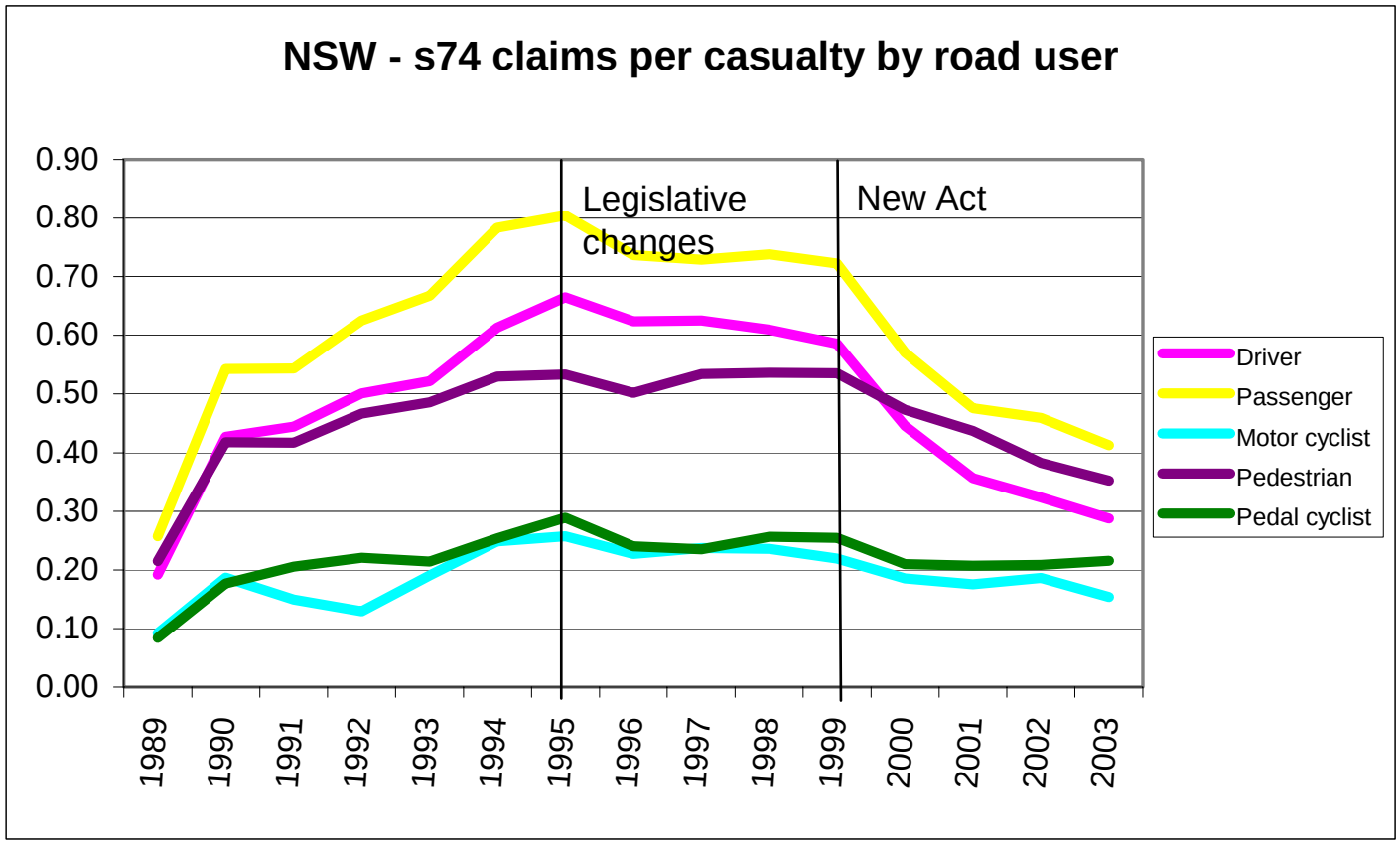
# Casualties per accident by road user



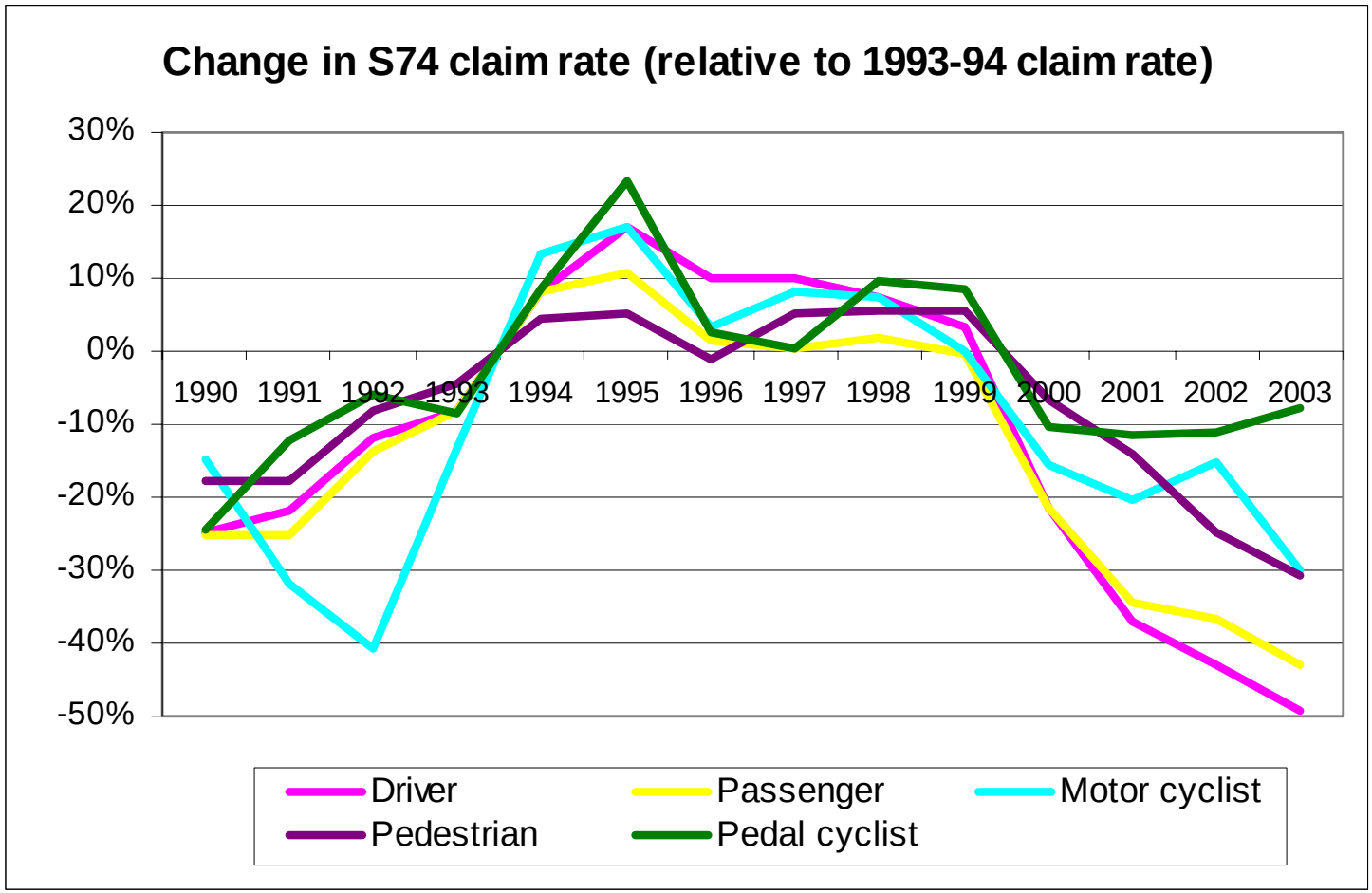
# Casualties per accident by road user



# CTP Claims


NSW - s74 claims per casualty by road user
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Legislative changes
New Act
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Driver
Passenger
Motor cyclist
Pedestrian
Pedal cyclist

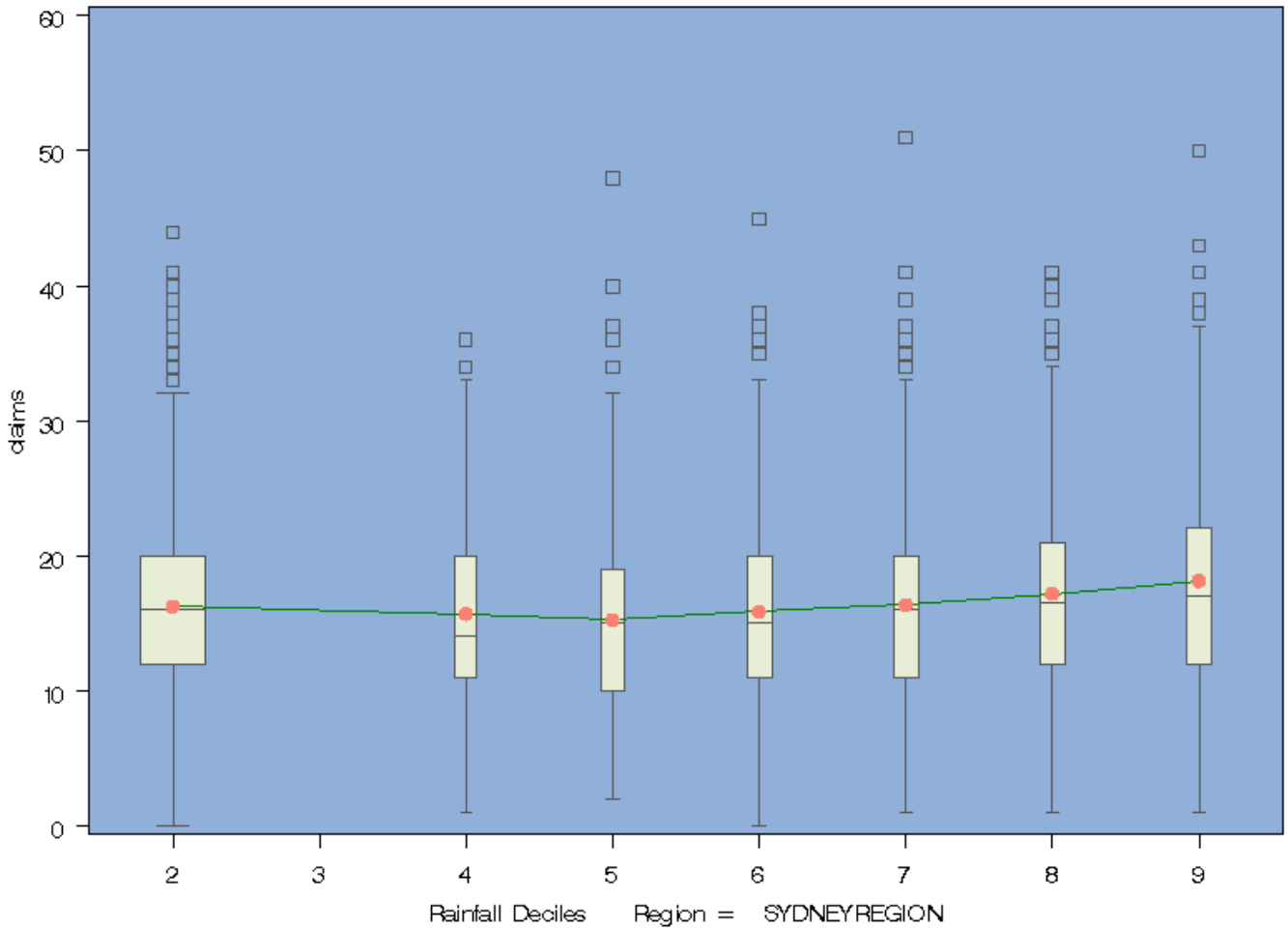
# CTP Claims


Change in S74 claim rate (relative to 1993-94 claim rate)
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Driver
Passenger
Motor cyclist
Pedestrian
Pedal cyclist

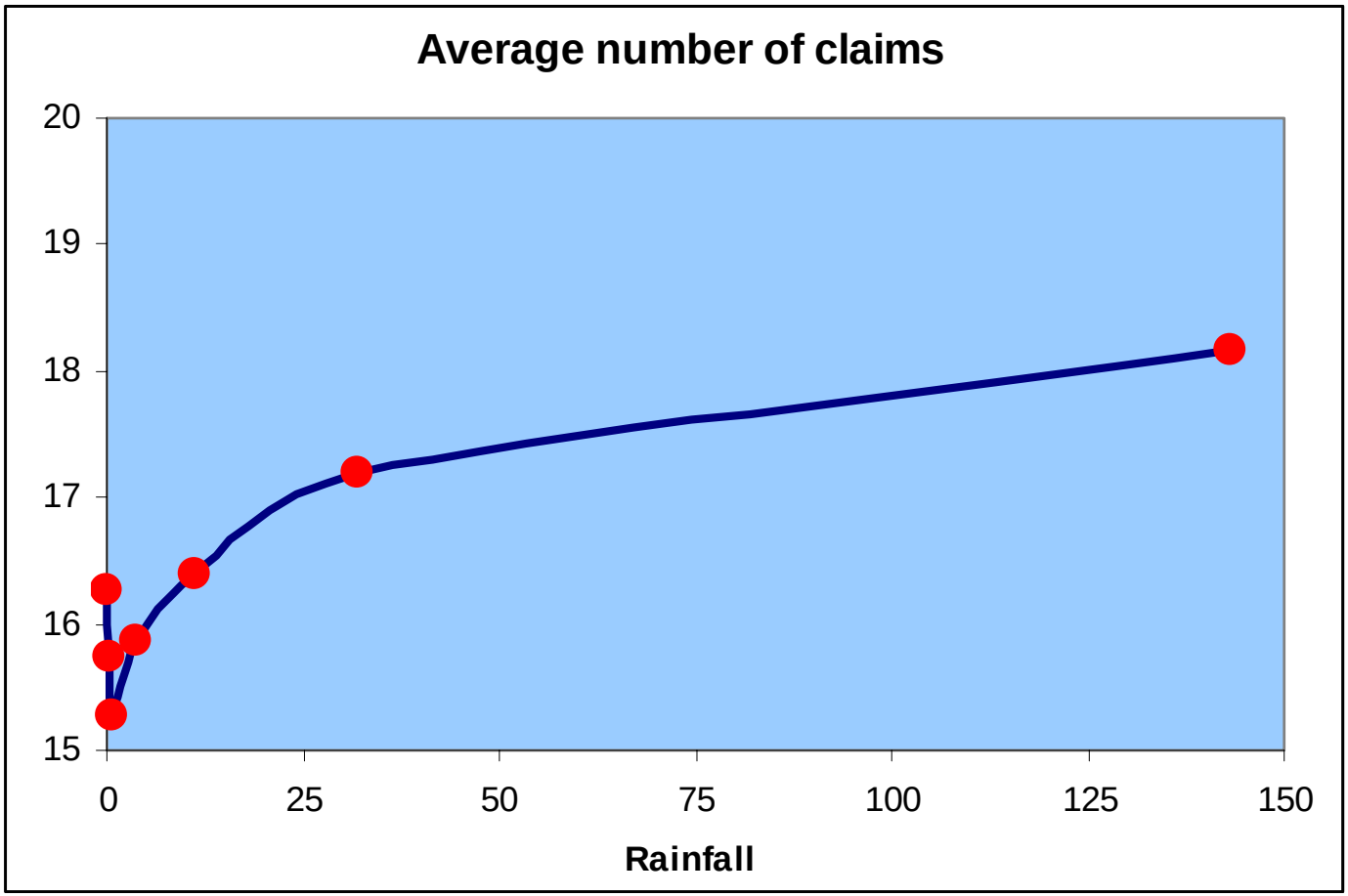
# Influence of Rainfall

- Hypothesised recent drought may be contributing factor to low claim frequencies
- Created daily set of claim and rainfall data by region
- Covered period 1990 – 2003, NSW only
- Used data to do a number of analyses to understand effect of rainfall on claims

# Sydney Region:
## Box plot for each decile



# Sydney Region:
## Plot of Daily Claims vs Rainfall



# Correlations

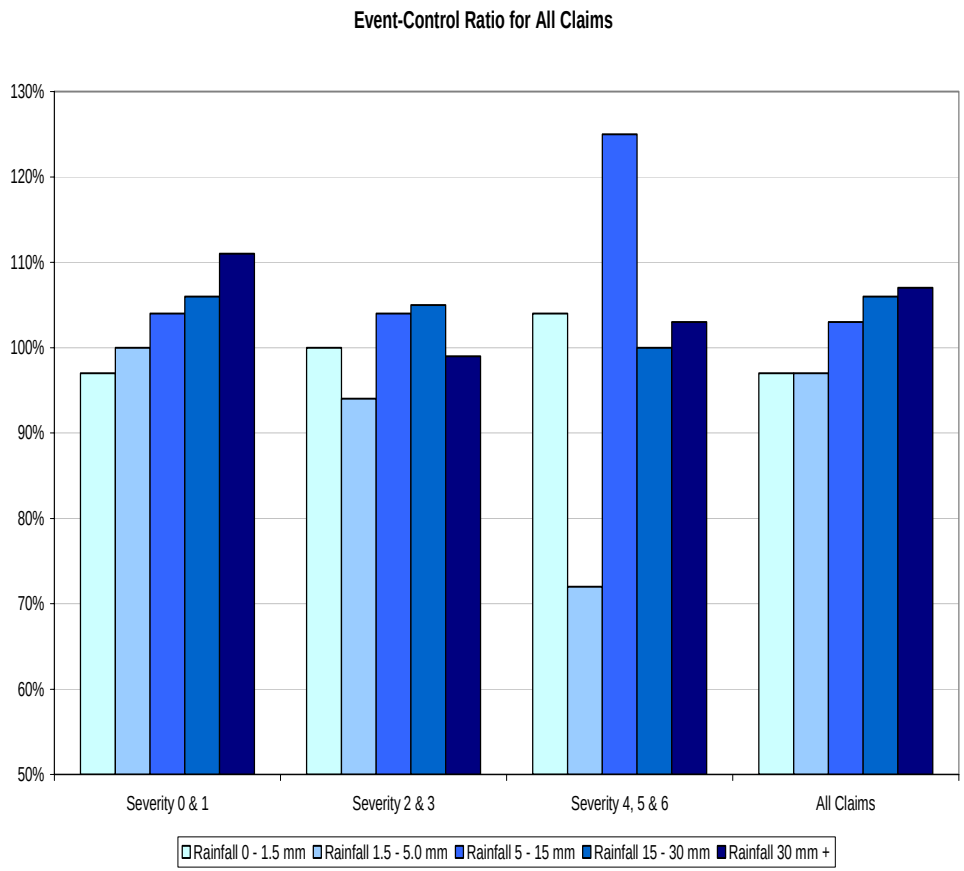
| Variable | Rainfall | Log (1+rainfall) |
|---|---|---|
| Sev 0 claims | 0.122 | 0.182 |
| Sev 1 claims | 0.144 | 0.233 |
| Sev 2 claims | 0.124 | 0.198 |
| Sev 3 claims | 0.086 | 0.148 |
| Sev 4 claims | 0.035 | 0.064 |
| Sev 5 claims | 0.032 | 0.051 |
| Sev 6 claims | 0.035 | 0.062 |
| All claims | 0.157 | 0.257 |

# Matched Sampling

- Match data for cases of poor weather with suitable control event where weather was good
  - Eg match a rainy Monday in February with a dry Monday in that February to provide an “event control” pair
- Compare accident experiences for periods with adverse conditions with control periods
- The estimate of the effect of the adverse factor is based on the combined data from many event-control pairs

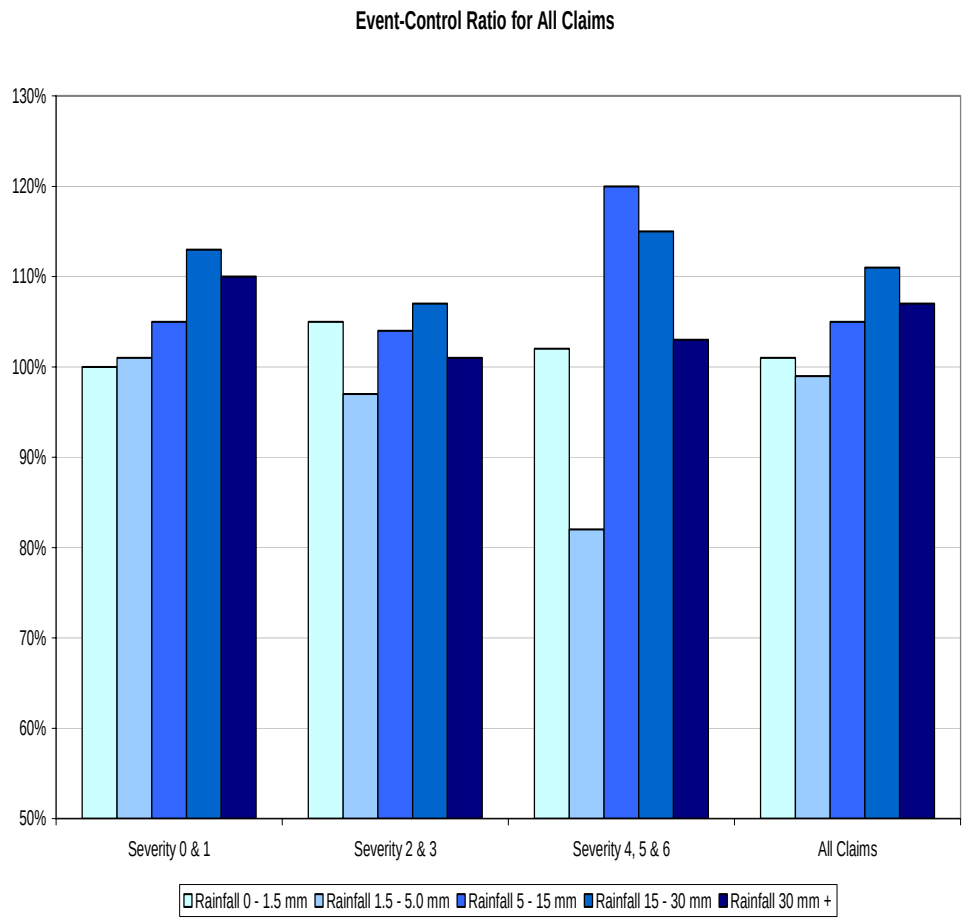
# Matched Sampling Results Sydney

| **Sydney Region** | Ratio of Event to Control Claim Numbers | | | | |
|---|---|---|---|---|---|
| Severity | Rainfall in mm | | | | |
| | 0 – 1.5 | 1.5 – 5 | 5 – 15 | 15 – 30 | 30+ |
| 0 & 1 | 0.97 | 1 | 1.04 | 1.06 | 1.11 |
| 2 & 3 | 1 | 0.94 | 1.04 | 1.05 | 0.99 |
| 4, 5 & 6 | 1.04 | 0.72 | 1.25 | 1 | 1.03 |
| All claims | 0.97 | 0.97 | 1.03 | 1.06 | 1.07 |



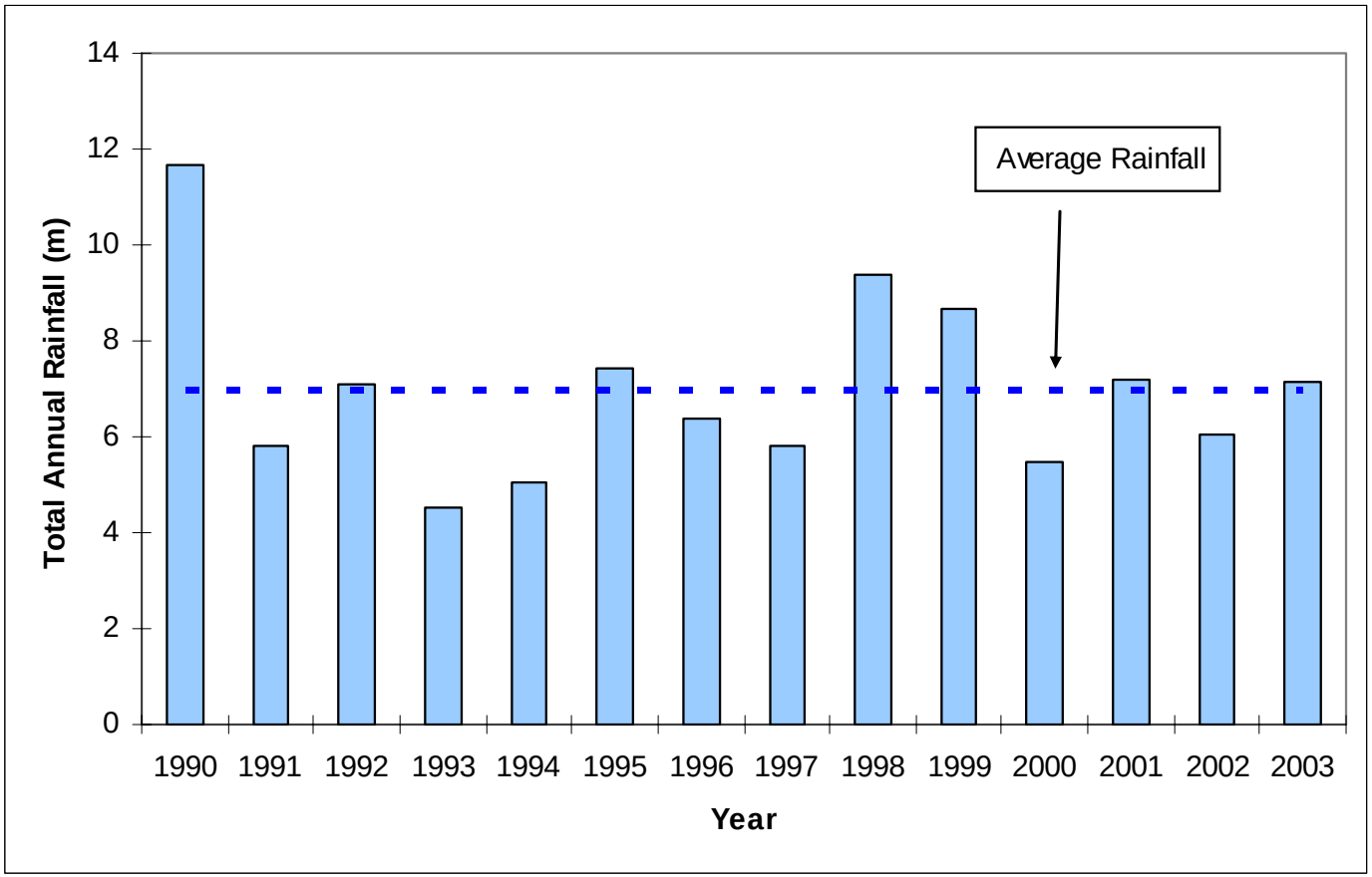
# Matched Sampling Results
# All Regions in NSW

| **All Regions** | Ratio of Event to Control Claim Numbers | | | | |
|---|---|---|---|---|---|
| Severity | Rainfall in mm | | | | |
| | 0 – 1.5 | 1.5 – 5 | 5 – 15 | 15 – 30 | 30+ |
| 0 & 1 | 1.00 | 1.01 | 1.05 | 1.13 | 1.10 |
| 2 & 3 | 1.05 | 0.97 | 1.04 | 1.07 | 1.01 |
| 4, 5 & 6 | 1.02 | 0.82 | 1.20 | 1.15 | 1.03 |
| All claims | 1.01 | 0.99 | 1.05 | 1.11 | 1.07 |

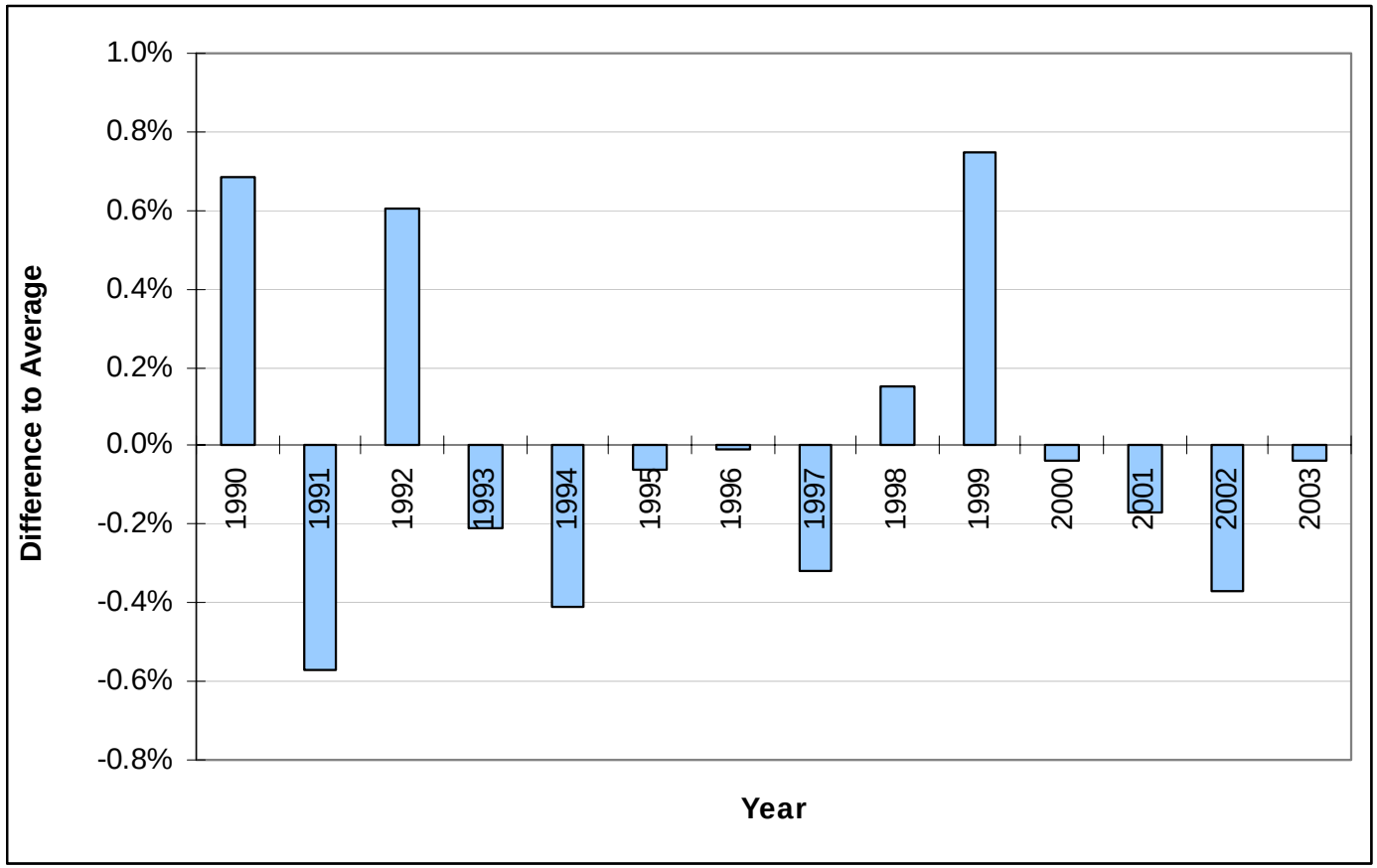


# Impact on Claim Frequency

*Has the level of rainfall had a significant impact on the claim frequency reductions that we have observed in recent years?*



# Frequency Variations



# Summary

- Accidents dramatically reduced between 1975 and 1992
- Slower reduction in accidents since then
- Clear correlation between RBTs and fatal accidents
- Improvements in vehicle “crashworthiness” broadly consistent with declines in fatalities
  - Increases from late 1990s appears partially attributable to increased use of 4WDs
- Unable to explain divergence between casualty for drivers and passengers
- There is some correlation between daily claim numbers and rainfall but has relatively small impact over any year