

Reductions and convergence in RTC fatality rates in OECD countries: Preliminary results

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- We apply an economic growth model to examine the transition of RTC fatality rates in some OECD countries

Conceptual framework

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- $\frac{F}{P} = \frac{V}{P} \times \frac{F}{V}$ (F=RTC fatalities, P=Population, V=No. of vehicles)

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- The transition process may be affected by the characteristics of individual countries

Stylised transition curves

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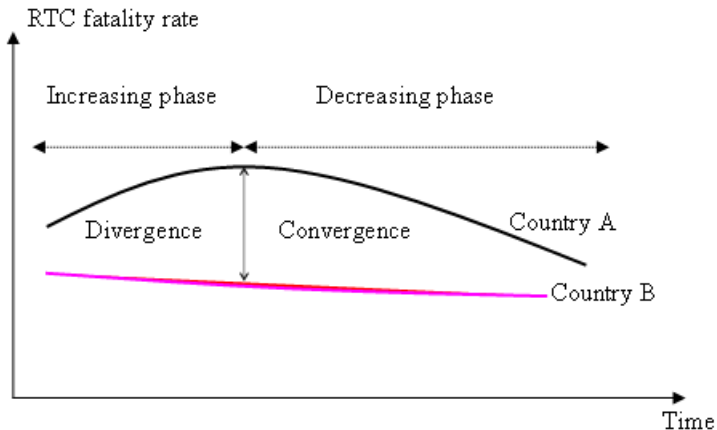
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Australian RTC fatalities/100,000 pop.: 1925-2008

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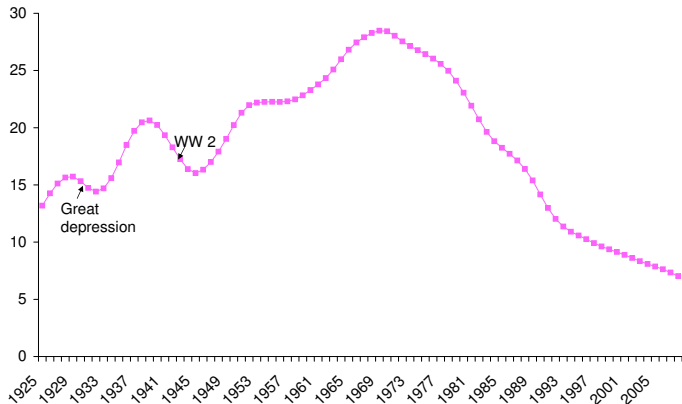
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- Dynamic growth model by Phillips and Sul (2007)

$$\log y_{it} = a_{it} + x_{it}t = \left(\frac{a_{it} + x_{it}t}{\mu_t} \right) \mu_t = b_{it}\mu_t$$

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- Test:
 - convergence ($b_{it} \rightarrow b$ as $t \rightarrow \infty$), and
 - formation of groups: $b_{it} \rightarrow \begin{cases} b_1 & \text{if } i \in G_1 \\ b_2 & \text{if } i \in G_2 \end{cases}$

Convergence test

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 - Decay model: $b_{it} = b_i + \frac{\sigma_i \varepsilon_{it}}{L(t)t^\alpha}$, where σ_i is a scale parameter, ε_{it} is iid (0,1), $L(t)$ satisfies $L(t) \rightarrow \infty$ as $t \rightarrow \infty$, and α is a decay control parameter

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 - Limiting form: $H_t \sim \frac{A}{L(t)^2 t^{2\alpha}}$ where $H_t = N^{-1} \sum_{i=1}^N (h_{it} - 1)^2$, $h_{it} = \log y_{it} / N^{-1} \sum_{i=1}^N \log y_{it}$, and $A > 0$ is a constant

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 - Empirical form: $\log \frac{H_1}{H_t} - 2 \log L(t) = a + \gamma \log t + u_t$ for $t = T_0, T_1, \dots, T$, $T_0 = rT$, $r = [0.2, 0.3]$ and $\gamma = 2\alpha$

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- The null hypothesis of convergence is tested as an one-sided t-test for $\gamma \geq 0$

- 1 Order the countries based on their average RTC fatality rate for 1992-2008 ($r=0.3$)

Test for clustering

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- 1 Order the countries based on their average RTC fatality rate for 1992-2008 ($r=0.3$)
- 2 Form a core group of k^* countries by selecting the k countries with the lowest average rates to form a sub-group G_k that satisfies the convergence test

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- 3 Add one country at a time to the core group and re-run the test, the country is added if it converges with the group

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- 3 Add one country at a time to the core group and re-run the test, the country is added if it converges with the group
- 4 Repeat the process for the remaining countries. If there is no k in step 2 that satisfies the convergence test, the remaining countries do not form a sub-convergence group

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- Annual data on RTC fatalities per 100,000 population from 24 OECD countries, 1985-2008

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- Slovakia, Poland, Slovenia, Czech, Israel, Korea and Northern Ireland were excluded because of missing data

Data: Adjustments

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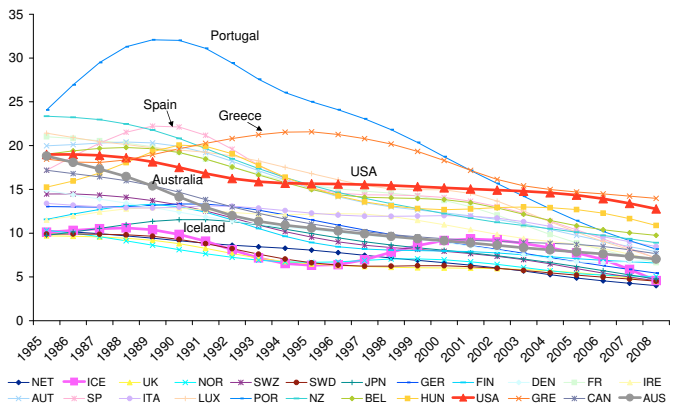
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- Some countries do not adhere. Adjustments made by IRTAD (1998):
 - Italy: (7 days) +8%
 - France: 1970-92 (6 days) +9%
 - Spain: before 1993 (24 hours) +30%
 - Portugal: (24 hours) +30%
 - Greece: before 1996 (3 days) +15%
 - Austria: 1983 to 1991 (4 days) +12%
 - Switzerland: before 1992 (more than 30 days) -3%
 - Japan: before 1993 (24 hours) +30%

OECD data: Level

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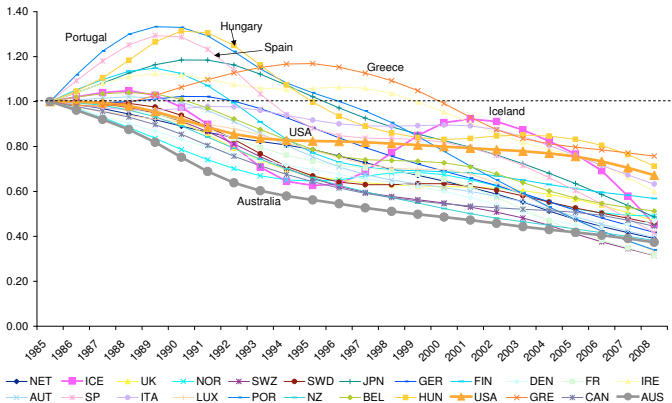
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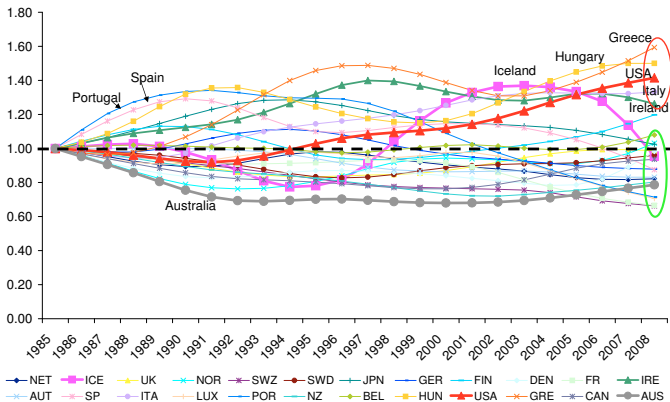
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- However, two convergent sub-groups were found:
 - a slow reduction group: Iceland, Ireland, Italy, Greece, Hungary and USA
 - a faster reduction group: the remaining countries

Cluster evidence

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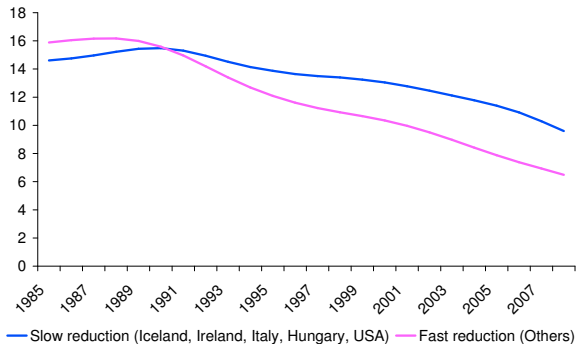
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- An economic growth model by Phillips and Sul (2007, 2009) has been applied to examine the transition of RTC fatalities rates amongst OECD countries
- There is no evidence of overall convergence in the reduction of RTC fatality rates from 1985 to 2008
- However, there is evidence that the countries can be separated into 2 sub-groups with differing rates of convergence

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- Examine factors affecting convergence/divergence behavior
- Collect and analyse longer series
- Explore possible group transitions
- Formulate policy applications (insights for developing countries)

Selected References



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