Impacts of Used Vehicles on Climate Change and Air Pollution Worldwide

Ensuring Better Air Quality and Reduced Climate Emissions through Cleaner Used Vehicles

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Key issues for today

- Why are 2nd and vehicle imports a concern?
- What is the current status and trends in global trade?
- What are different countries doing to grapple with the issue of old vehicles entering their markets?
- What policies are preferred?
- Can we reach some common agreements on basic principles regarding this issue?
Reasons for 2\textsuperscript{nd} hand vehicle import/export

Import side:
• Used vehicles offer consumers car ownership at a lower cost
• Open trade policies do not restrict flows
• Regulations/fiscal policies on imports sometimes favor 2\textsuperscript{nd} hand vehicles

Export side:
• Economically attractive prices relative to internal markets
• Stringent emission standards/recycling standards in exporting countries
Why concerns about this trade?

Basically the spread of inferior vehicles:
- Vehicle model year highly correlated with safety (individual vehicles may also become less safe as they age)
- Strong correlation with pollutant emissions
- Rising correlation with fuel consumption/CO2 emissions
- Rising car ownership leads to increasing traffic congestion
- Oil consumption/balance of payments
- Vehicle scrappage/disposal issues
Paris Agreement: Deep Transport CO$_2$ Reductions Needed

- IEA 2 degree scenario may not be aggressive enough
IEA ETP 2012 (and later ETPs): global light-duty vehicle stock will exceed 2 billion by 2050

- Almost all growth is in developing countries
Air pollutants, CO2 – all are dropping with newer models

Air pollutants affecting human health
- NOx
- Non-methane hydrocarbons
- Particulates (PM-10, PM2.5)
- Carbon monoxide
- Toxic emissions (e.g. benzene)
- Heavy metals

Air pollutants affecting the climate
- Methane
- Black carbon
- N₂O

Fuel quality / tailpipe controls
- Fuel economy improvement
Reducing air quality requires coordination of fuel quality and vehicle emission controls

- **PM2.5 emissions as a function of vehicle emission standards**

- **Impact of fuel sulfur levels and emissions control standards on PM$_{2.5}$ emissions from heavy-duty diesel vehicles (grams/km) Source: Climate and Clean Air Coalition (2016)**
Global Fuel economy Initiative: cut energy use/km by 50% by 2030

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<th></th>
<th>2020</th>
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<td><strong>New Cars</strong></td>
<td><em><em>30% reduction</em> in L/100km compared to 2005</em>*</td>
<td><strong>50% average improvement globally</strong></td>
<td><strong>50% + globally</strong></td>
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<td>Engines, drive-trains, weight, aerodynamics.</td>
<td>Hybridisation of most models.</td>
<td>Significant contributions from Plug-in vehicles</td>
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<td><strong>Total fleet</strong></td>
<td><strong>20% reduction</strong></td>
<td><strong>35% reduction</strong></td>
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<td>With lag time for stock turnover; includes eco-driving, maintenance</td>
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Historical fleet CO₂ emissions performance and current standards (gCO₂/km normalized to NEDC) for passenger cars

*Note that Japan has already exceeded its 2020 statutory target, as of 2013.*
Countries could dramatically cut their fuel import bills in the future, but must strongly encourage newer, highly efficient models.

Figure 10.9  Fuel import bills in selected countries by fuel and scenario

Source: IEA World Energy Outlook 2012
Electric vehicles – the shape of the future, better than the past

- UN Declaration on E-mobility calls for 100 million sales by 2030, and is consistent with IEA 2 degree scenario
- Sales of BEVs and PHEVs by year across top 8 national markets growing quickly
- Beginning to make appearances as 2\textsuperscript{nd} hand vehicles
The major vehicle exporting countries

- Vehicle balance of trade varies considerably
A few countries account for large numbers of 2nd hand exports

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<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Vehicle exports numbers</th>
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<td>1</td>
<td>New Zealand</td>
<td>113,183</td>
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<td>2</td>
<td>United Arab Emirates</td>
<td>104,952³</td>
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<td>3</td>
<td>Myanmar</td>
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<td>Kenya</td>
<td>65,469⁴</td>
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<td>5</td>
<td>Chile</td>
<td>58,603</td>
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<td>Sri Lanka</td>
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<td>South Africa</td>
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<td>Tanzania</td>
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<td>Total</td>
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Source: (Japan Export Vehicle Inspection Center, 2015)
# 2nd hand vehicle restrictions in Africa: state of play

- Many countries restricting to 5 years or less
- Some countries still allowing quite old vehicles to enter

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<tr>
<th>Age Restrictions</th>
<th>Countries with Age restrictions</th>
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<td>3 Years</td>
<td>Mauritius, Seychelles, Algeria, Chad</td>
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<td>4 Years</td>
<td>Gabon, Senegal</td>
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<td>5 Years</td>
<td>Libya, Mozambique, Niger, Tunisia</td>
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<td>7 years</td>
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<td>8 years</td>
<td>Kenya, Mauritania, Namibia</td>
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<td>10 years</td>
<td>Eritrea, Benin, Democratic Republic of Congo</td>
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<td>12 Years</td>
<td>Liberia</td>
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<td>12 Years</td>
<td>Nigeria and Swaziland</td>
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Some countries are seeing average age of imported vehicles rising
Asia – patchwork of different regs

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<th>Compliance to emission standards</th>
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<th>CHI</th>
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Potential policies to discuss

• **Regulatory**
  • Age-based restrictions of vehicles
  • Emissions standard-based restrictions
  • Fuel economy regs applied to 2nd hand vehicles

• **Vehicle import or registration taxes**
  • By age (but rising, not declining by age!)
  • Pollutant standard/CO2 emissions based
  • Ad valorem or engine size also can work
  • Incentives for highly efficient/electric vehicles
What other information do we need?

• International trade flows still poorly understood
  • How many vehicles of what types?
  • New v. 2nd hand vehicles entering each country, age and model-level detail
  • Information on origins of vehicles

• National registration databases with new and (newly registered) 2nd hand vehicles are very useful
Final thoughts, questions...

• How do policy makers grapple with the strong desire for car ownership – whatever the societal cost?
• Need to better document the impacts 2\textsuperscript{nd} hand vehicles have on air quality, energy/CO2, traffic, and safety
• How much do 2\textsuperscript{nd} hand vehicle flows slow down spread of new technologies?
• Need to catalog policies and align these where possible
• End-of life issues – what is happening to these vehicles?