CEDAR Centre for Diet and Activity Research
A UKCRC Public Health Research Centre of Excellence

Dynamic Models:
An Example from the London Cycling System

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UK Clinical Research Collaboration igniting our potential

University of Cambridge Institute of Public Health

UEA University of East Anglia

MRC Medical Research Council

Sixteen Reasons Other Than Prediction to Build Models:

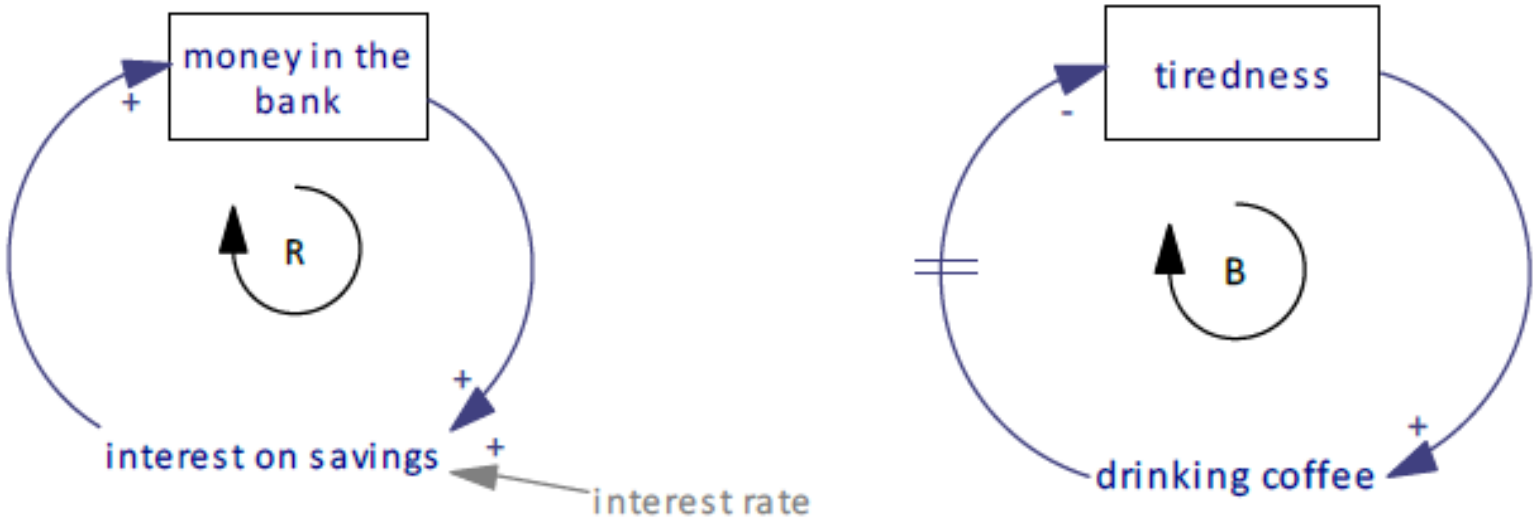
Epstein 2008 Why Model?

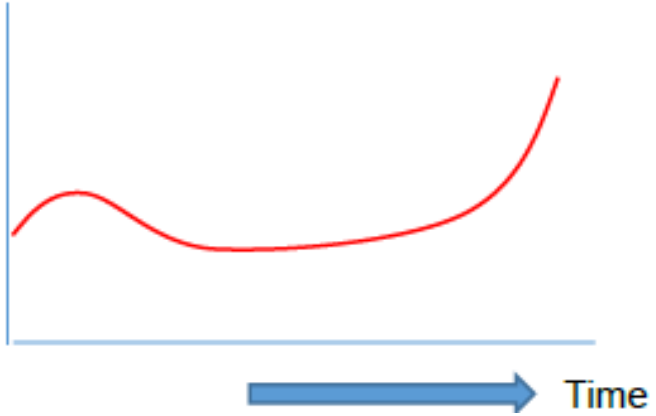
1. Explain (very distinct from predict)
2. Guide data collection
3. Illuminate core dynamics
4. Suggest dynamical analogies
5. Discover new questions
6. Promote a scientific habit of mind
7. Bound (bracket) outcomes to plausible ranges
8. Illuminate core uncertainties.
9. Offer crisis options in near-real time
10. Demonstrate tradeoffs / suggest efficiencies
11. Challenge the robustness of prevailing theory through perturbations
12. Expose prevailing wisdom as incompatible with available data
13. Train practitioners
14. Discipline the policy dialogue
15. Educate the general public
16. Reveal the apparently simple (complex) to be complex (simple)

Understanding Complex Systems

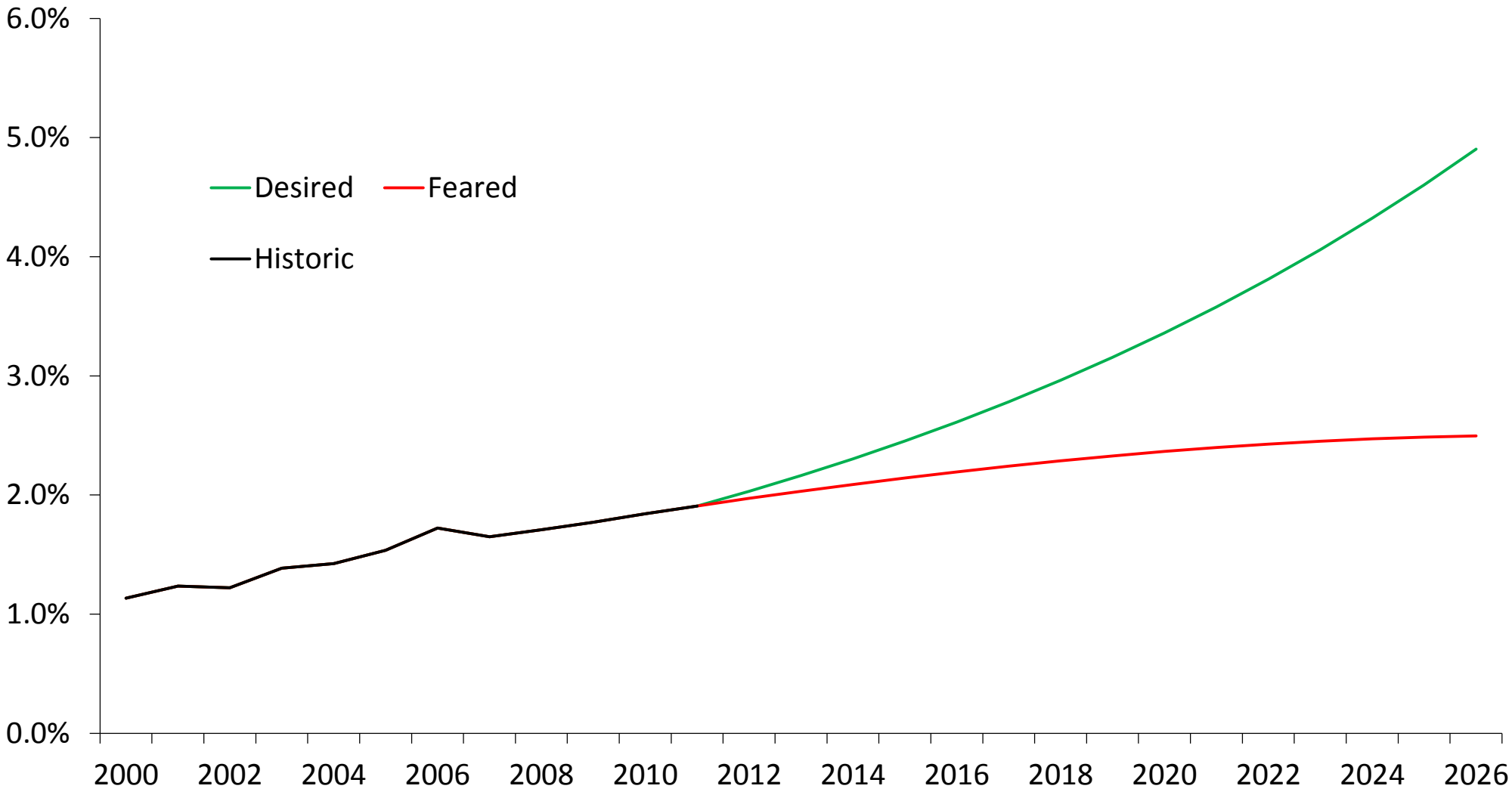
- Complex systems include many interacting variables that change over time
- The pattern of interaction drives of system behaviour over time
- Interaction between variables is characterised by feedback loops
- Accumulation of “stocks” is important, including people, information, or resources
- Time matters. The pattern of cause and effect may change variables at different rates over time, creating tensions between short- and long-term policy effects
- Models should make complexity tractable

Reinforcing & Balancing Loops



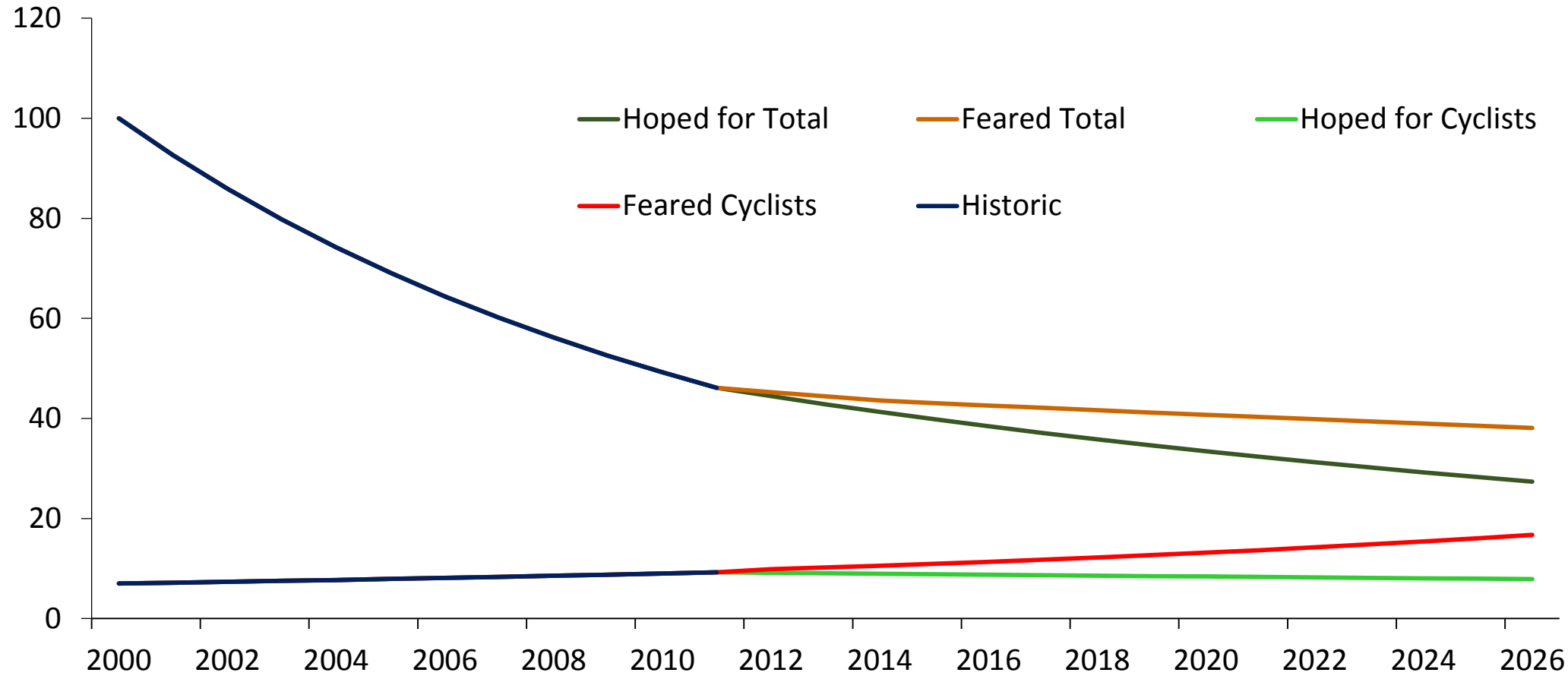


London Cycling Mode Share

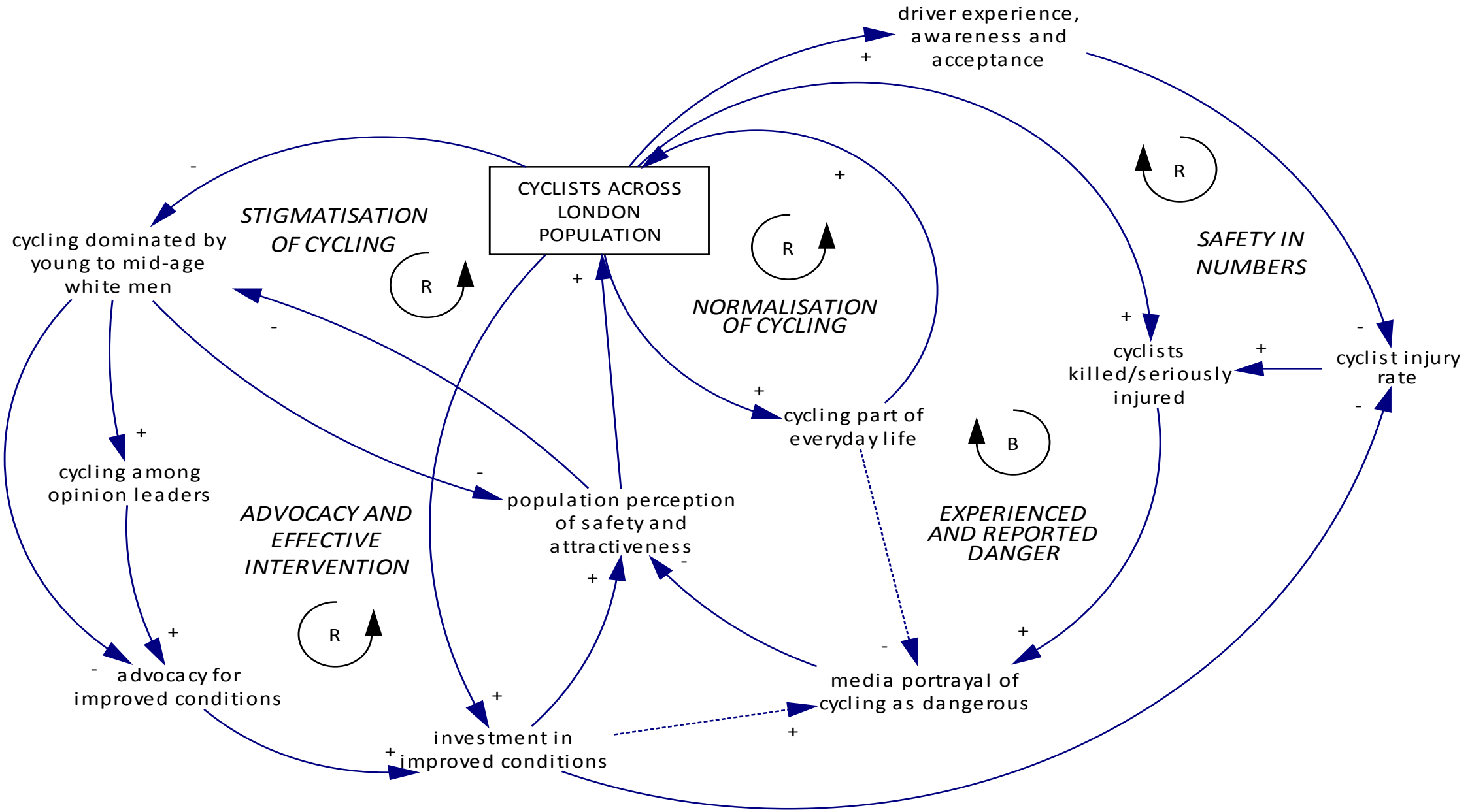


London Road Traffic Killed/ Seriously Injured

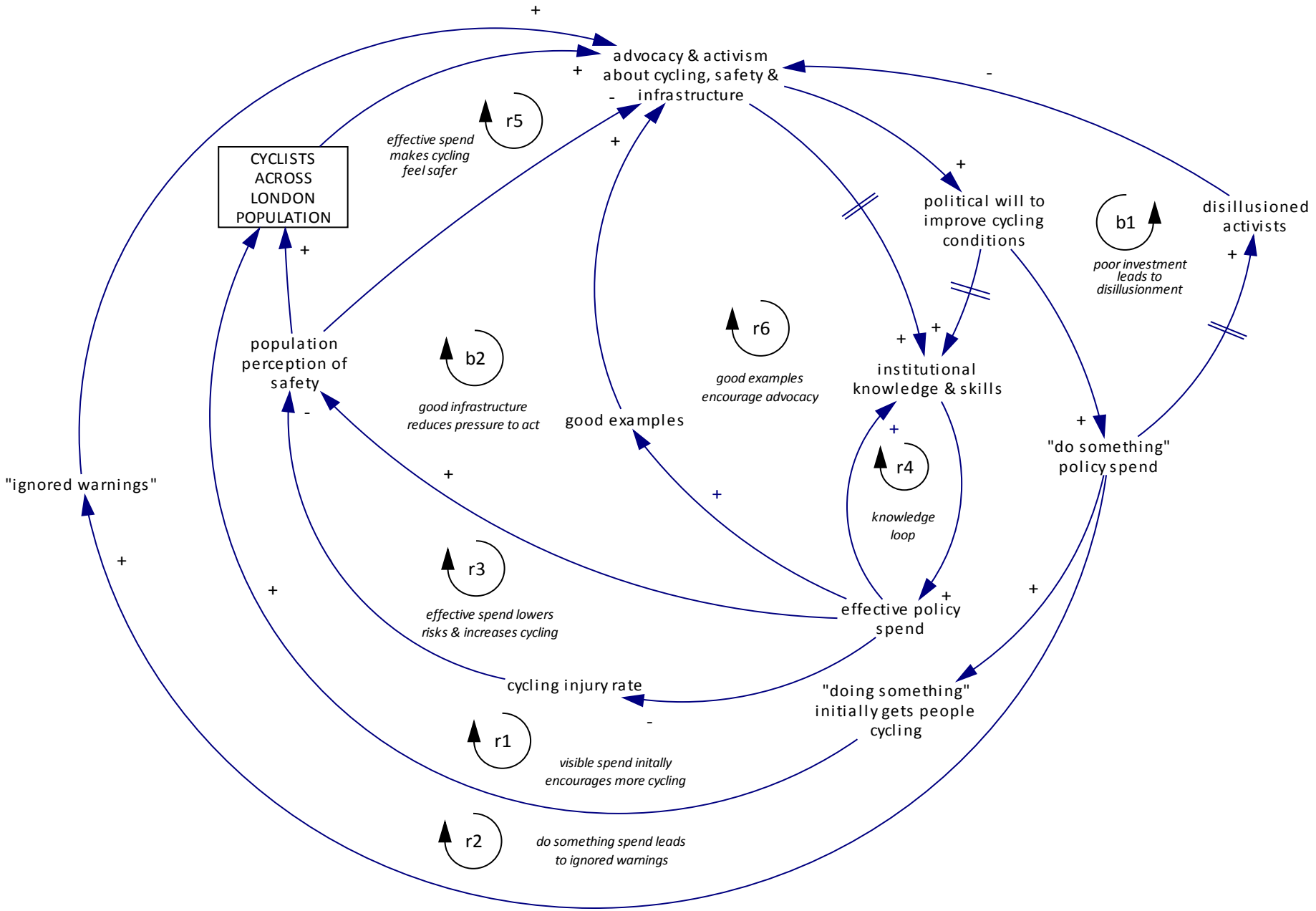
Year 2000= 100 for total KSI



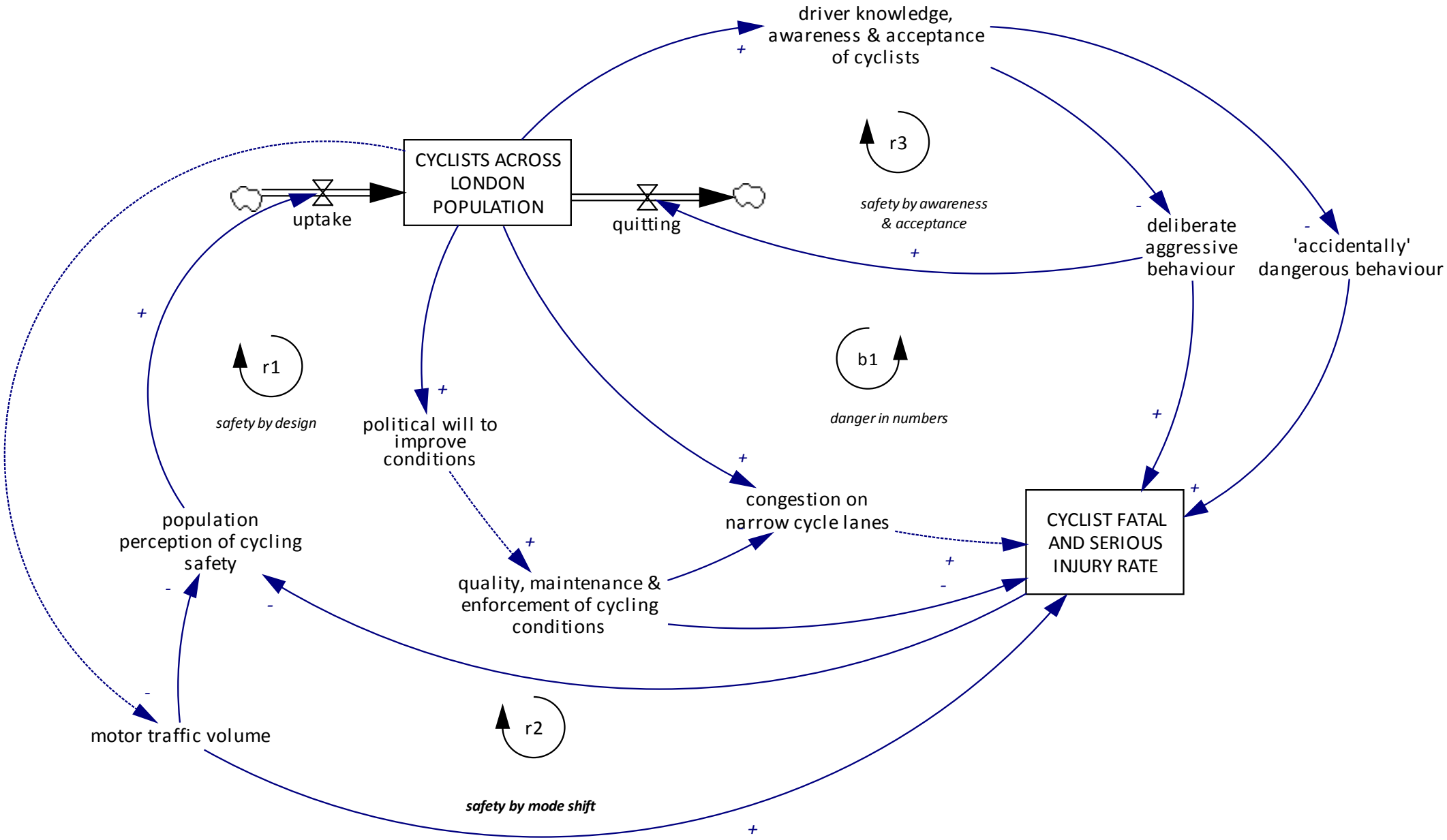
London Cycling System Overall Diagram



Advocacy, Knowledge & Effective Investment



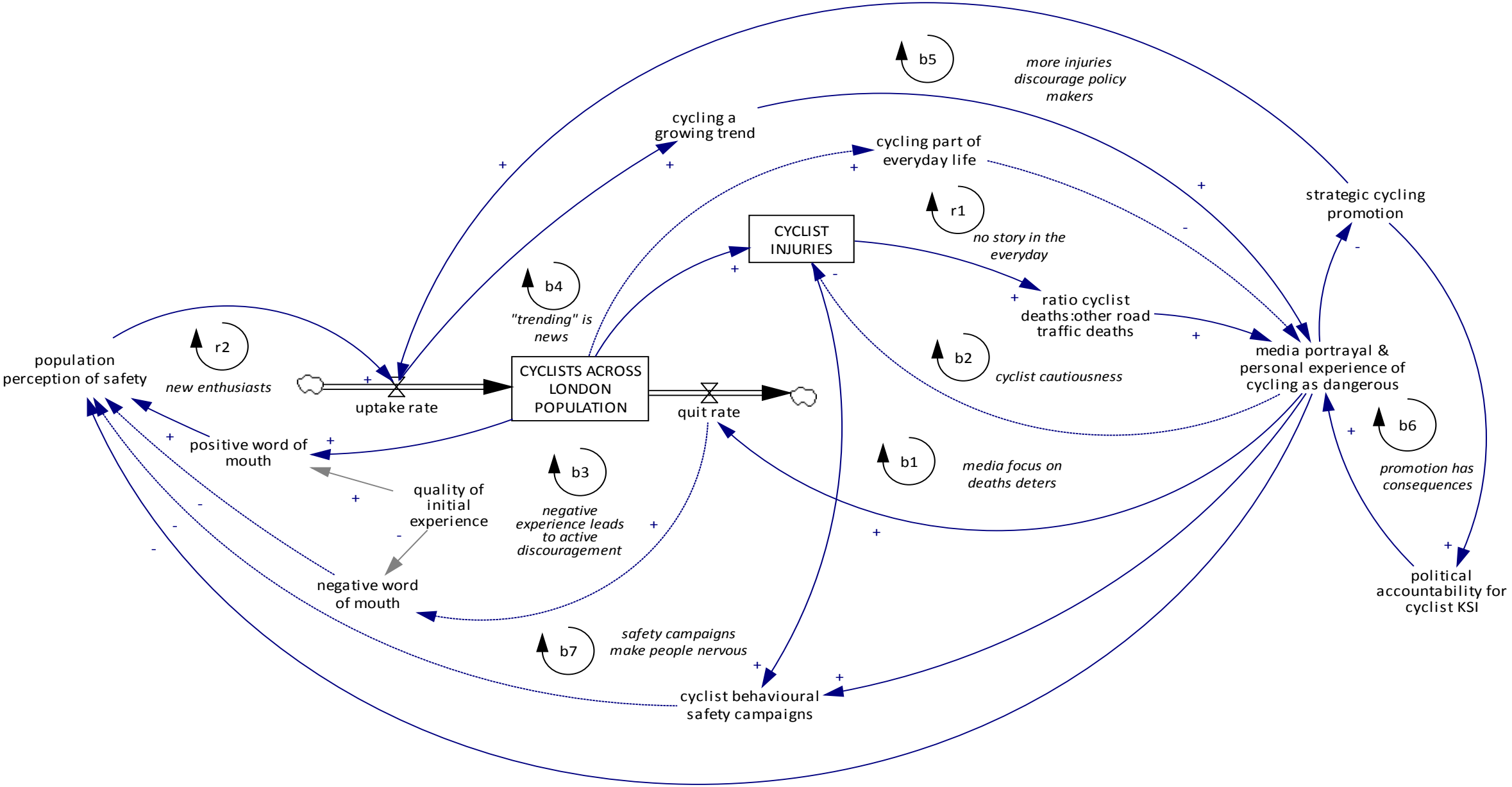
Safety in Numbers



Conclusions

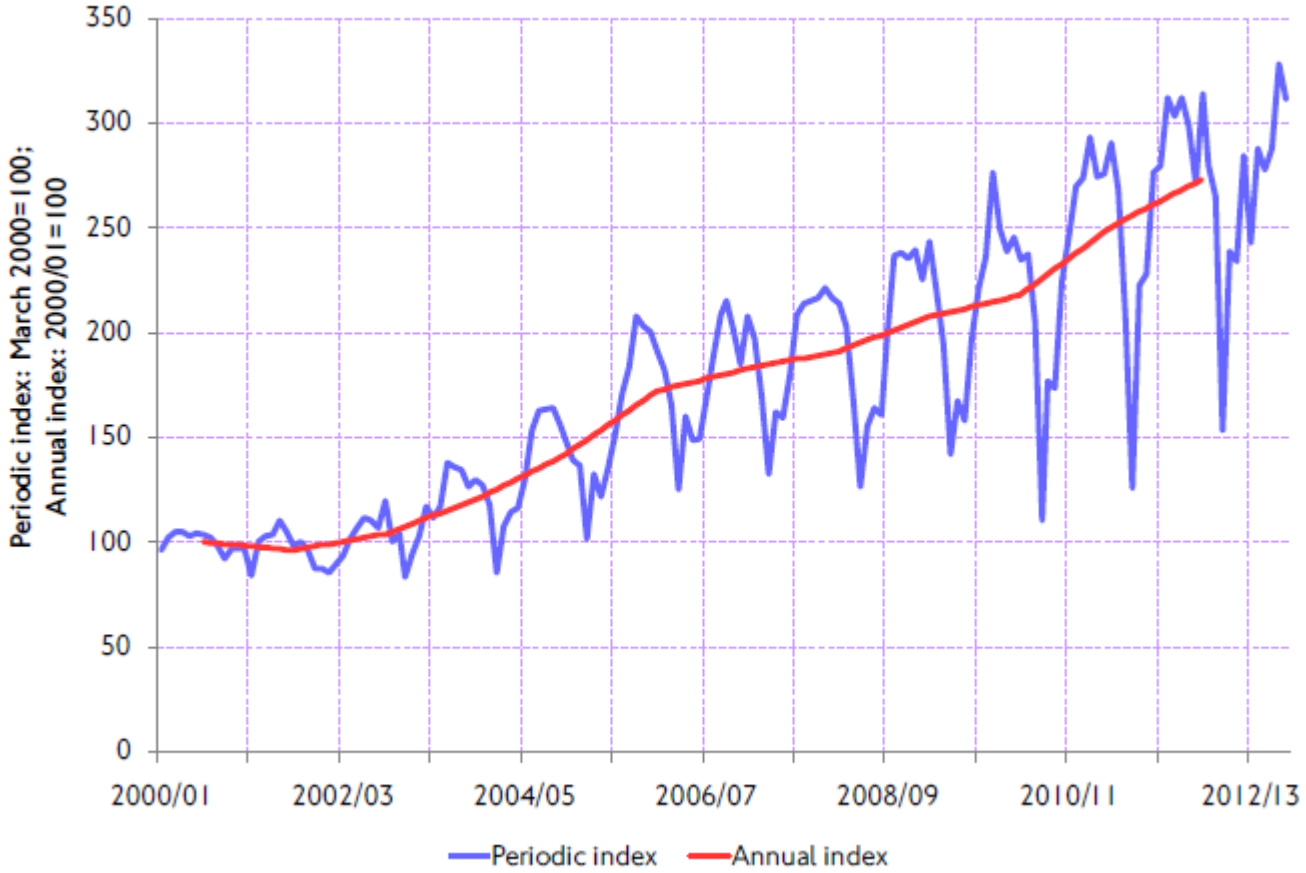
- We need models that capture dynamic complexity: why cycling not in choice set
- Relations between
  - policy & advocacy
  - culture & infrastructure
  - stuff & meaning
  - processes of normalisation/estrangement & stigmatisation
- Data & methods
- Models should make complexity tractable

Experienced & Reported Danger

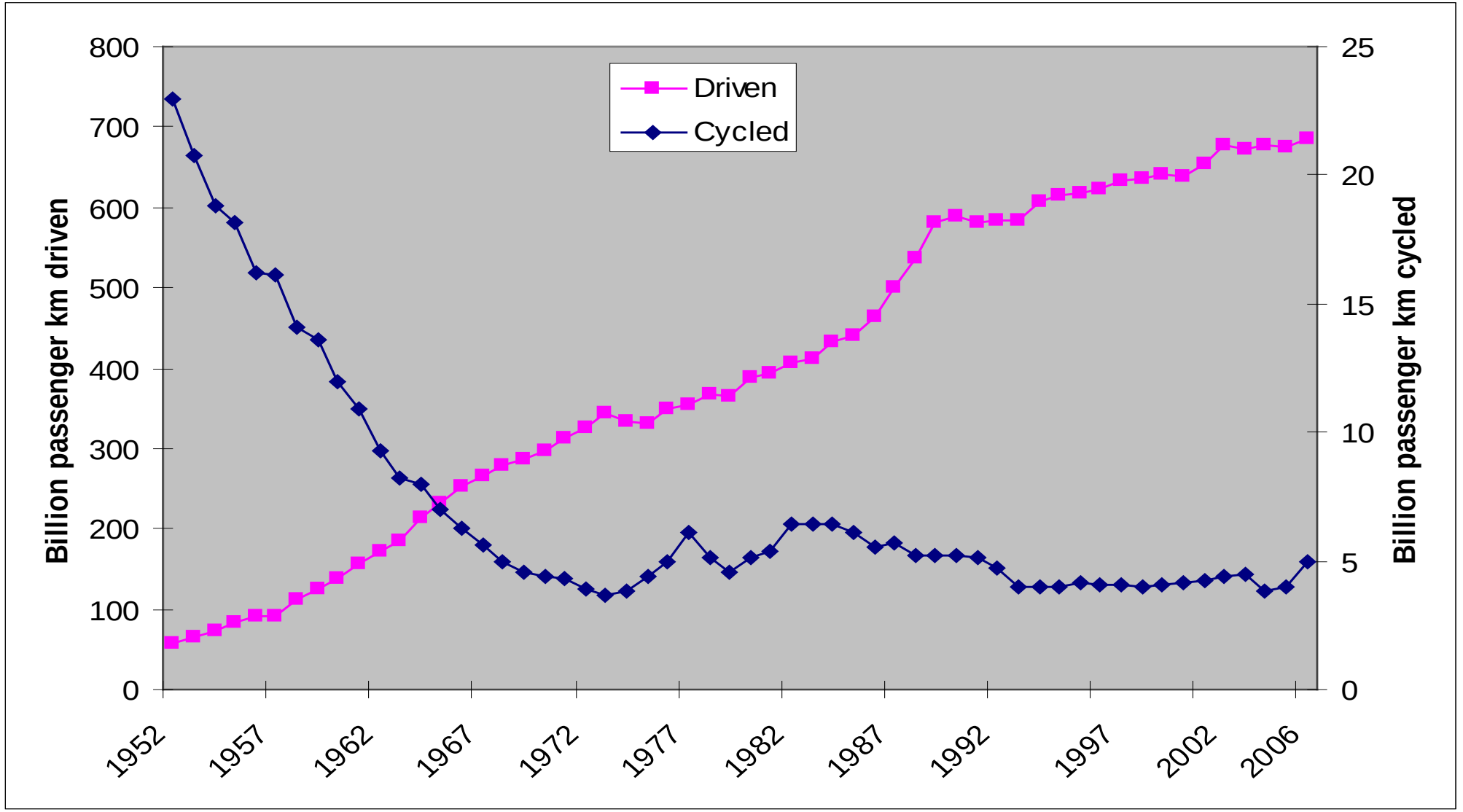


Transport for London Road Network (TLRN)

Figure 3.9 Trends in cycle flows on the TLRN – annualised and periodic indices.

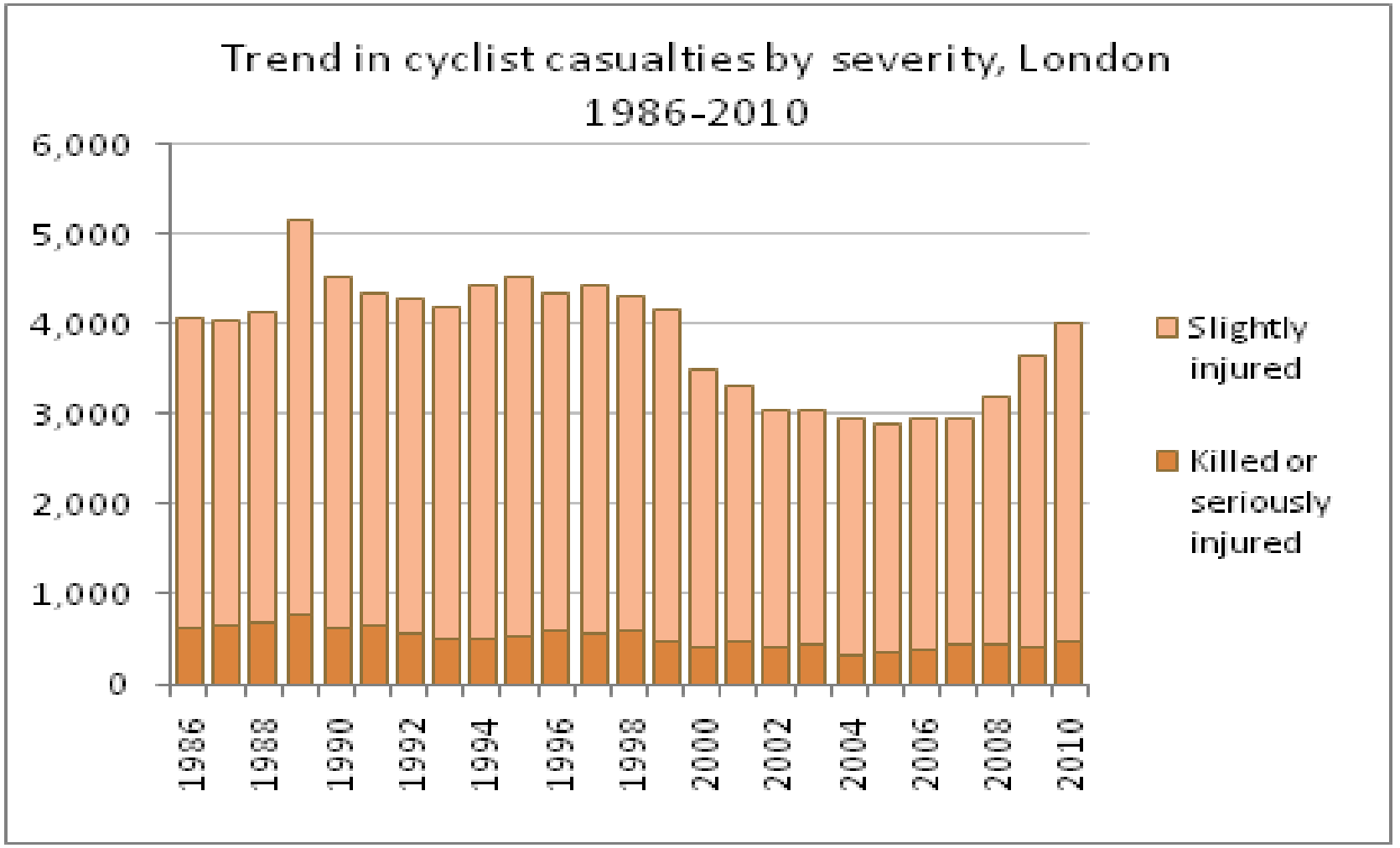


UK Total Distance Driven & Cycled



Source: National Transport Statistics UK

Trend in Cyclist Casualties by Severity



http://londontransportdata.wordpress.com/category/subject/cycling/