

Comparing Fuel Efficiency Across Countries

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Study Objectives

- ❑ Fuel economy of the new car fleet is widely different across countries but there is no analysis of all contributory factors.
 - ❑ Some factors , like size differences, are obvious across countries, but it is not clear if there are consistent differences in technology application for fuel economy other than the diesel engine.
 - ❑ We compared the new light duty vehicle fleet across 5 countries – USA, France, Germany, China and India – in model year 2008.
 - ❑ Analysis attempted to explain all the reasons for the new vehicle fleet fuel economy difference through data decomposition method.
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Regional Preferences

- ❑ Income, taxes, fuel price, geography and infrastructure determine attribute valuations in different regions of the world
 - ❑ US market has high valuation of comfort, size and convenience, with high income and relatively low vehicle and fuel price.
 - ❑ European market has high valuation of performance, and diesel engine market is helped by reduced diesel fuel tax. Average car size is in the B/C class
 - ❑ Many developing country markets have high valuation of vehicle and fuel cost due to relatively low income, but many also feature a large diesel fuel subsidy.
 - ❑ Individual markets also affected by supply constraints and import taxes, especially in the developing world.
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Inter Country Comparison

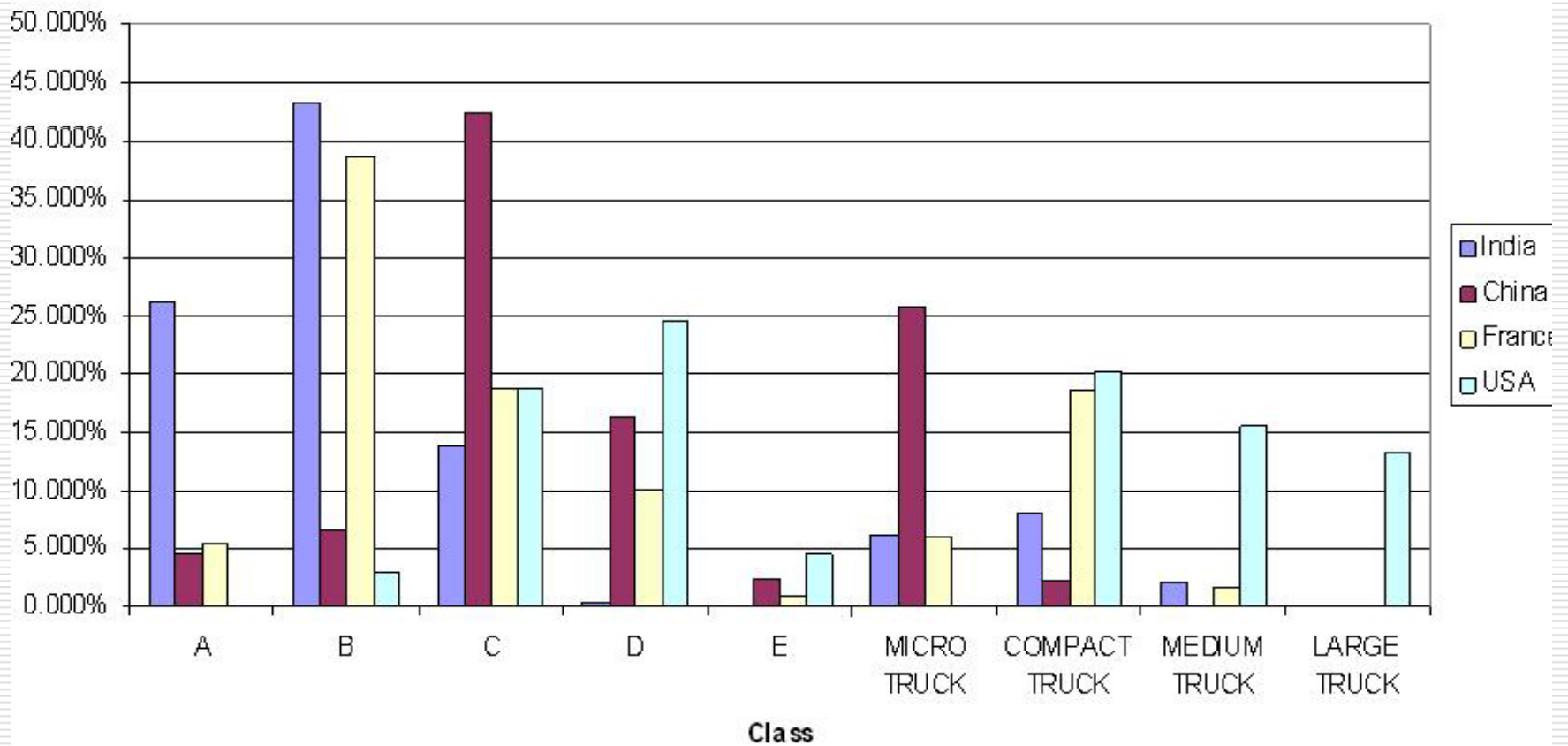
	USA	France	China	India
FC L/100km NEDC basis	10.1	5.5	7.6	5.7
Average Engine Size	3 to 3.5 L	1.2 to1.5L	1.3 to 1.6L	0.9 to 1.3L
Diesel Penetration	~0	81%	~0	35%
Manual Transmission	6%	92%	~40%	~60%

Data Issues

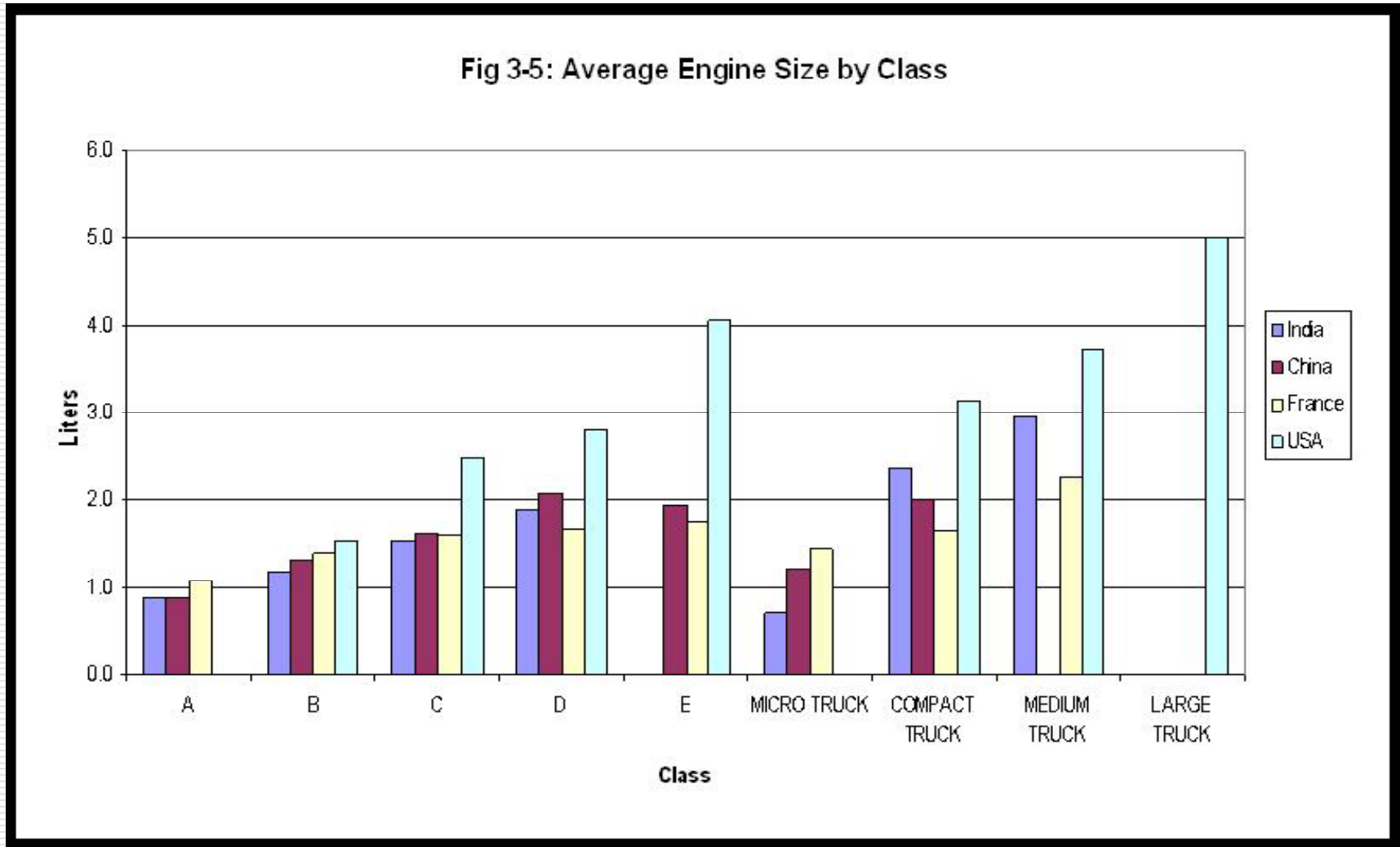
- ❑ Detailed data for all countries on a uniform basis presents a challenge.
 - ❑ We obtained data from Polk for Europe and India, but had sales data for the US and China at the model/engine level. Vehicle specifications were generally obtained from published reports or manufacturer websites.
 - ❑ Fuel economy data was obtained from official government listings, but test procedures are different across different countries. The fuel economy numbers were all adjusted to be equivalent to the European NEDC test results, but this is based on average adjustments.
 - ❑ Data had to be matched manually so all sales could not be included. Instead we focused on the top 70% of sales
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Sales by Size

Fig. 3-3 Market Share of Class by Country

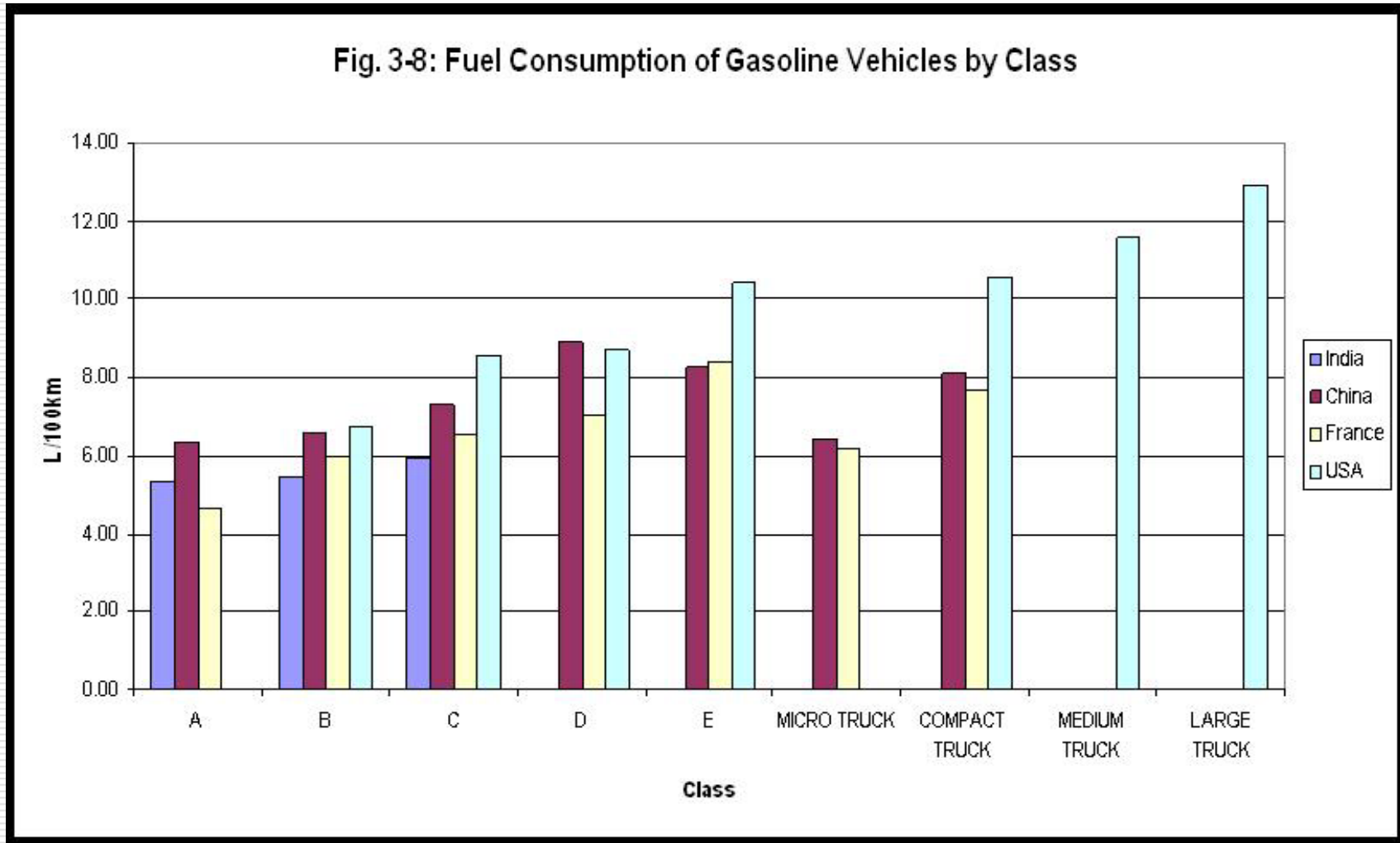


Engine Size by Class



Gasoline Vehicle Fuel Economy

Fig. 3-8: Fuel Consumption of Gasoline Vehicles by Class



Size Mix Effects

Baseline:	Delta FC	Percent	Delta FC	Percent	Total Delta
France	Vehicle	Vehicle	Market	Market	FC
USA	-2.734	55.5	-2.253	44.5	-4.923
China	-2.081	97.7	-0.0485	2.3	-2.129
India	-0.3913	142.7	+0.117	-42.7	-0.274

Technology Comparison

- After all adjustments for diesel, manual transmission, weight and performance, we find
 - There are no significant differences in technology between US and France
 - The Chinese market shows a significant technology opportunity in the smaller size classes
 - The Indian market also shows significant technology opportunity in the smaller size classes
 - The larger size classes are dominated by German imports in the Chinese and Indian market with OECD level technology
 - The technology opportunity in the smaller size classes must be tempered by the fact that these vehicles are very cheap in India and China when compared to equivalent size vehicles in European markets
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Conclusions

- ❑ Across countries markets are very different due to both income and consumer preference differences.
 - ❑ There does appear to be some technology lag in smaller vehicles in India and China relative to similar vehicles in OECD countries.
 - ❑ Due to very low vehicle prices in developing countries, it may difficult to solve the technology lag problem easily.
 - ❑ Inter-country differences suggests that fuel economy policies should be tailored to the country situation, and developed country policies may not work in developing country environments
 - ❑ Future changes in vehicle mix in developing countries also may not follow the same path as in OECD countries.
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