China's Energy & Oil Demand

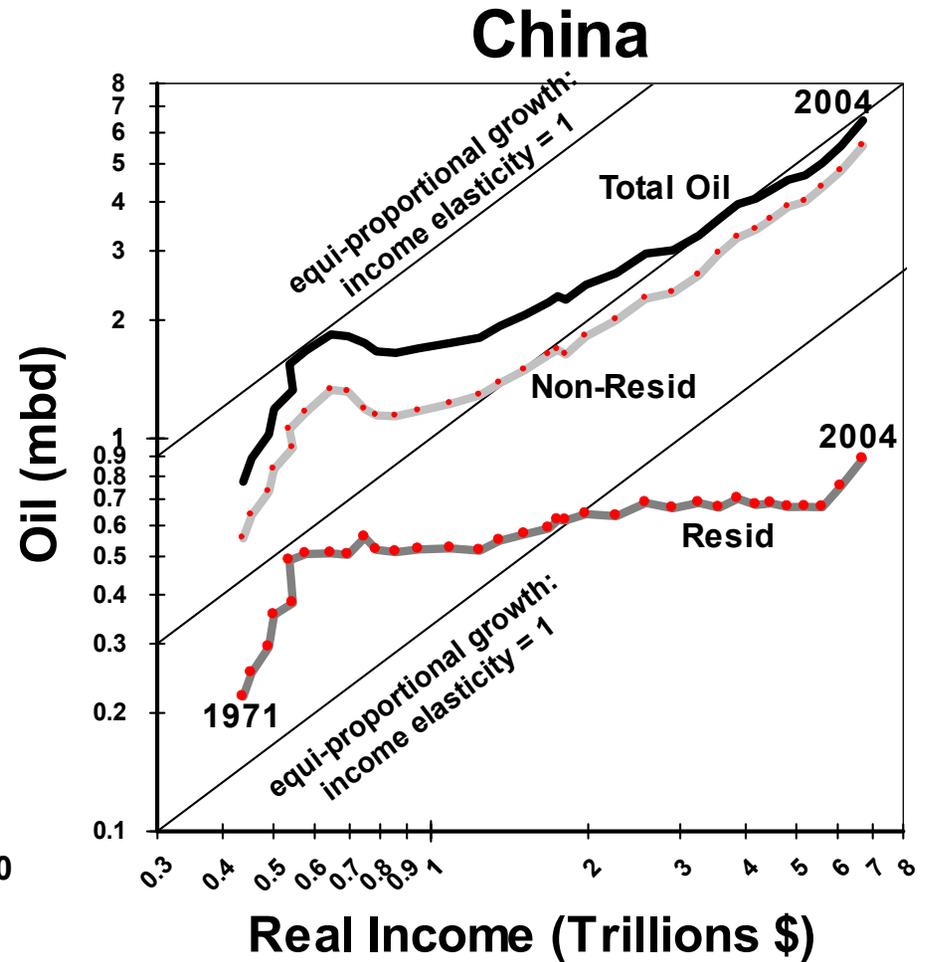New York Energy Forum
October 3, 2006
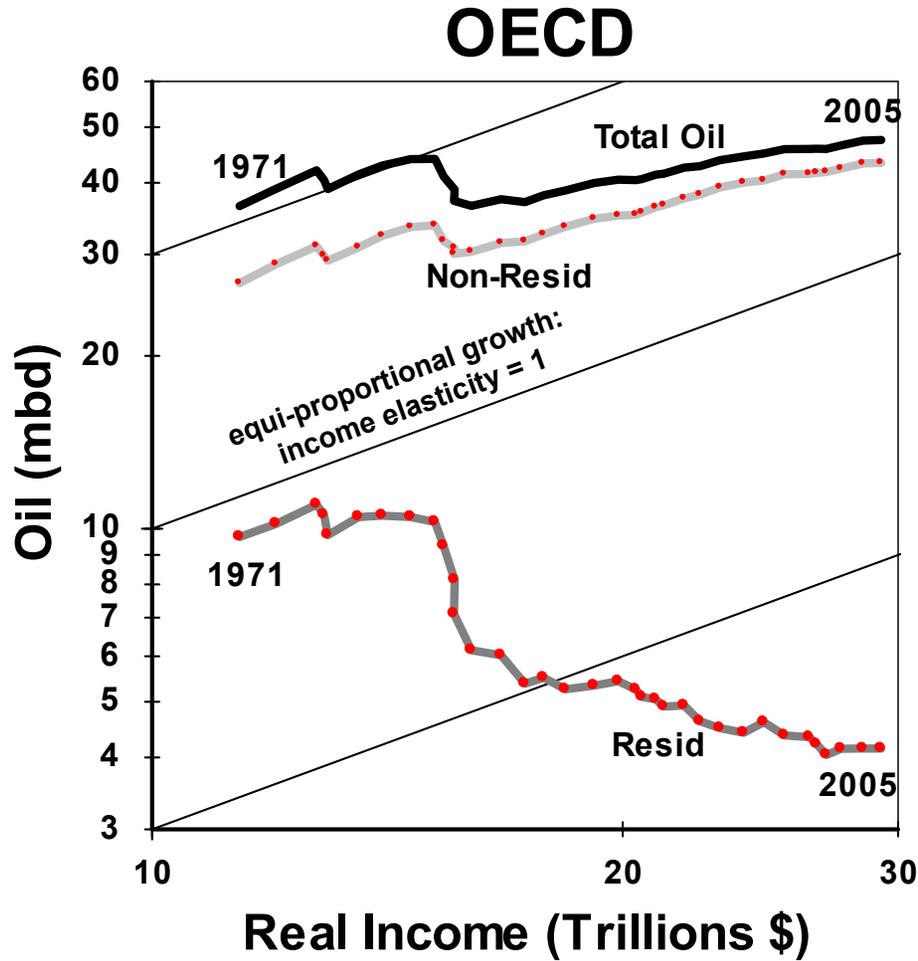
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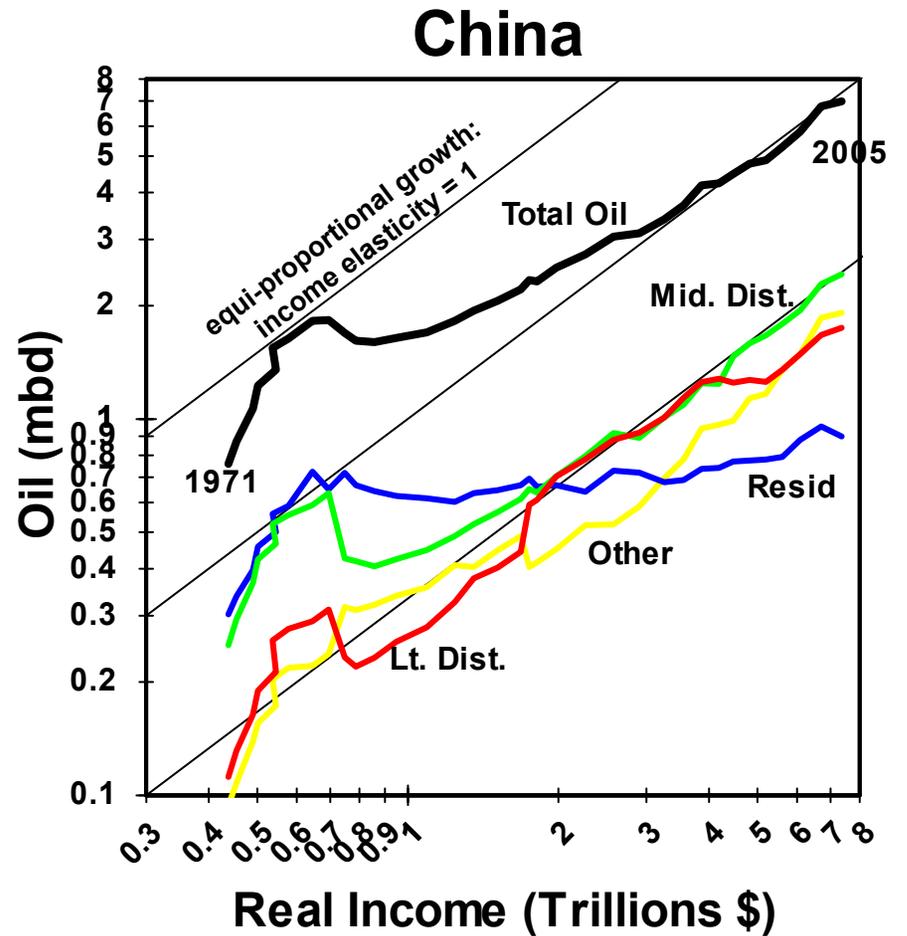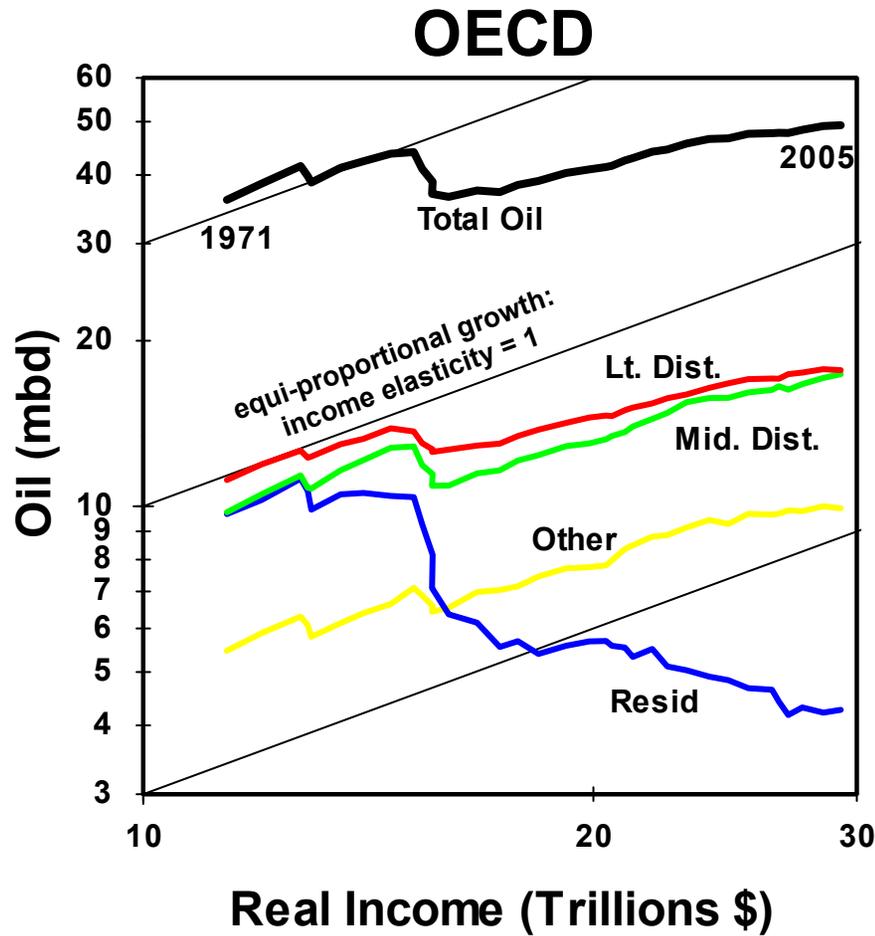
Vehicle ownership paper (and other papers) available from website:
http://www.econ.nyu.edu/dept/courses/gately/index.htm

- Take a long-range, historical view of China's growing demand for energy and oil
- Analyze China's "income elasticity" of energy and oil demand. How fast does demand grow relative to income growth?
- Analyze China's growth in vehicle ownership, and make projections to 2030 for vehicle ownership and total number of vehicles
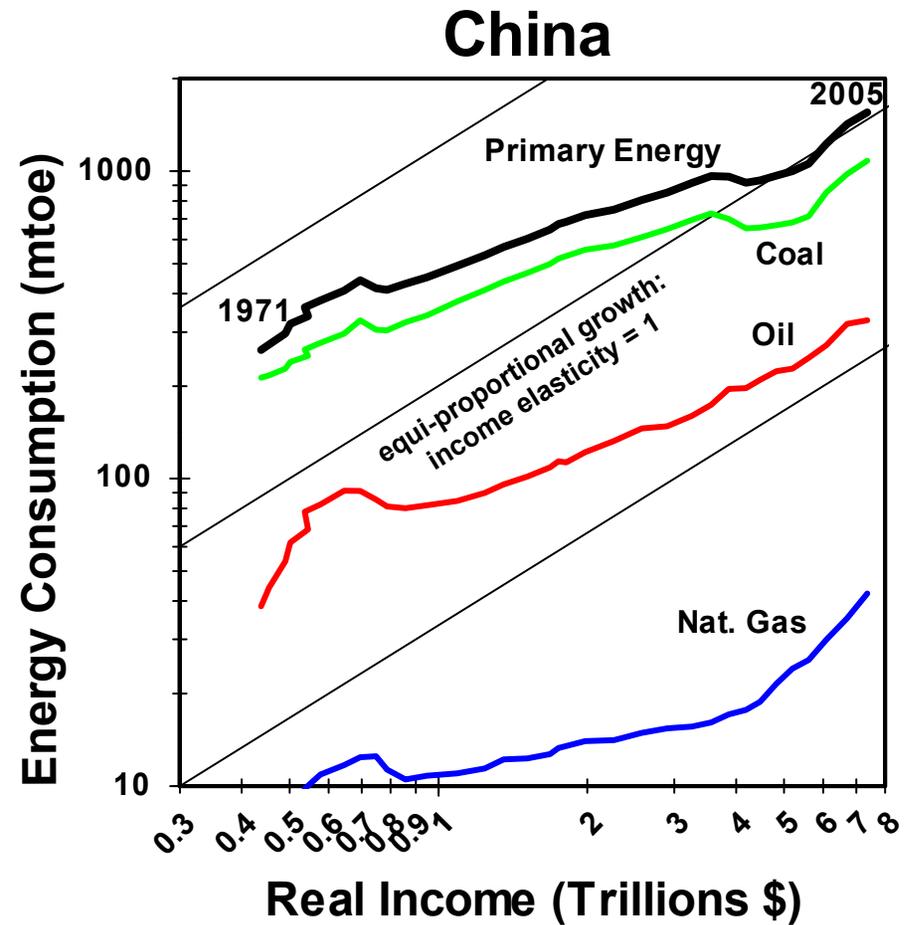
Oil Demand and Real Income since 1971 (IEA data)

OECD

Oil (mbd)

1971
Total Oil
2005
Non-Resid

equi-proportional growth:
income elasticity = 1

1971
Resid
2005

Real Income (Trillions $)

China

Oil (mbd)

equi-proportional growth:
income elasticity = 1
2004
Total Oil
Non-Resid

2004
Resid
1971

equi-proportional growth:
income elasticity = 1

Real Income (Trillions $)

Oil Demand and Real Income: 1971-2005 (BP data)
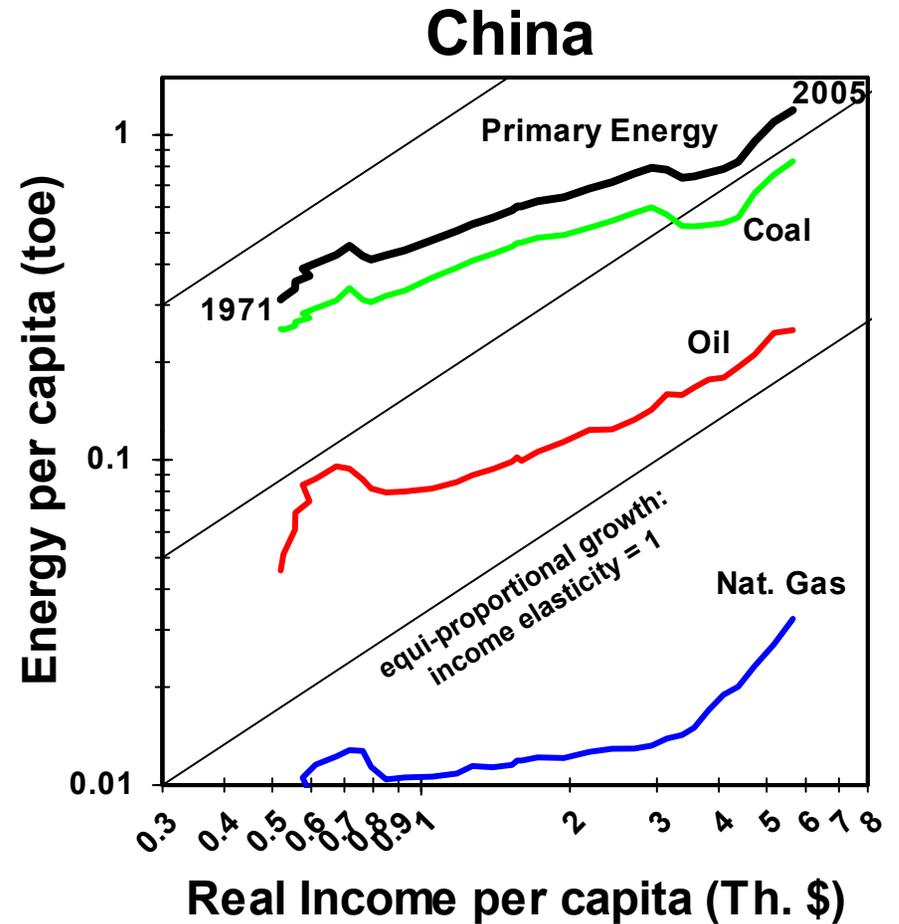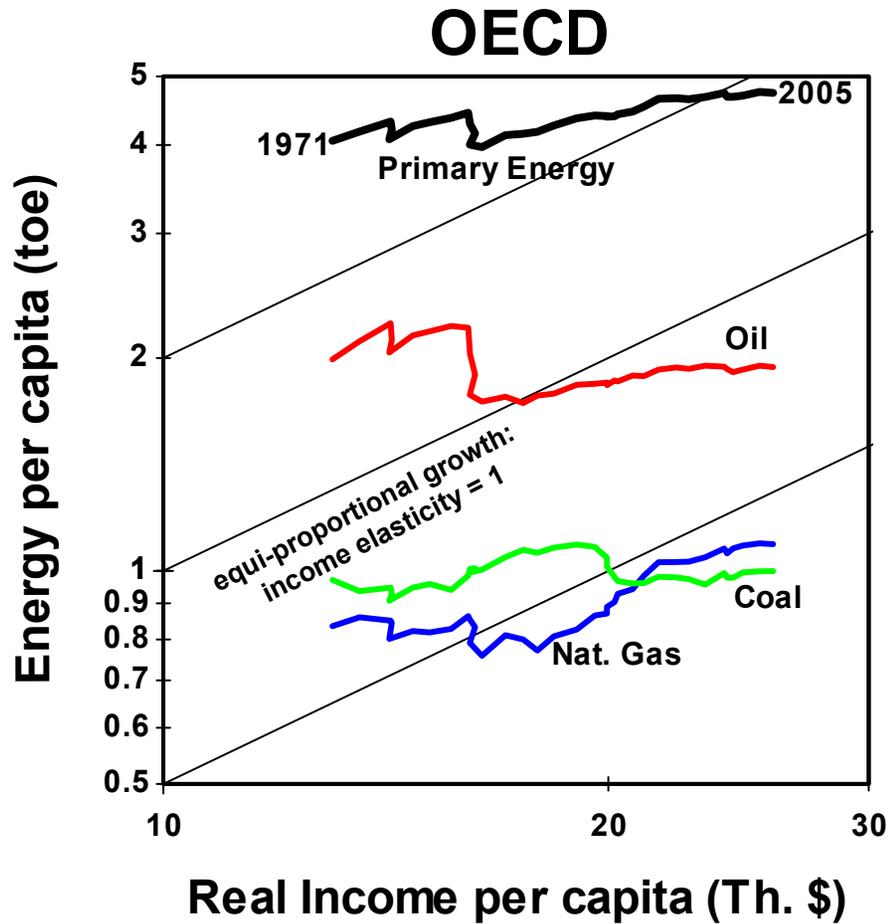
OECD

China

Energy Demand and Real Income: 1971-2005 (BP data)
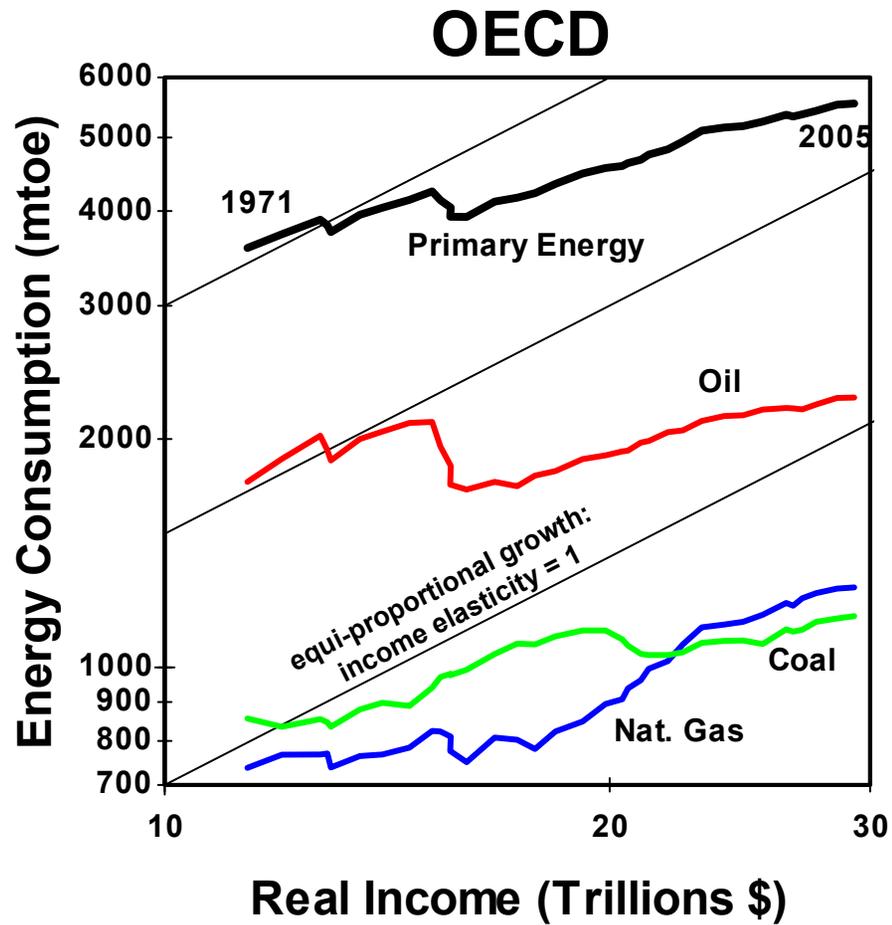
Per-capita Energy Demand and Real Income: 1971-2005
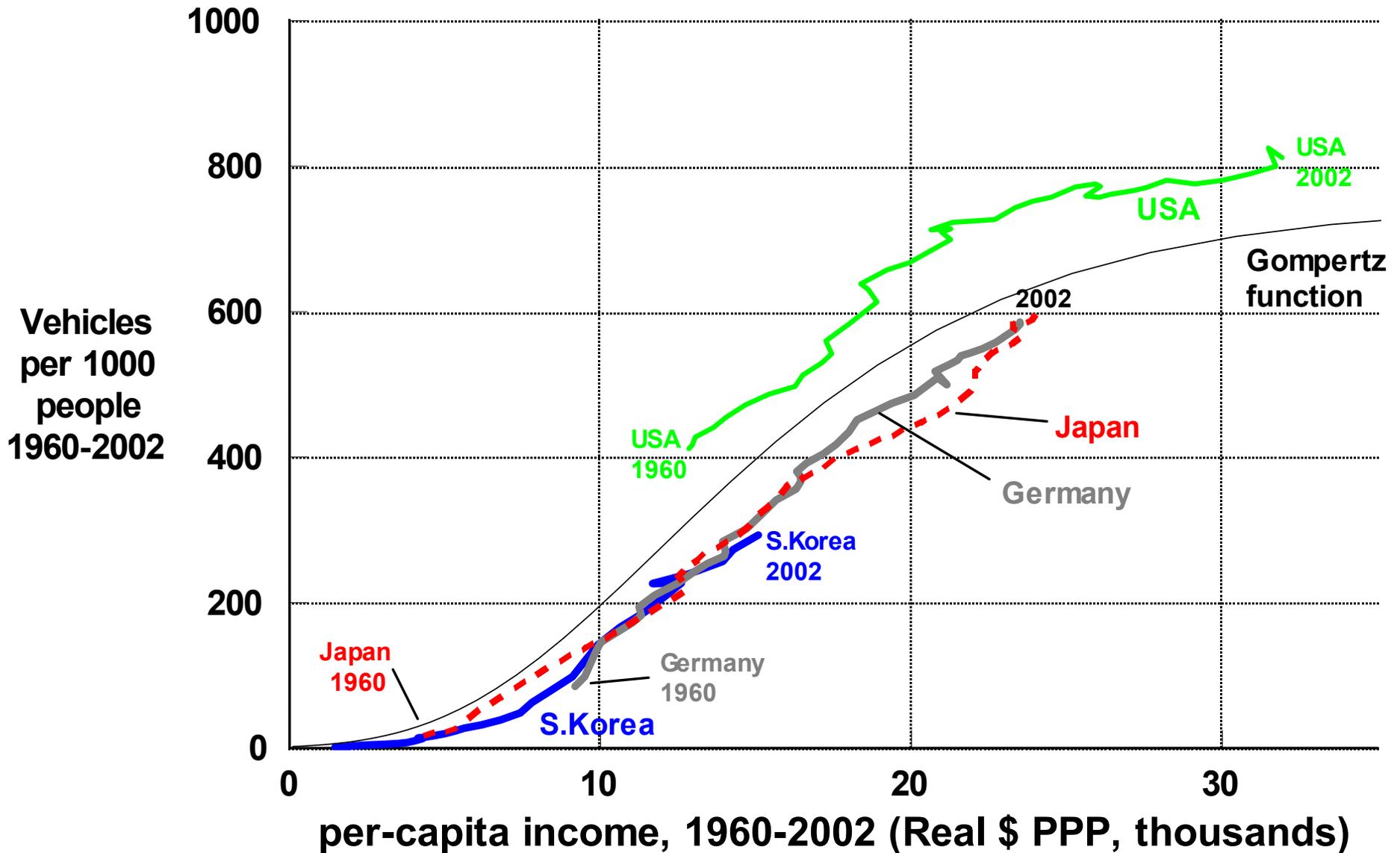# (BP data)

China's "income elasticity" of oil demand:

Its oil demand will grow almost as rapidly as its income. Even with flat demand for Resid, the demand for all other oil products will grow almost as rapidly as income.

Next: the growth of vehicle ownership.

Growth in Vehicle Ownership and Per-Capita Income: Germany, Japan, South Korea, USA

Growth in Vehicle Ownership and Per-Capita Income: Brazil, China, India, South Korea

per-capita income, 1960-2002 (Real $ PPP, thousands)
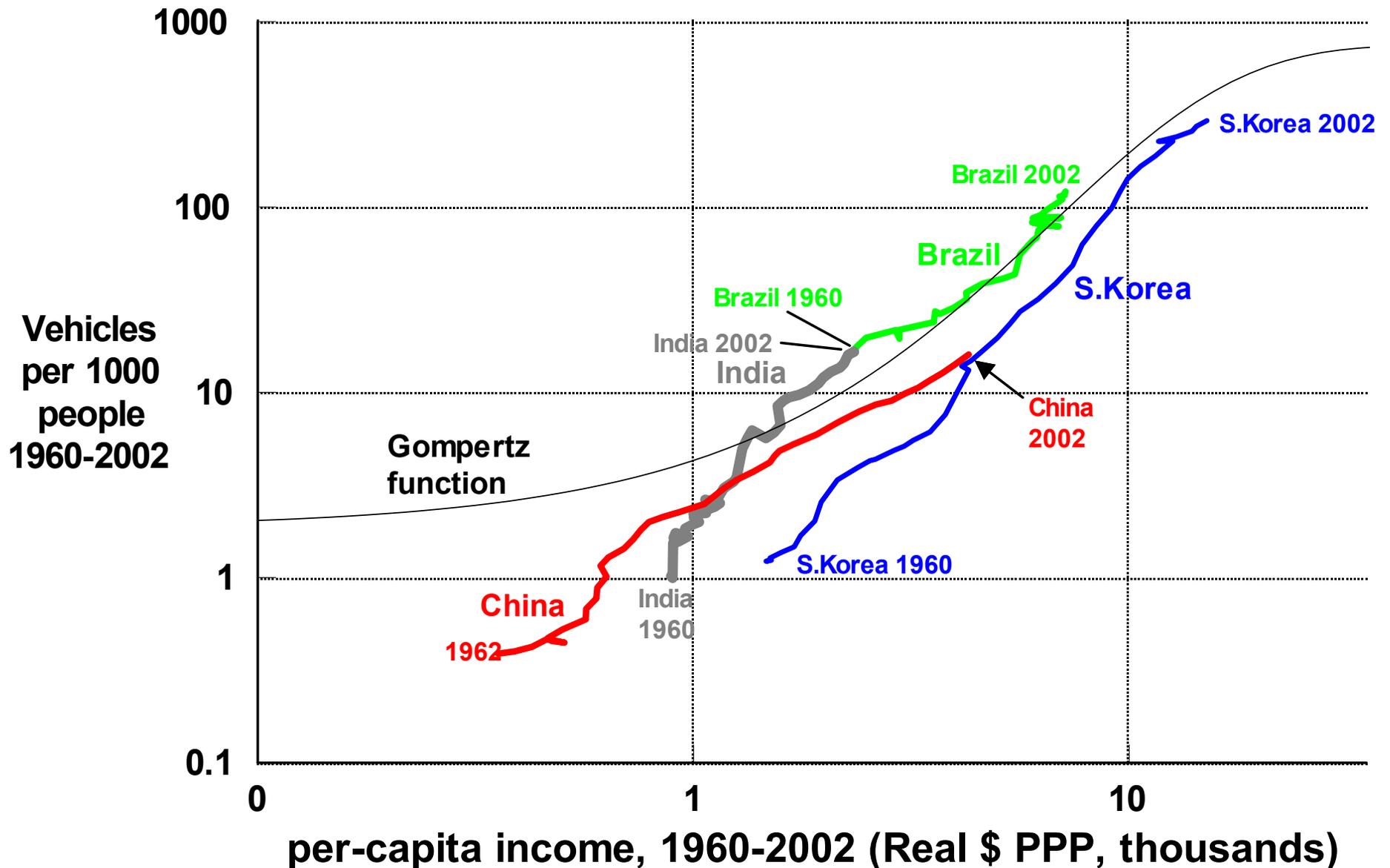
Modeling Vehicle Ownership as a function of Per-Capita Income: An illustrative S-shaped Gompertz function

• Vehicle ownership grows slowly at lowest income levels (below $3000)

• about <u>twice as rapidly as income</u> in $3000-$10000 range

• about as fast as income in range of $12000-$18000

• quite slowly at highest income levels, as saturation is approached.
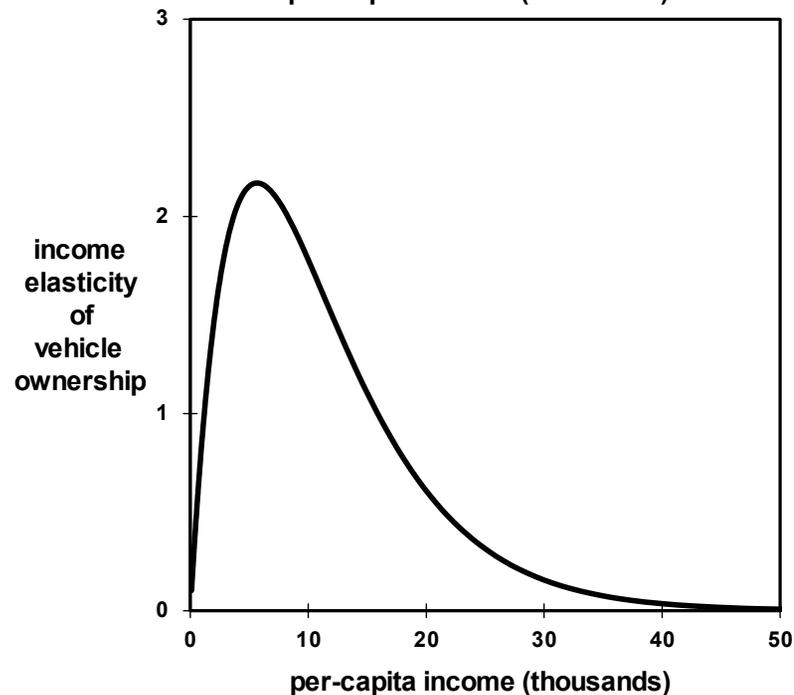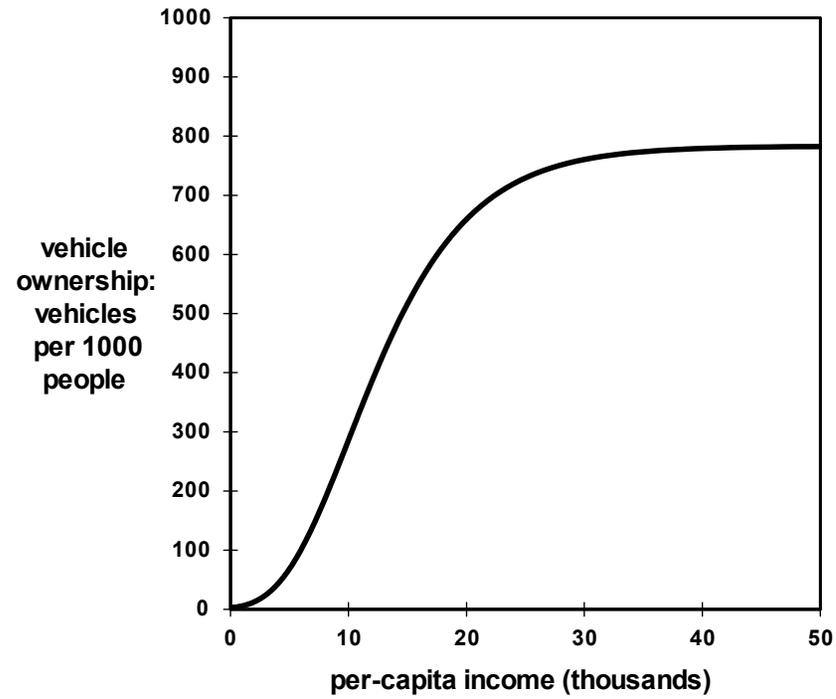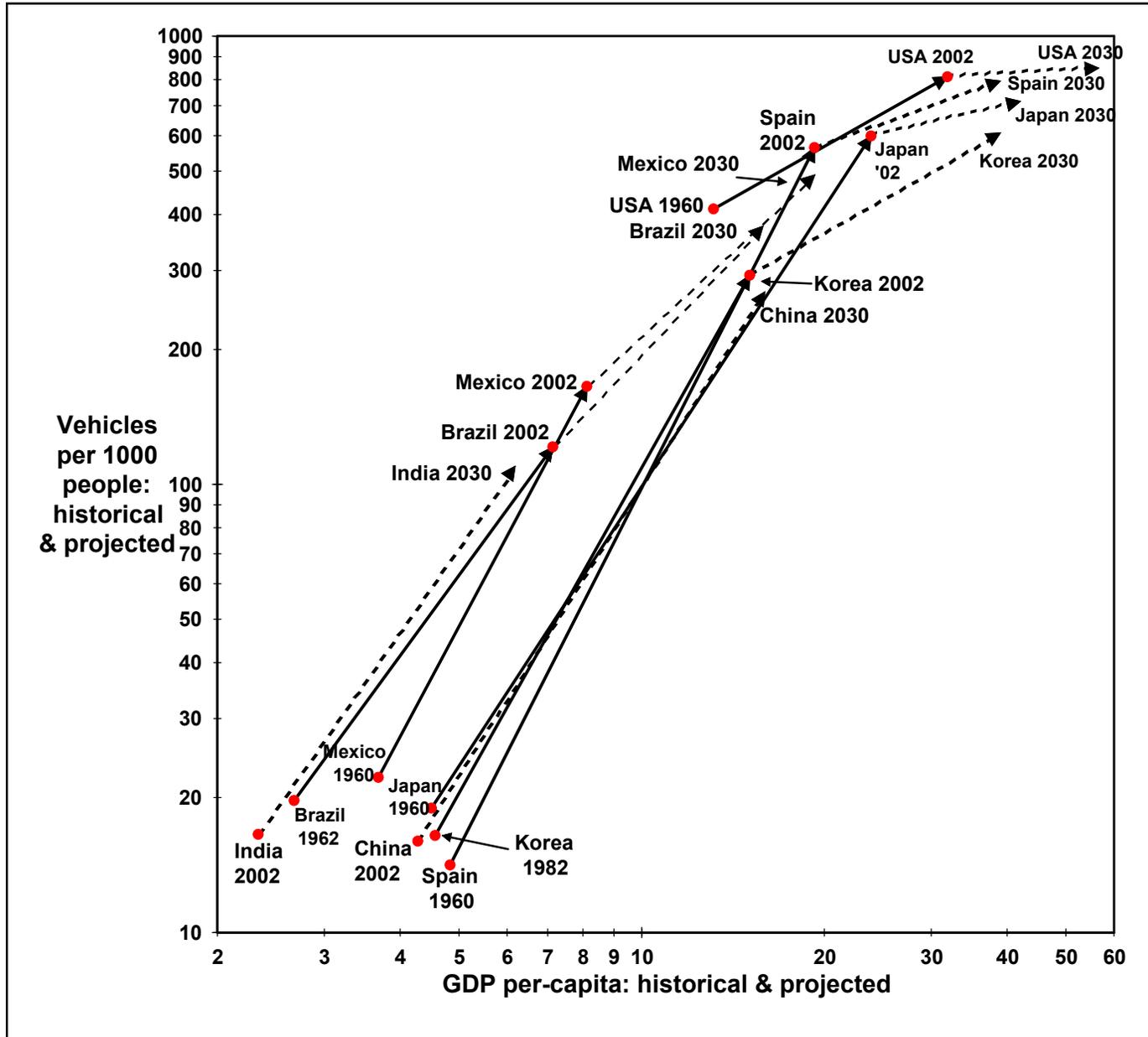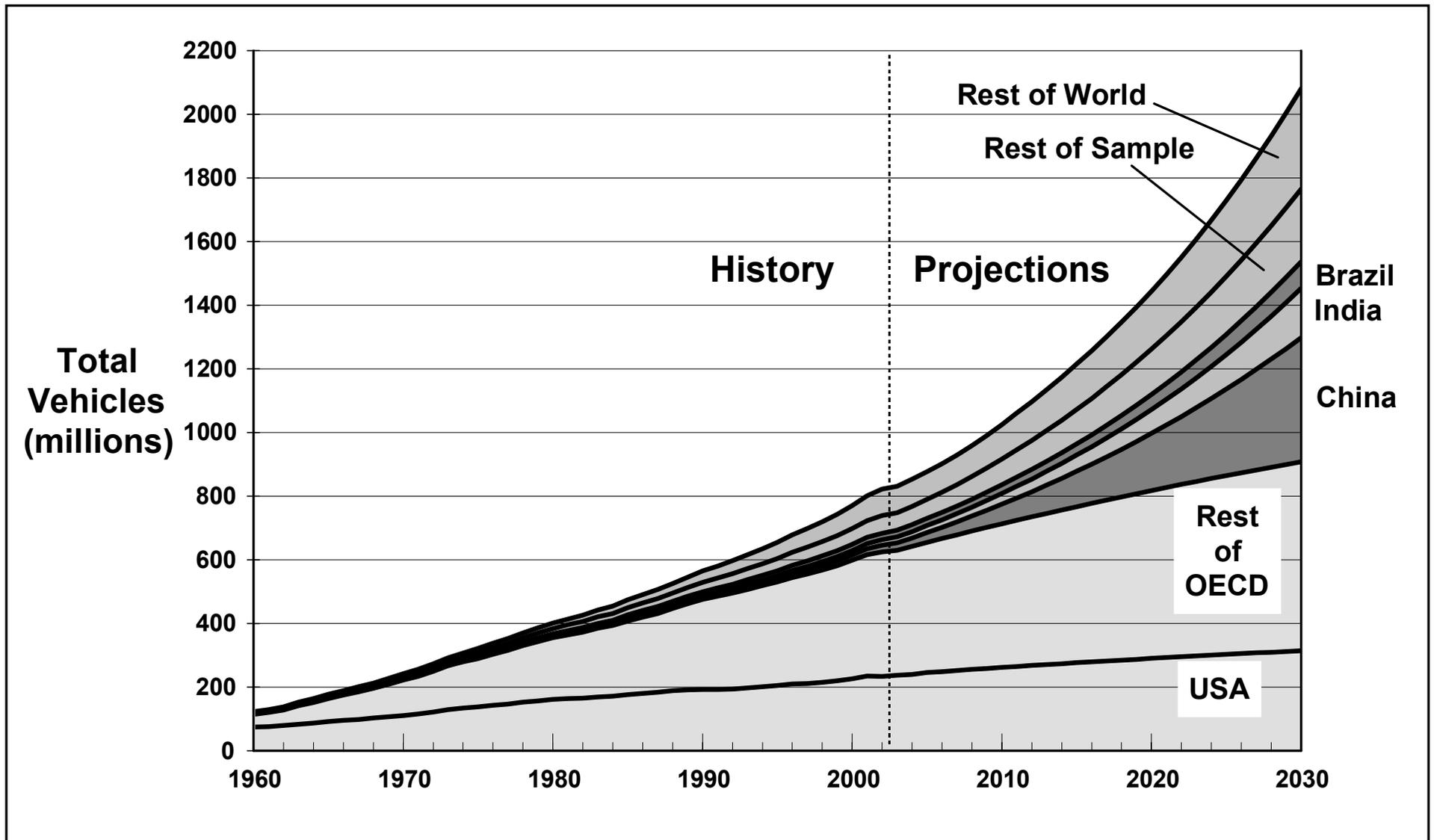
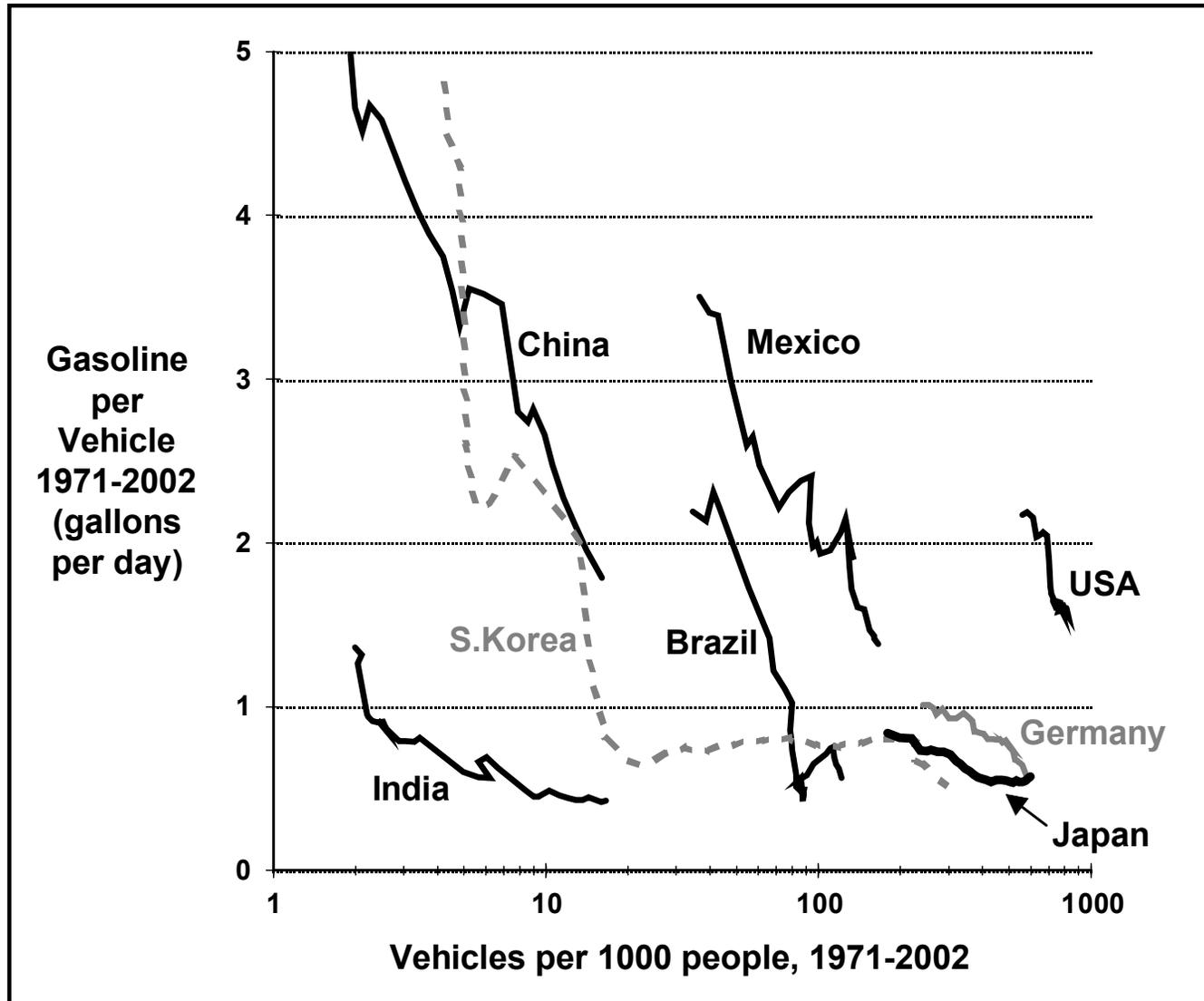# Vehicle Ownership and Per-Capita Income: 8 countries

Vehicle Ownership and Per-Capita Income: Projections 2002-2030

Country	per-capita GDP (thousands, real, PPP)			Vehicles per 1000 population			Total Vehicles (millions)			ratio of growth rates: Veh.Own. to per-cap. GDP
	2002	2030	Average annual growth rate	2002	2030	Average annual growth rate	2002	2030	Average annual growth rate	
United States	32	57	2.1%	812	849	0.2%	234	314	1.1%	0.08
Germany	23	38	1.7%	586	705	0.7%	48	57	0.6%	0.38
France	24	41	2.0%	576	779	1.1%	35	50	1.3%	0.54
Great Britain	24	43	2.2%	515	685	1.0%	31	44	1.3%	0.47
Japan	24	42	2.0%	599	716	0.6%	76	87	0.5%	0.31
Brazil	7	16	2.9%	121	377	4.1%	21	84	5.1%	1.43
China	4	16	4.8%	16	269	10.6%	21	390	11.1%	2.20
Indonesia	3	7	3.4%	29	166	6.5%	6	46	7.4%	1.89
India	2	6	3.5%	17	110	7.0%	17	156	8.1%	1.98
OECD Total	**22**	**42**	**1.5%**	**548**	**713**	**0.6%**	**617**	**908**	**1.4%**	**0.42**
Non-OECD Total	**4**	**9**	**2.2%**	**38**	**169**	**3.6%**	**195**	**1172**	**6.6%**	**1.61**
Total World	**7**	**14**	**1.7%**	**130**	**254**	**1.6%**	**812**	**2080**	**3.4%**	**0.94**

History 1960-2002 and Projections 2002-2030: Total Vehicles

Gasoline per Vehicle and Vehicle Ownership, 1971-2002.
As vehicle ownership increases, fuel per vehicle declines.
Fuel demand will increase more slowly than # Vehicles.

Projected Ratios of Vehicle Ownership Growth to Per-capita Income Growth, 2002-2030. Comparison of D-G-S Projections with IEA(2004) and OPEC(2004)

Region	D-G-S	IEA(2004)	OPEC(2004)
OECD	0.42	0.57	0.39
Non-OECD	1.61	1.12	0.97
China	2.20	1.38	1.28
India	1.98	0.39	
Egypt	2.09	1.21	
World	0.94	0.61	0.57

- China's "income elasticity" of oil demand. Its oil demand will grow almost as rapidly as its income. Even with flat demand for Resid, the demand for all other oil products will grow about as rapidly as income.

- China's vehicle ownership will grow twice as rapidly as its income for next two decades. By 2030 it will have nearly 400 million vehicles -- nearly 20 times as many vehicles as in 2002 -- and more vehicles than the USA.

- But its vehicle ownership of 270 per 1000 people – about where South Korea was in 2002 – will still be only one-third of ultimate saturation levels.