



The Future of Ireland's Car Stock – policy and projections

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Outline

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- Parameter Estimation
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- Conclusions



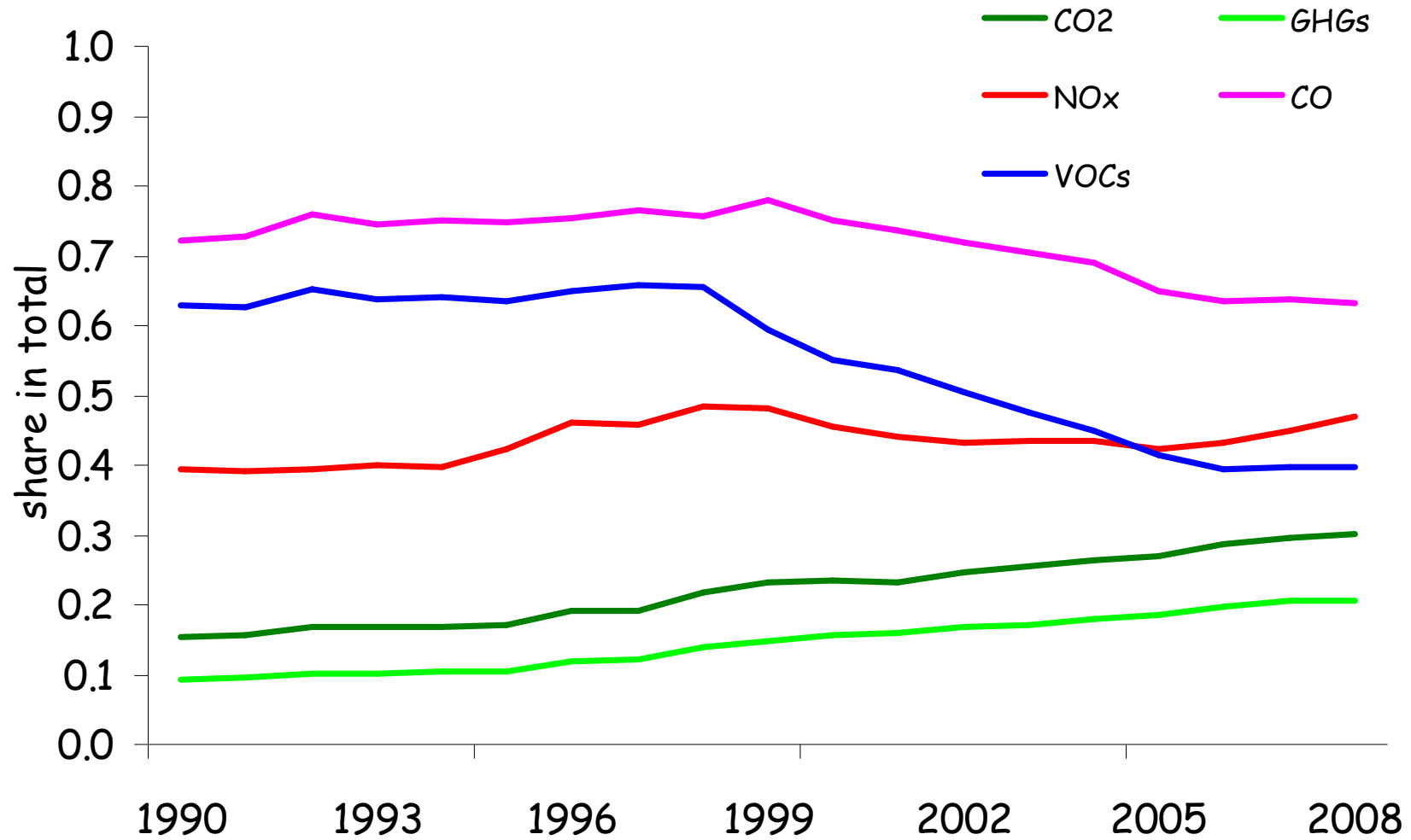
Introduction

- **Transport Emissions are increasing rapidly**
 - CO₂, NO_x, SO₂
 - Private car transport accounted for 5986 kt CO₂ in 2006*
 - This translates to 37% of transport energy related emissions
 - And about 12% of overall CO₂ emissions
- **Number of Policy Changes**
 - Purchase (VRT), Ownership (Motor Tax) and Usage (Carbon tax)
 - Recent government Scrappage scheme
- **Technological Uncertainty**
 - Electric Vehicles and conventional Cars

*Source: O'Gallachoir (2010)



Transport Emissions



Source: ISus v0.4



ISus Car Stock Model (1)

- **Assumptions**

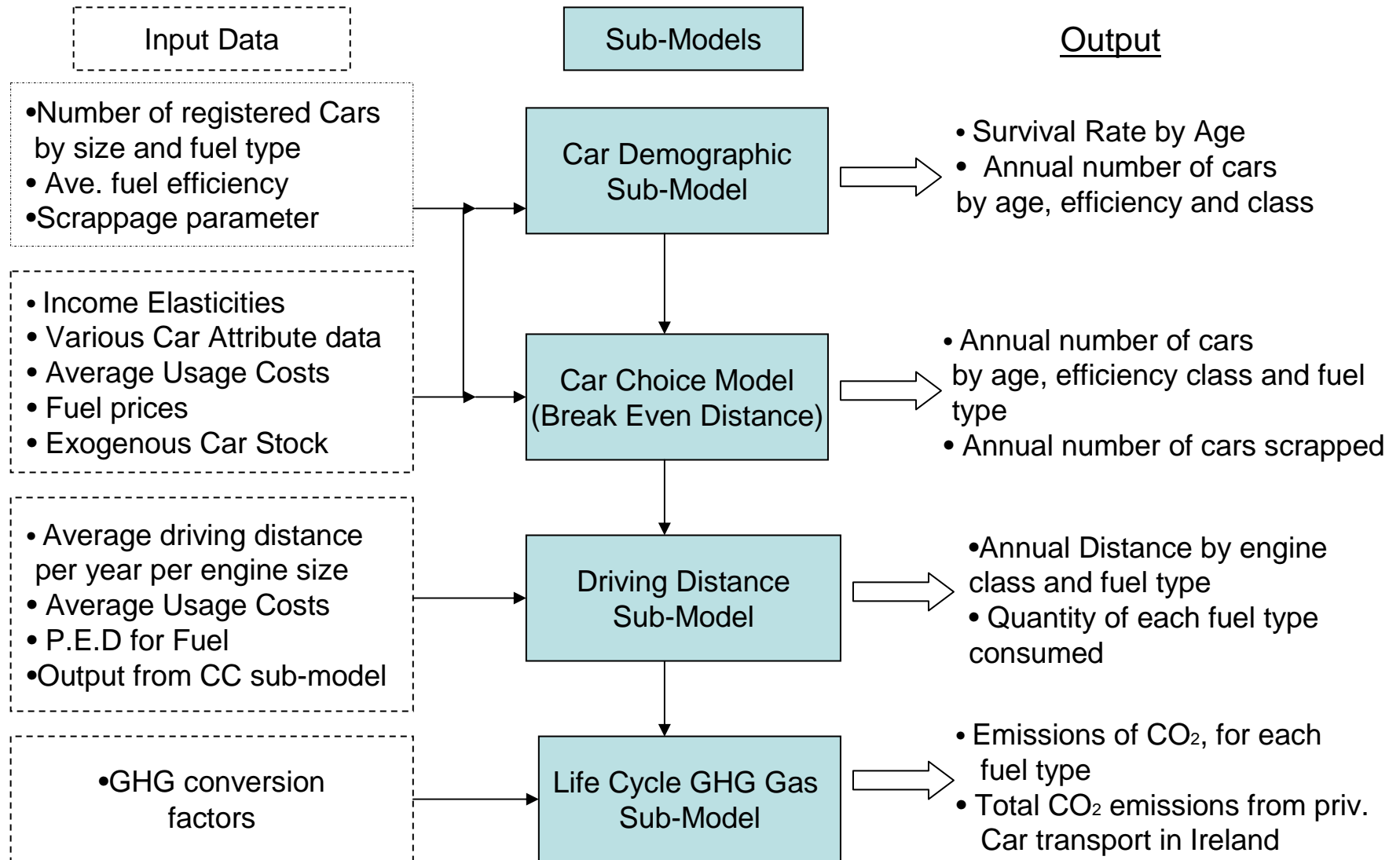
- Change in ownership has no effect on usage behaviour
- No further major policy changes
- Cars follow a scrappage function

- **Data Sources**

- CSO (Sales & Mileage Distribution), SEI (Efficiency & Conversion factors), Irish Times Archive (Historical Efficiency), SIMI (New Car prices & demand), HBS (various parameter estimates), VCA in the UK (Emission attributes), Bulletin of Vehicle Licensing Statistics (Diesel Sales & Stock Age profile)



ISus Car Stock Model (2)





Parameter Estimation (1)

- **Car Demographic Model**
 - This follows a scrap and sales approach which allows us to track changes in the quantity, size, fuel type, efficiency and age of private car stock

- **Car Size Choice**
 - Multi-nominal logit model which gives us income elasticity for each engine size
 - Estimated using HBS 04/05



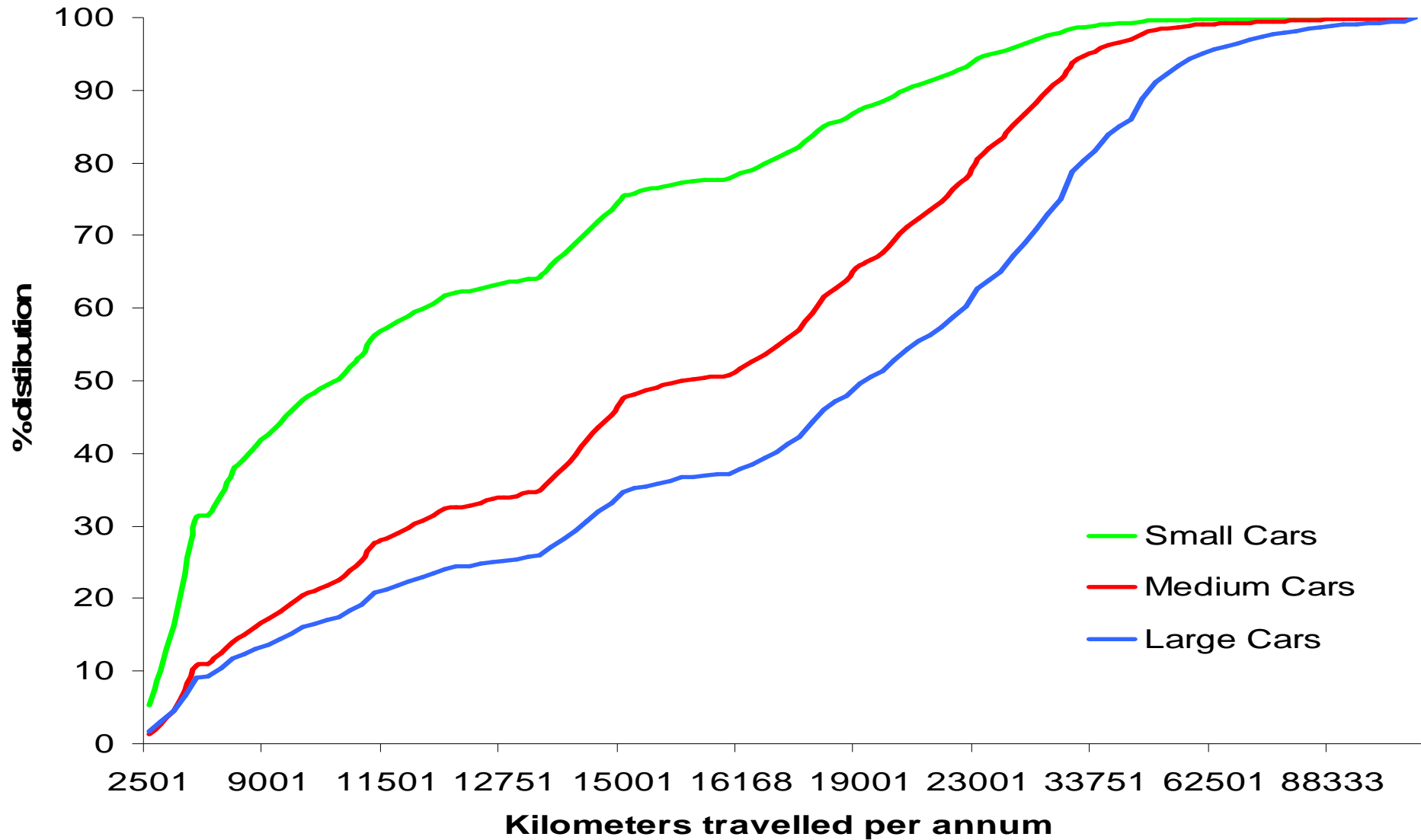
Parameter Estimation (2)

- **Car Distance Model**
 - Computes the mean distance travelled by each fuel and engine size category
 - Estimated using Mileage data from CSO for each engine size

- **Car Fuel Choice**
 - Break Even Distance model to compute market shares of diesel in each engine class
 - Estimated using Mileage Distribution data from CSO



Mileage Distribution





Tax Changes

- New emission based effects purchase and ownership of vehicles
- Effectively reduces the price of small petrol cars and middle diesel ones
- New Car Sales show an obvious effect
- Effect on Emissions is not so clear cut
 - Increasing share of Diesel cars prior to tax change
 - No evidence of increasing diesel market share having any significant effect on average driver distance for each Diesel engine size



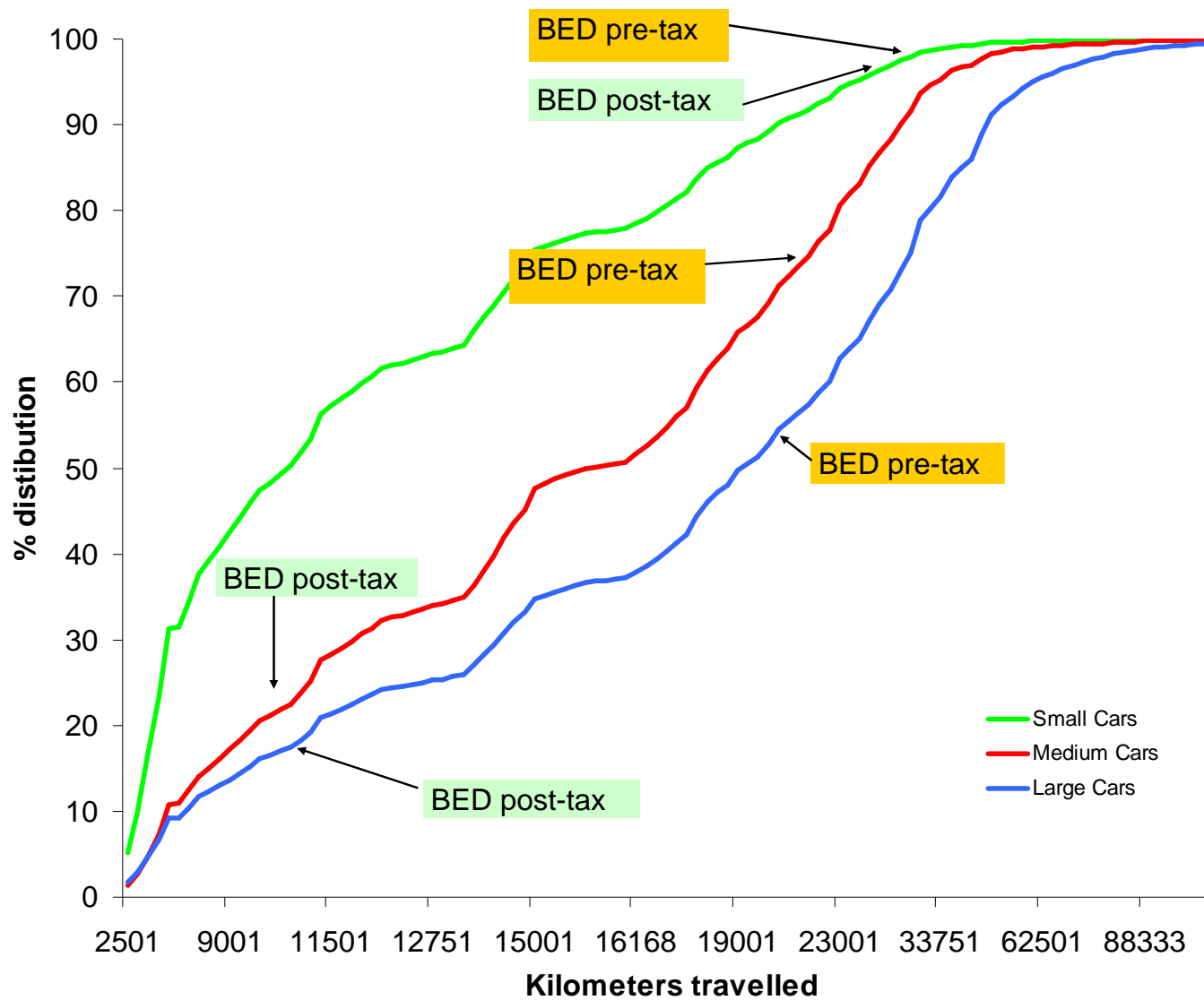
Example of Tax Change

Toyota Corolla 1.4 litre	Pre-Tax Change	Post-Tax Change	Emission Band
Petrol	€22,105	€22,675	D
Motor Tax per annum	€333	€430	
Diesel	€24,775	€22,915	B
Motor Tax per annum	€333	€150	
Ford Mondeo 2.0 litre			
Diesel	€36,345	€33,390	D
Motor Tax per annum	€614	€430	
Petrol	€33,215	€33,525	E
Motor Tax per annum	€614	€600	

Source: SIMI and own calculations

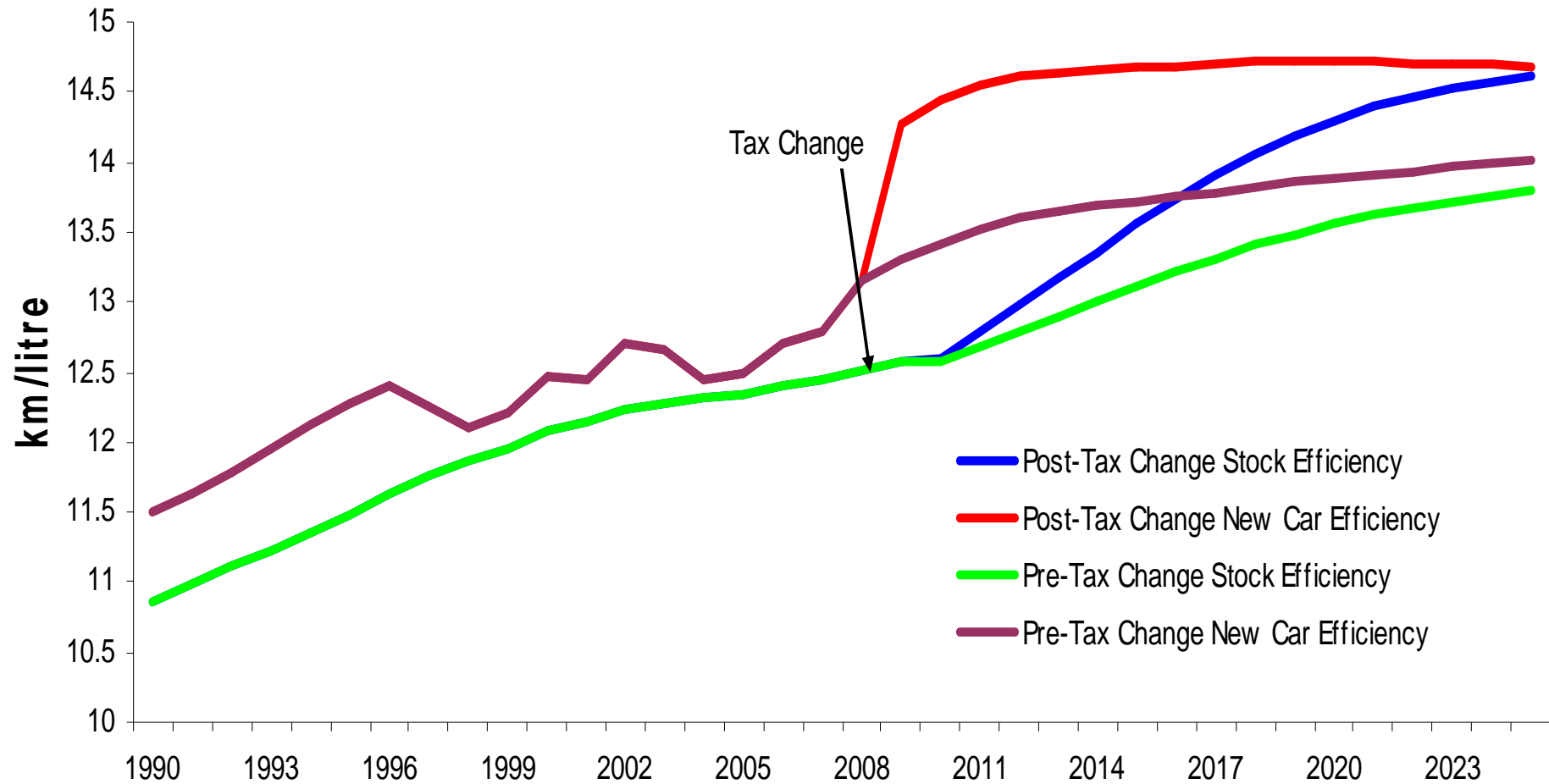


Break-Even Distance effect





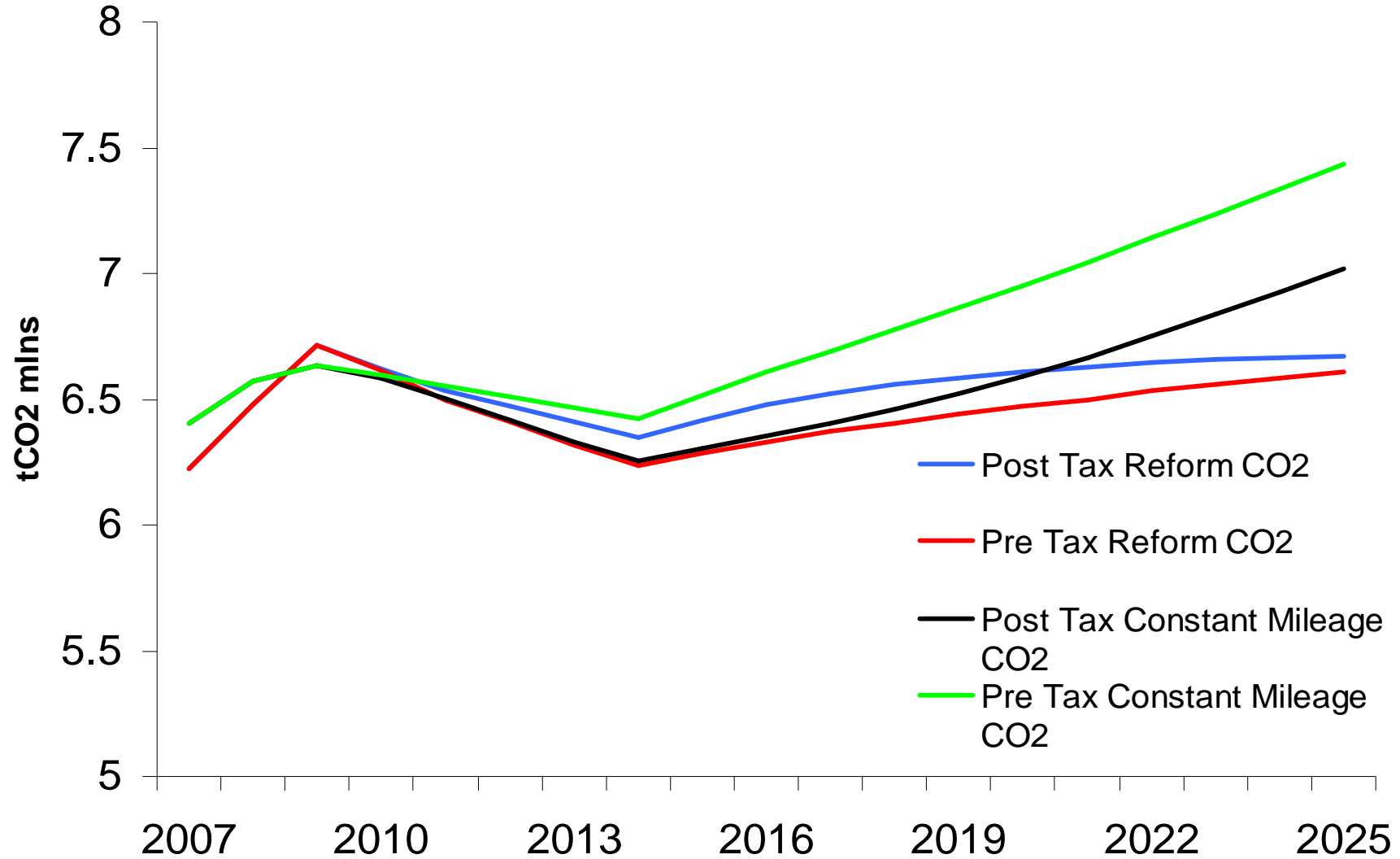
Effect on Efficiency



Source: ISus v0.4



Effect on CO₂



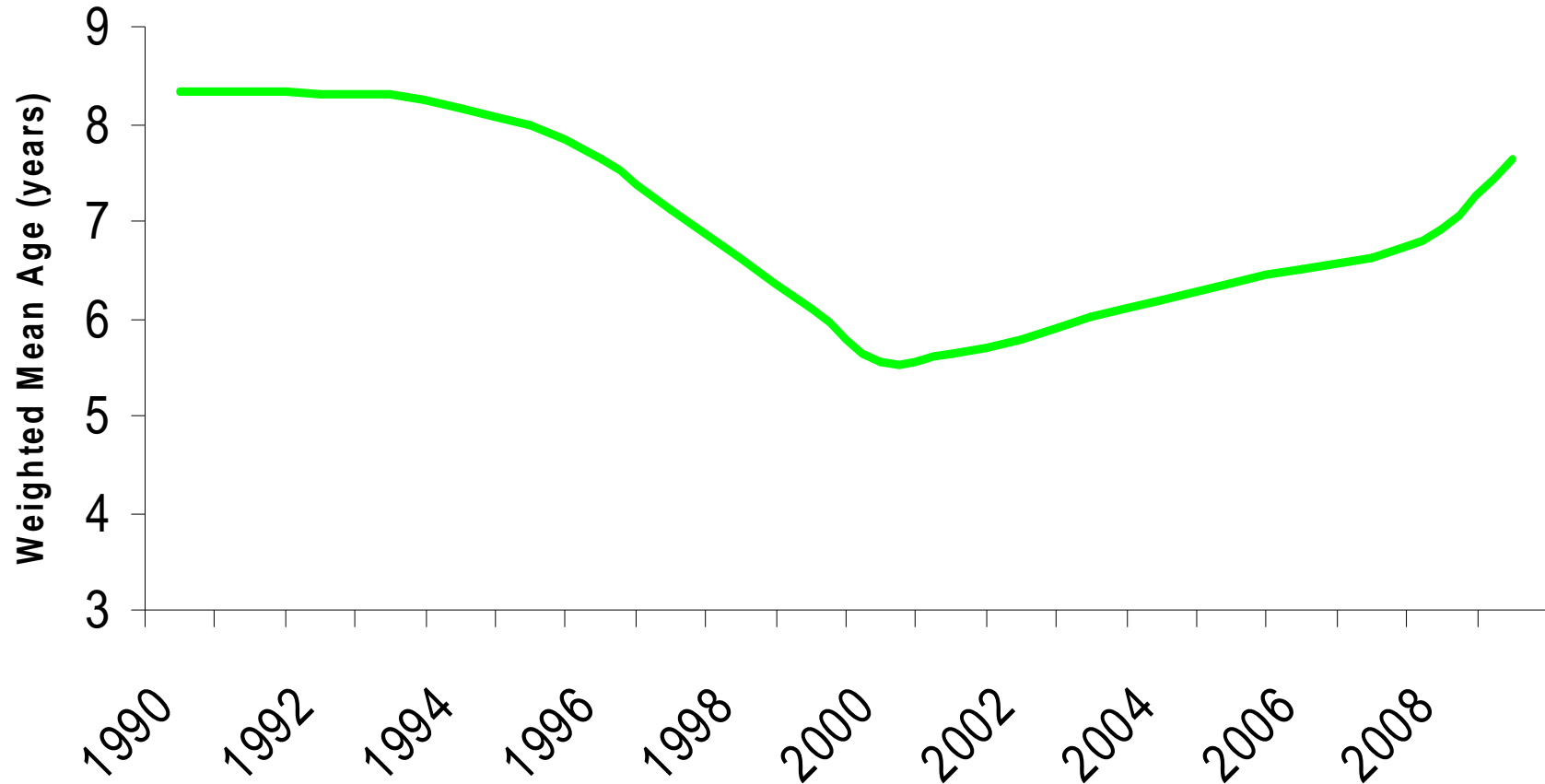


Scrappage Scheme

- The model is not designed to explicitly explore this question
 - There is lack of data for the second hand market
- However, we have knowledge of the age profile of the stock
 - Framing the Scrappage decision – Engineering & Cyclical components
 - We also can adjust the Scrappage parameters in the model for cars over 10 years old
 - There appears to be little actual effect
 - In terms of emissions, a small negative effect



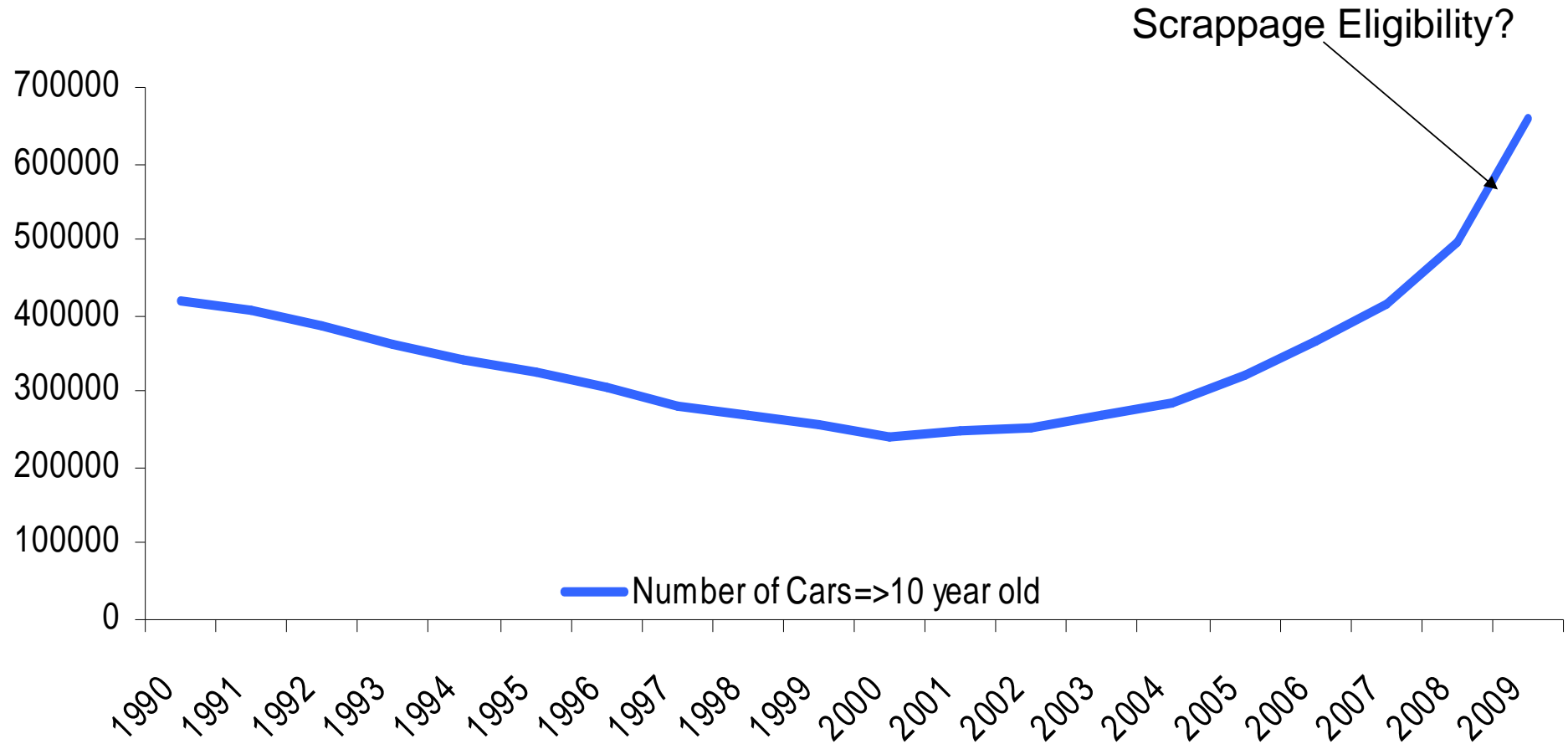
Age of Car Stock



Source: ISus v0.4



Cars > 10 years old



Source: ISus v0.4

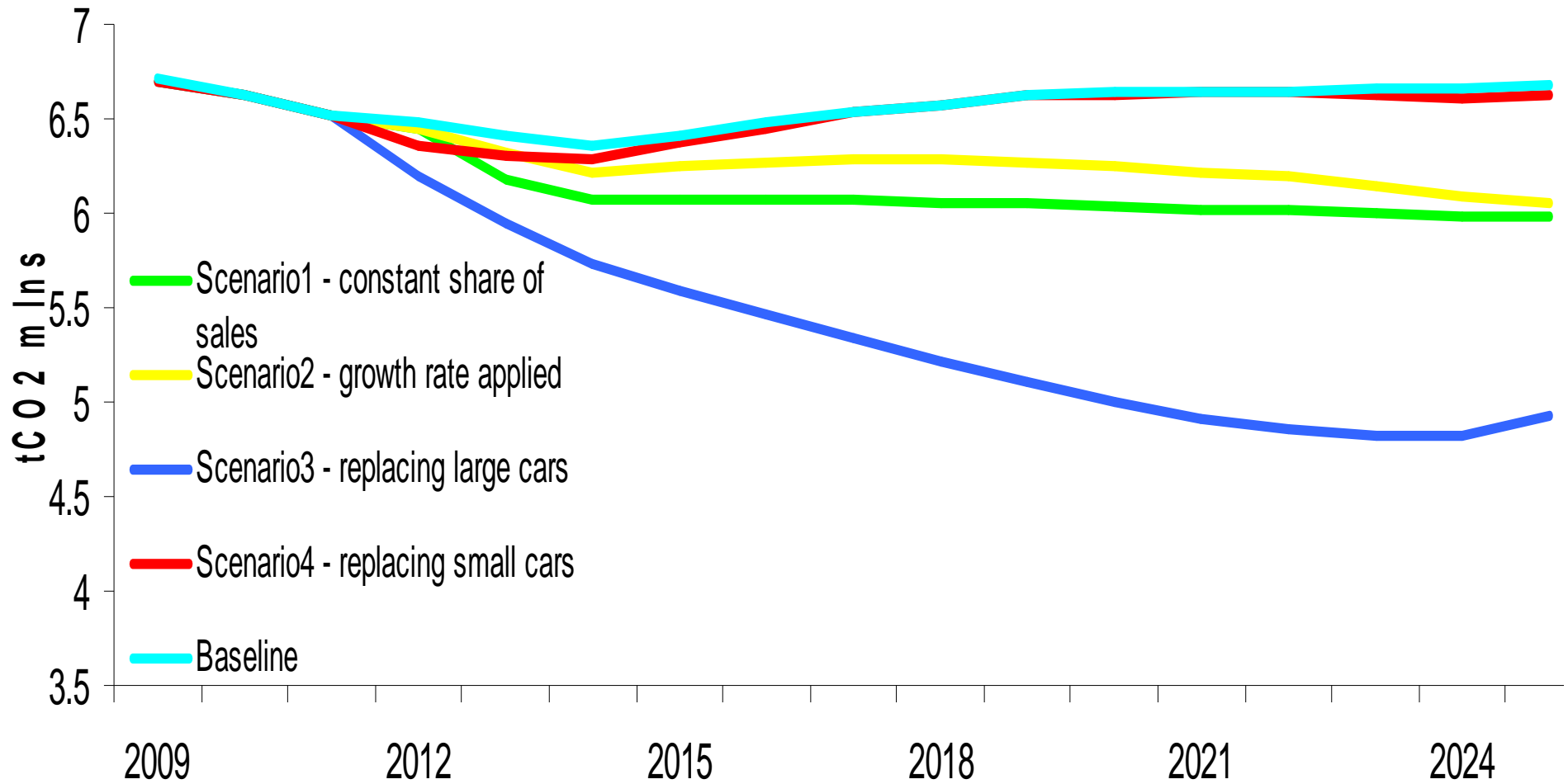


Electric Vehicles

- Basic Selling Scenarios to achieve 10% of total Car Stock by 2025 (c. 240,000)
- 4 Scenarios
 - Scenario 1 is based on a constant 10% market penetration from 2012-2025. The share of electric vehicles is distributed equally across other fuel types.
 - Scenario 2 is based on a growth rate of 10% in the share of electric vehicles with initial market penetration being 5% in 2012. Again, these electric vehicles are distributed equally across other fuel types.
 - Scenario 3 is based on a market penetration as in Scenario 1 but these electric vehicles partially replace the largest emitting engine categories.
 - Scenario 4 is again based on a market penetration as in Scenario 1 with this simulation computing the resultant CO₂ if these new electric cars replace low emitting cars like small petrol and medium diesel ones.
- Importance of replacement effects
- Type of purchaser and driving behaviour uncertainty



EV Scenarios



Source: ISus v0.4



Conclusions

- Much of the Car Stock is here to stay
- Technological progress will have an effect but will not achieve end goal on its own
- Other factors like congestion, quality of life and health have significance
- Policies aimed at reducing the VKT whether spatial, behavioural or price based are important

