Crash or Crash Through? Australian Policy Targets and Road Traffic Casualties: Preliminary results

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[preliminary results, please do not quote without permission from the authors]

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ABSTRACT

A reduction in road traffic crash (RTC) fatalities is a national public policy objective in Australia: a target of no more than 5.6 fatalities per 100,000 population has been set, to be achieved by the end of 2010 (Australian Transport Council 2000). It is clear, though, that this target is unlikely to be met. The purpose of this paper is three-fold. First, we model the historical trend reduction in RTC fatalities and estimate the year at which Australia is likely to reach this aggregate target. Second, we decompose the analysis at the level of the Australian states and territories. This enables us to identify the relative contributors to Australia's progress to meet the national target that was set. Third, we employ the approach used by García-Ferrer, de Juan and Poncela (2007) to estimate fatalities and casualties elasticities using time series data for the State of Queensland, for which a monthly time-series is available. Evidence on the elasticity of fatalities with respect to crashes is then used to reconsider the established policy target. The empirical work presented in this paper provides some insights into trends in RTCs and may present a useful first step for setting future casualty targets. Additionally, work of this kind may provide the basis for further discussions about the likely trend in the costs of RTCs and optimal strategies for their containment.

Table 1
Fatalities per 100,000 population, due to road traffic crashes:
Australian states and territories, 1971 to 2008

	Australia	NSW	Vic	Qld	SA	WA	Tas	ACT	NT
Mean	15.95	15.84	14.33	17.5	16.22	16.53	17.24	9.68	39.25
Median	15.16	15.14	14.29	14.56	15.71	14.12	16.34	10.04	37.10
Maximum	27.47	27.39	25.63	32.69	30.77	32.51	32.66	20.03	68.91
Minimum	6.87	5.71	5.73	7.67	6.19	8.08	6.76	2.75	17.31
Std. Dev.	7.10	7.51	6.68	8.41	6.52	7.31	7.12	4.85	12.95

Sources: See text.

Table 2
Monthly road traffic crashes and casualties in Queensland, January 1992 to March 2008

	RTC	Casualty RTC	All casualties	Fatalities	All injuries	Hospitalisations	Non-hospitalisations	Registered vehicles
Mean	1,766	1,027	1,375	29	1,346	423	923	2,438,113
Median	1,759	1,011	1,362	29	1,327	406	919	2,385,758
Maximum	2,147	1,324	1,840	60	1,803	590	1,252	3,292,816
Minimum	1,337	676	884	12	850	261	589	1,846,495
Std. Dev.	170.12	153.21	201.96	7.47	202.36	77.79	136.51	396,302.8

Sources: See text.

Table 3
Projections: years at which Australian states and territories will attain a fatality rate of 5.6 deaths per 100,000

	Observations	Linear Trend Equation	Year
Australia	2001-2008	y = -0.25x +507 (0.036) [-6.98] p = 0.00	2014
New South Wales	2001-2008	y = -0.34x +679 (0.061) [-5.47] p = 0.00	2010
Victoria	2001-2008	y = -0.4x +811 (0.085) t = [-4.71] p = 0.00	2009
Queensland	2001-2008	y = -0.11x +219 (0.052) [-2.00] p = 0.09	2031
South Australia	2001-2008	y = -0.56x +1126 (0.103) [-5.42] p = 0.00	2011
Western Australia	1990-2008	y = -0.22x +444 (0.047) [-4.57] p = 0.00	2024
Tasmania	2001-2008	y = -0.23x +471 (0.301) [-0.76] p = 0.47	2024
Australian Capital Territory			2001
Northern Territory	1971-2008	y = -0.99x +2010 (0.102) [-9.68] p = 0.00	2024
	1989-2008	y = -0.70x + 1425 (0.221) [-3.17] p = 0.01	2034

Notes: The standard errors are in ( ) parentheses and t statistics in [ ] brackets.

Table 4
Augmented Dickey-Fuller tests for unit roots and Perron's structural break test for stationarity

	Maintained deterministic elements: I (intercept) and T (trend)	Critical *t* values for ADF statistics (5% level of significance)	ADF *t* statistic	Conclusion *re* the presence of unit roots
lnfatalities	I & T	-3.43	-7.03***	no unit root
lnhosp	I & T	-3.43	-4.73***	no unit root
lnnonhosp	I & T	-3.43	-7.88***	no unit root
lnvehicles	I	-2.88	2.05	unit root I(1)
	Coefficient (α_1) of y_{t-1} (Std. error)	Calculated *t* statistic for H_0 $\alpha_1 = 1$	Perron's critical values for *t* statistic testing for change in level, 5% level of significance (breakpoint = 0.6)	Conclusion *re* stationarity
lninjuries	0.45 (0.07)	-8.12	-3.76	stationary series around a structural break 2001:4
lnrtc	0.64 (0.07)	-5.02	-3.76	stationary series around a structural break 2001:4

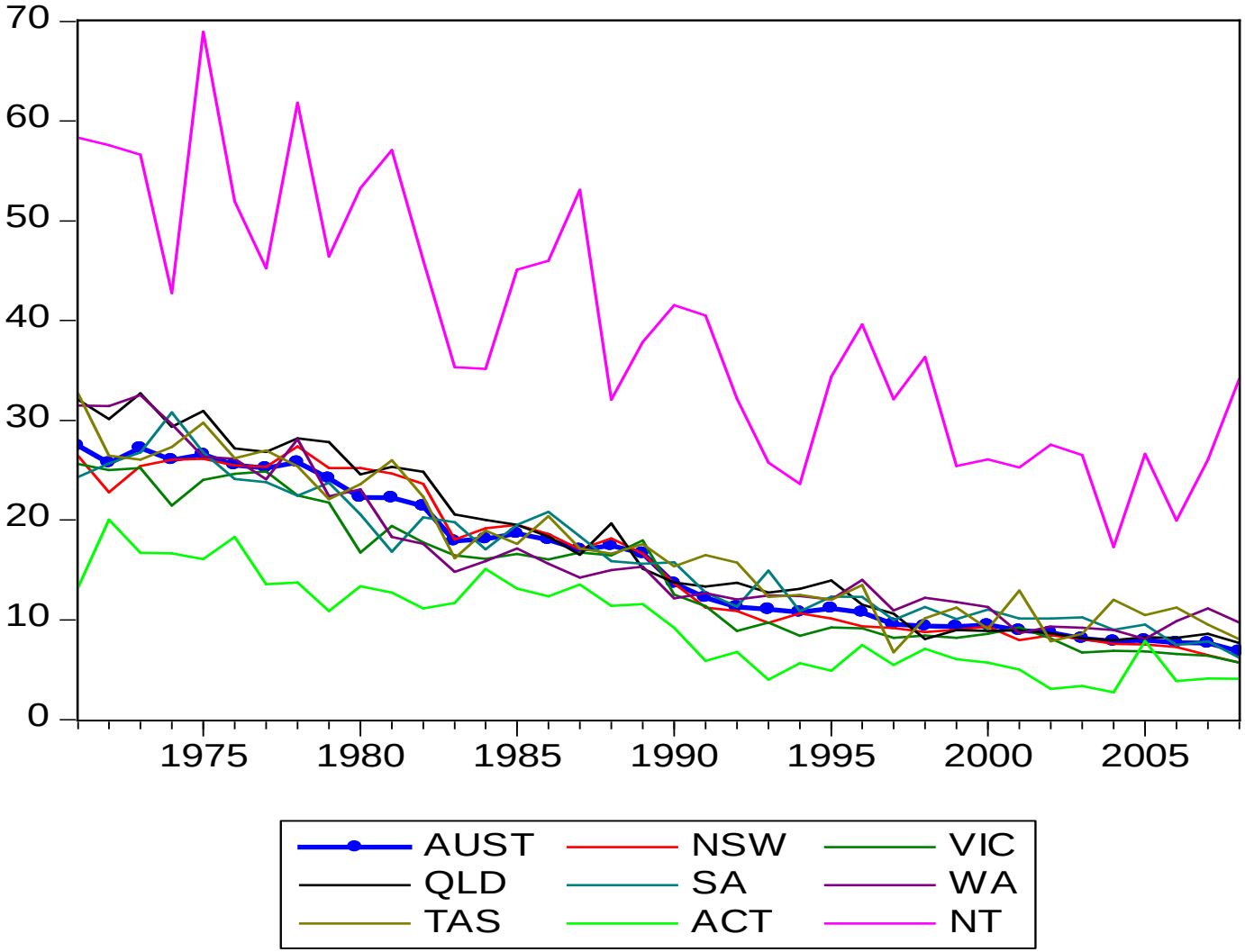
Source: Equations estimated using *Eviews 6*. Critical values for Perron's structural break test from Patterson (2000).

Table 5
Empirical results for estimation of the road traffic crash casualty equations

	lnfatal			*lninjury*			*lnhosp*			*lnnonhosp*		
	Coeff	*t*-statistic	*p* value	Coeff	*t*-statistic	*p* value	Coeff	*t*-statistic	*p* value	Coeff	*t*-statistic	*p* value
c	-5.01			-0.19			-1.52***			-0.46		
	(1.801)	-2.78	0.01	(0.340)	0.55	0.58	(0.484)	-3.14	0.00	(0.365)	-1.25	0.21
lnrtc	1.13***			0.95***			0.99***			0.96***		
	(0.243)	4.65	0.00	(0.043)	22.03	0.00	(0.066)	15.00	0.00	(0.049)	19.57	0.00
dlnvehicles				-4.76**						-5.52**		
				(2.368)	-2.01	0.05				(2.588)	-2.13	0.03
dlnvehicles(-1)	-2.18						11.44***					
	(12.902)	-0.17	0.87				(3.886)	2.94	0.00			
time							0.001***			0.001**		
							(0.0001)	5.92	0.00	(0.0003)	2.40	0.02
ar(1)				0.99***						0.92***		
				(0.010)	94.02	0.00				(0.034)	26.84	0.00
ar(2)	0.21***											
	(0.074)	2.93	0.00									
ar(12)	0.19**											
	(0.073)	2.55	0.01									
ma(1)				-0.74***						-0.50***		
				(0.053)	-13.97	0.00				(0.080)	-6.20	0.00
dvpd	-0.19***						0.06***					
	(0.055)	-3.46	0.00				(0.020)	3.10	0.00			
dv0204	-0.68***											
	(0.206)	-3.27	0.00									
dv0598	-0.81***											
	(0.206)	-3.93	0.00									
Goodness of Fit & Diagnostic Tests												
Adjusted R^2	0.34			0.93			0.86			0.90		
F- statistic	14.25***			645.33***			298.95***			364.29***		
Breusch Godfrey	14.70			10.09			11.75			5.90		
Jarque-Bera	2.65			0.56			0.09			0.006		
Ramsey RESET	5.20*	(2 fitted terms)		1.32			0.13			0.67		
ARCH	3.03*			0.47			0.30			1.60		
ADF statistic	-12.32***			-14.33***			-13.61***			-13.76***		

Notes: (i) The variables are as described in the text. (ii) *ln* indicates natural logarithms and 'd' indicates first-differences. (iii) The standard errors are in ( ) parentheses beneath the estimated coefficients. (iv) *** , ** and * indicate statistical significance at 1, 5, and 10 percent, respectively. (v) The Adjusted R^2 is the coefficient of determination adjusted for degrees of freedom. (vi) *F* statistic tests the hypothesis that all coefficients are zero. (vii) Breusch-Godfrey LM (Lagrange multiplier) is a test for serial correlation in the errors. (viii) The Jarque-Bera statistic is a χ^2 test for normality of the residuals. (ix) Ramsey RESET is an *F*-test for specification error. (x) The ARCH test is a Lagrange multiplier test for autoregressive conditional heteroscedascity in the residuals. (xi) The ADF statistic is the Augmented Dickey Fuller test for stationarity of the residuals.

Figure 1: Fatalities per 100,000 population due to road traffic crashes, Australian states and territories, 1971 to 2008



Source: See text.

Figure 2a: Monthly road traffic crashes in Queensland, January 1992 to March 2008

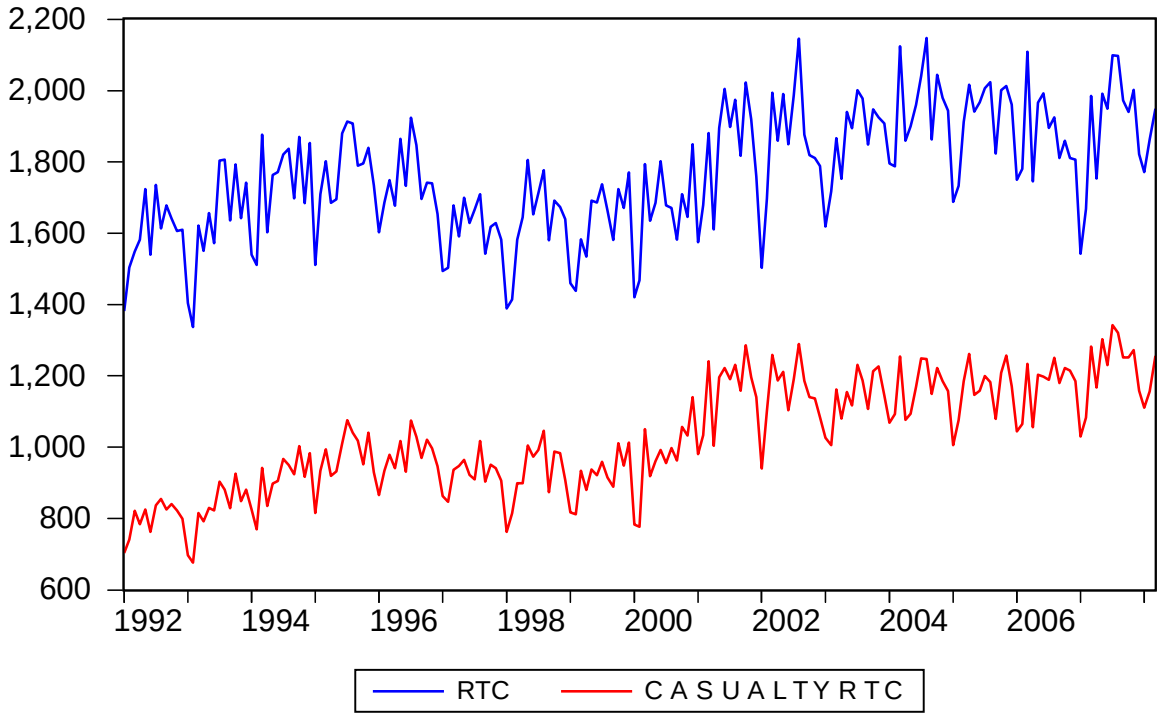
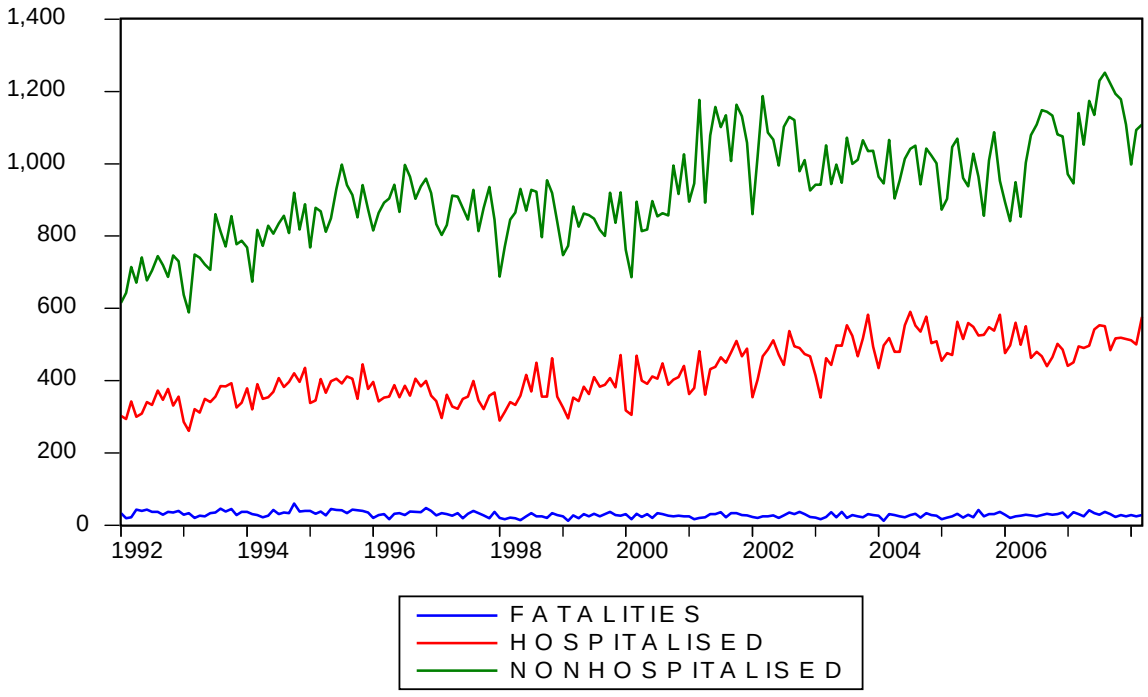


Figure 2b: Monthly casualties due to road traffic crashes, Queensland, January 1992 to March 2008



Source: See text.

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