An Economic Analysis of Feebates for California

Dr. Walter McManus
Director, Automotive Analysis Division
University of Michigan
Transportation Research Institute

UMTRI

Automotive Analysis Division

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Economic and Demographic Analysis

Industry Structure

Advanced Manufacturing and Training

Study Goals

- Compare effectiveness of two alternative GHG feebate designs
  - $0-Band
  - Size-based
- Compare designs under two regulatory regimes
  - “2020 CAFE”
  - “2020 CAFE” and “Pavley I”
  - “Pavley II” could be added in future work

Comment on value of fuel economy to consumers

- **Revealed preferences**: statistical analysis based on actual purchase behavior of consumers in new and used vehicle markets
- **Stated preferences**: statistical analysis based on surveys of consumers
- Present value calculations: based on engineering cost studies and assumumptions

Revealed preferences for fuel economy: Peer-reviewed econometric research on the value of fuel economy to consumers

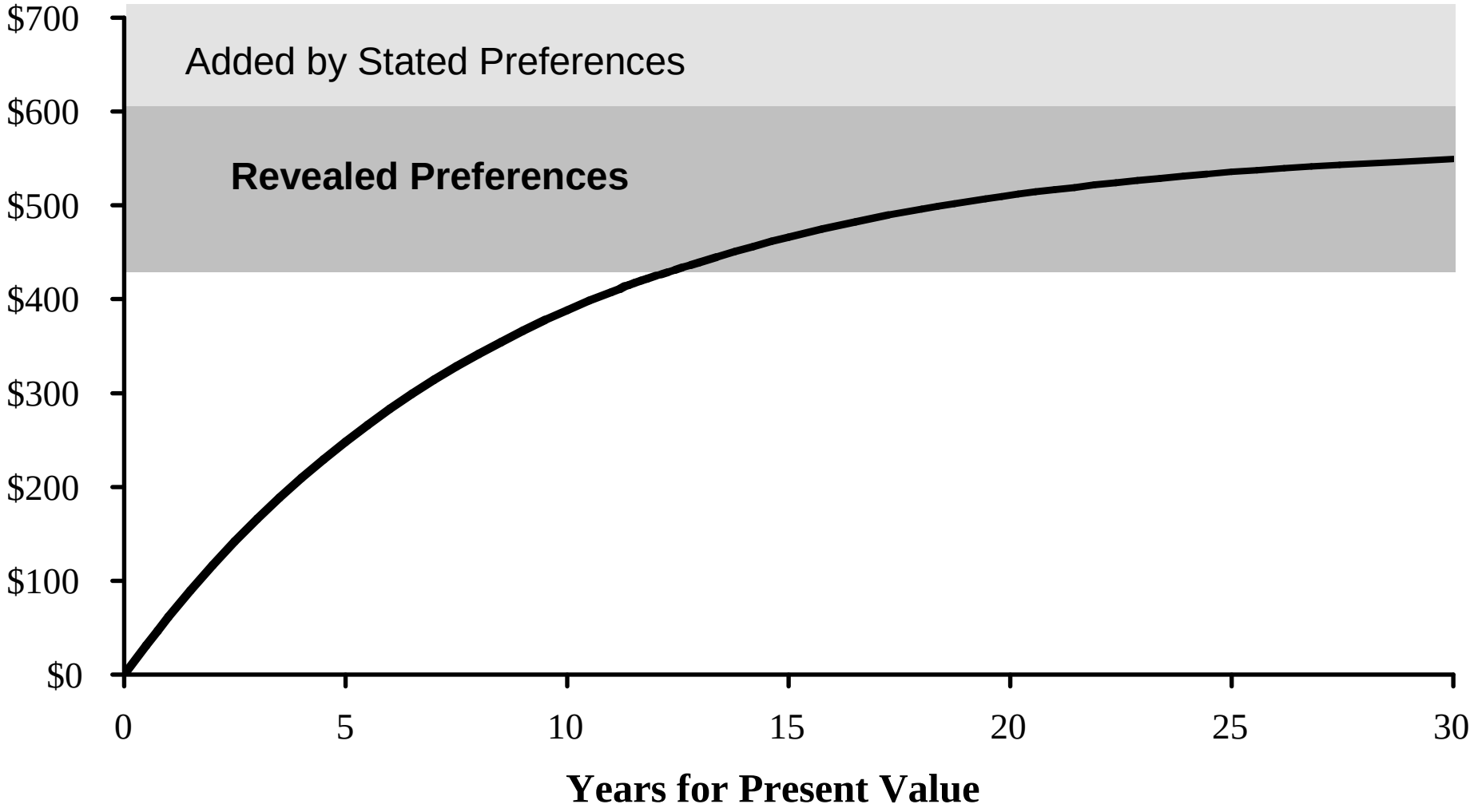
- "New Car Sales and Used Car Stocks: A Model of the Automobile Market." *James Berkovec* **RAND Journal of Economics**, 1985, vol. 16, issue 2, pages 195-214.
- "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market." Steven Berry, *James Levinsohn,* and *Ariel Pakes,* **Journal of Political Economy**, 2004, vol. 112, issue 1, pages 68-105.
- Griliches, Z. 1961. "Hedonic Price Indexes for Automobiles: AnEconometric Analysis of Quality Change." In **The Price Statistics of the Federal Government**, National Bureau of Economic Research.
- Automobile Fuel Economy: What Is it Worth?*Molly Espey* and *Santosh Nair,* **Contemporary Economic Policy**, 2005, vol. 23, issue 3, pages 317-323.
- "The link between gasoline prices and vehicle sales:economic theory trumps conventional Detroit wisdom." McManus, Walter, **Business Economics** 1 42 (2007): pp. 54-60.

Stated preferences for fuel economy: market research

- JD Power and Associates, Initial Quality Survey, various years
- JD Power and Associates, Clean Diesel and Hybrid Electric Research Studies
- Internal market research for GM, various years

Present Value of One MPG

(starting at 25 mpg; $3/gallon; 15,000 miles per year declining at 5.2% per year; 7% discount rate)



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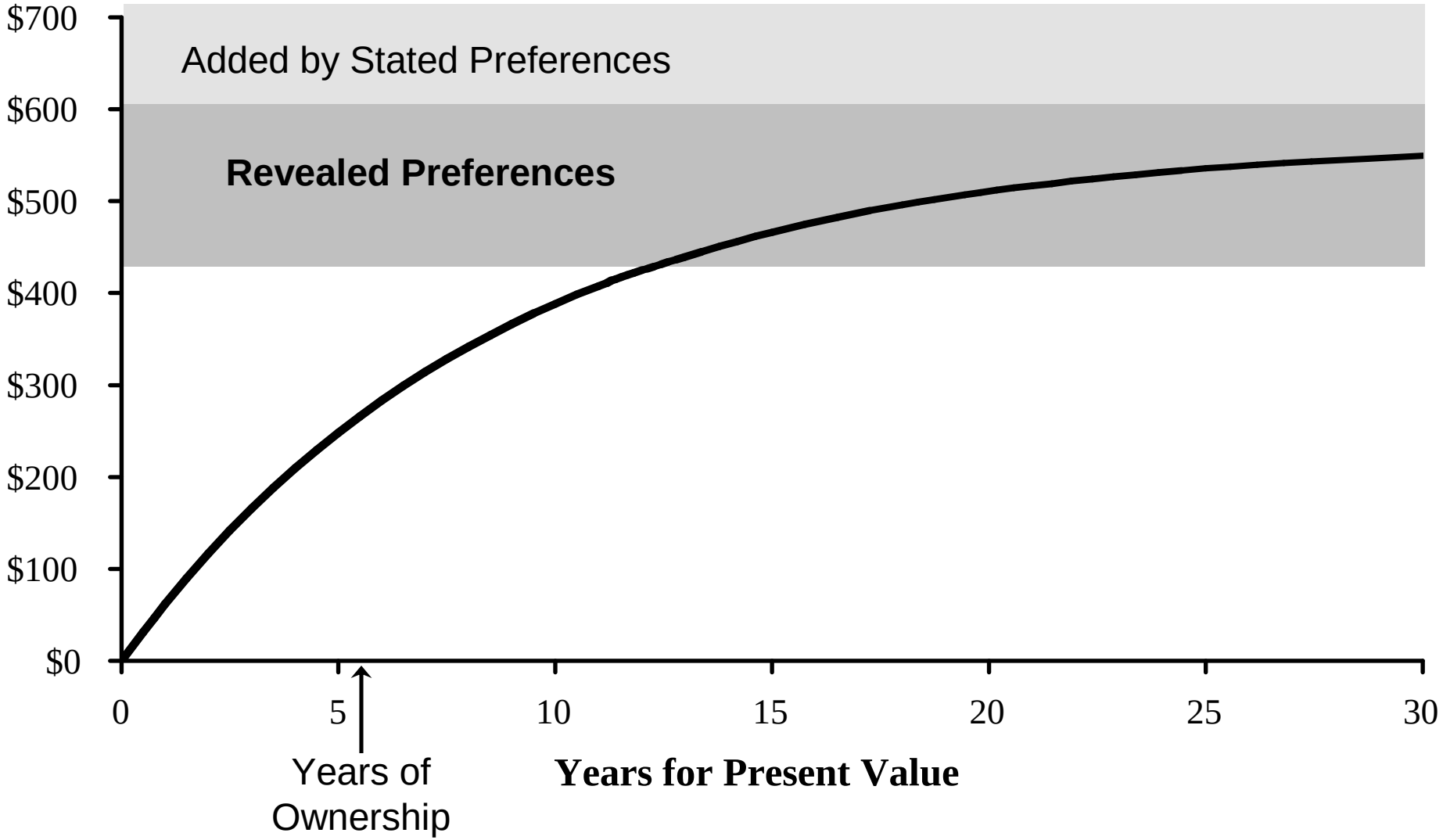

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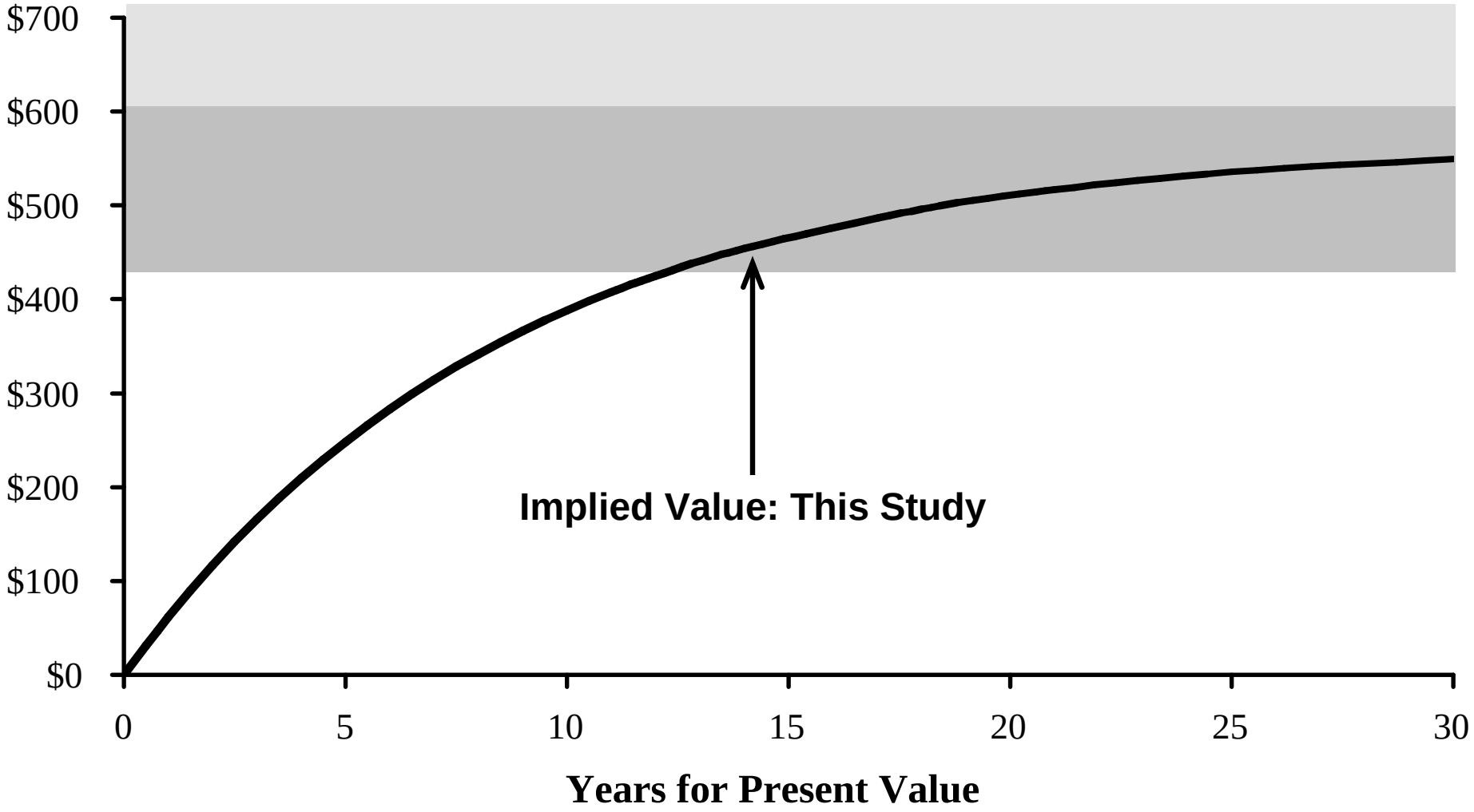
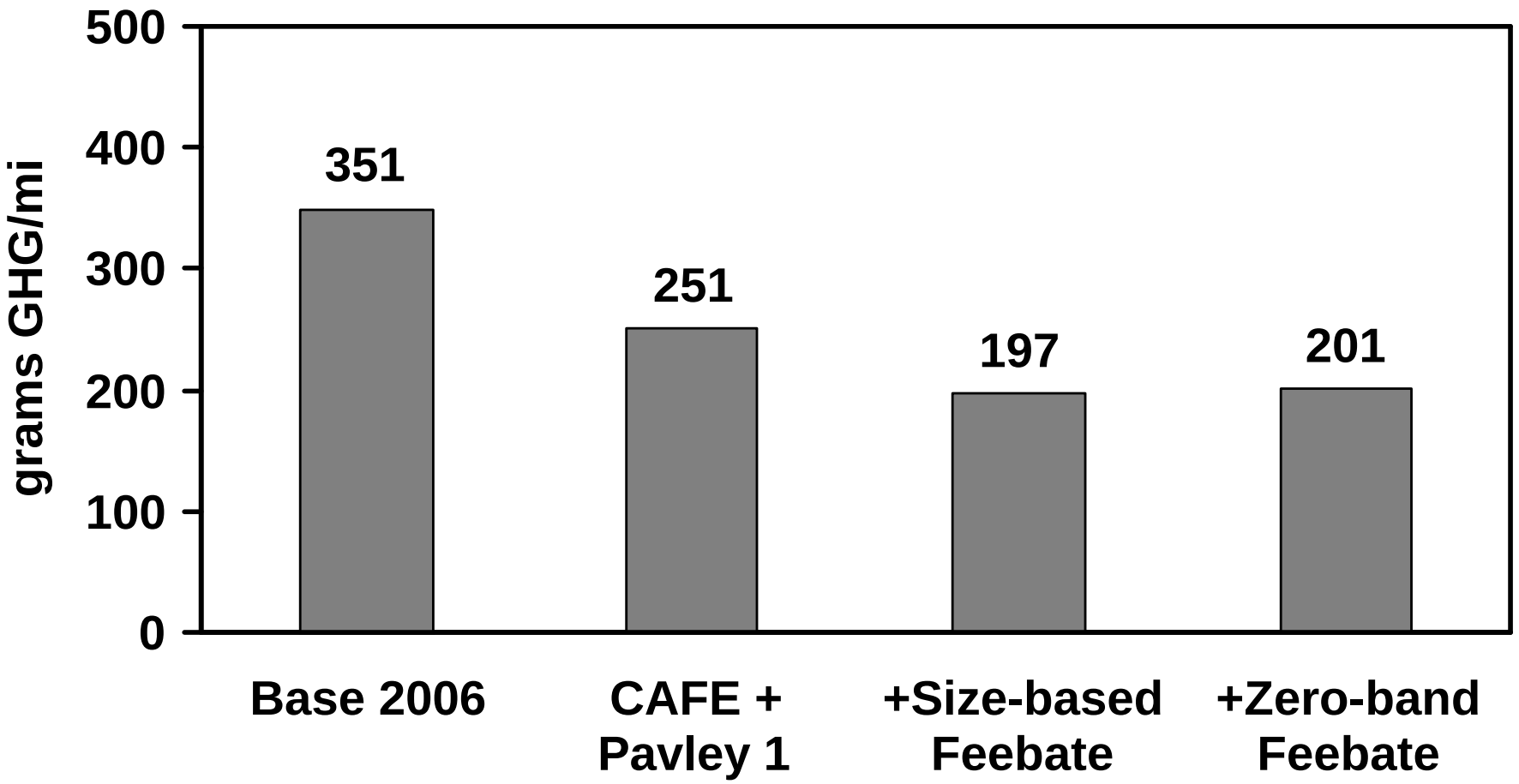


GHG Emissions

Simulation Results: GHG Emissions

				Size-Based Feebates		Zero-Band Feebates	
	Base 2006 Market	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"
GHG per Mile	351	254	251	199	197	203	201
Equiv. MPG	25.2	34.8	35.3	44.4	45.0	43.7	44.0
Change vs. Base 2006 Market		-27.6%	-28.5%	-43%	-44%	-42%	-43%
Change vs. Plus "Pavley I"				-21%	-22%	-19%	-20%

GHG Emissions Reduction

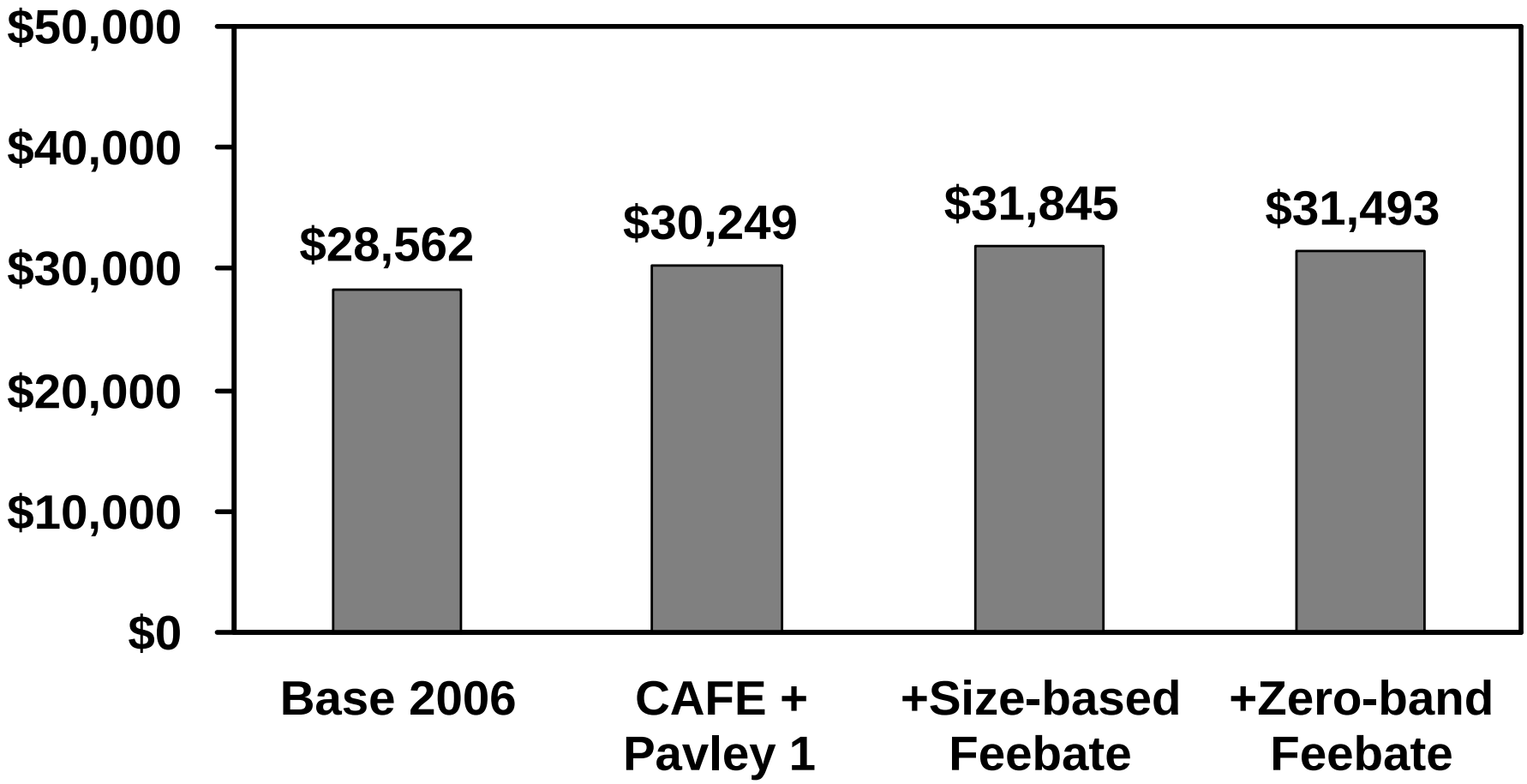


Retail Price

Simulation Results: Average Retail Price

				Size-Based Feebates		Zero-Band Feebates	
	Base 2006 Market	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"
Average MSRP	$28,562	$30,295	$30,249	$31,710	$31,845	$31,346	$31,493
Change vs. Base 2006 Market		6%	6%	11%	12%	10%	10%
Change vs. Plus "Pavley I"				5%	5%	4%	4%

Retail Price

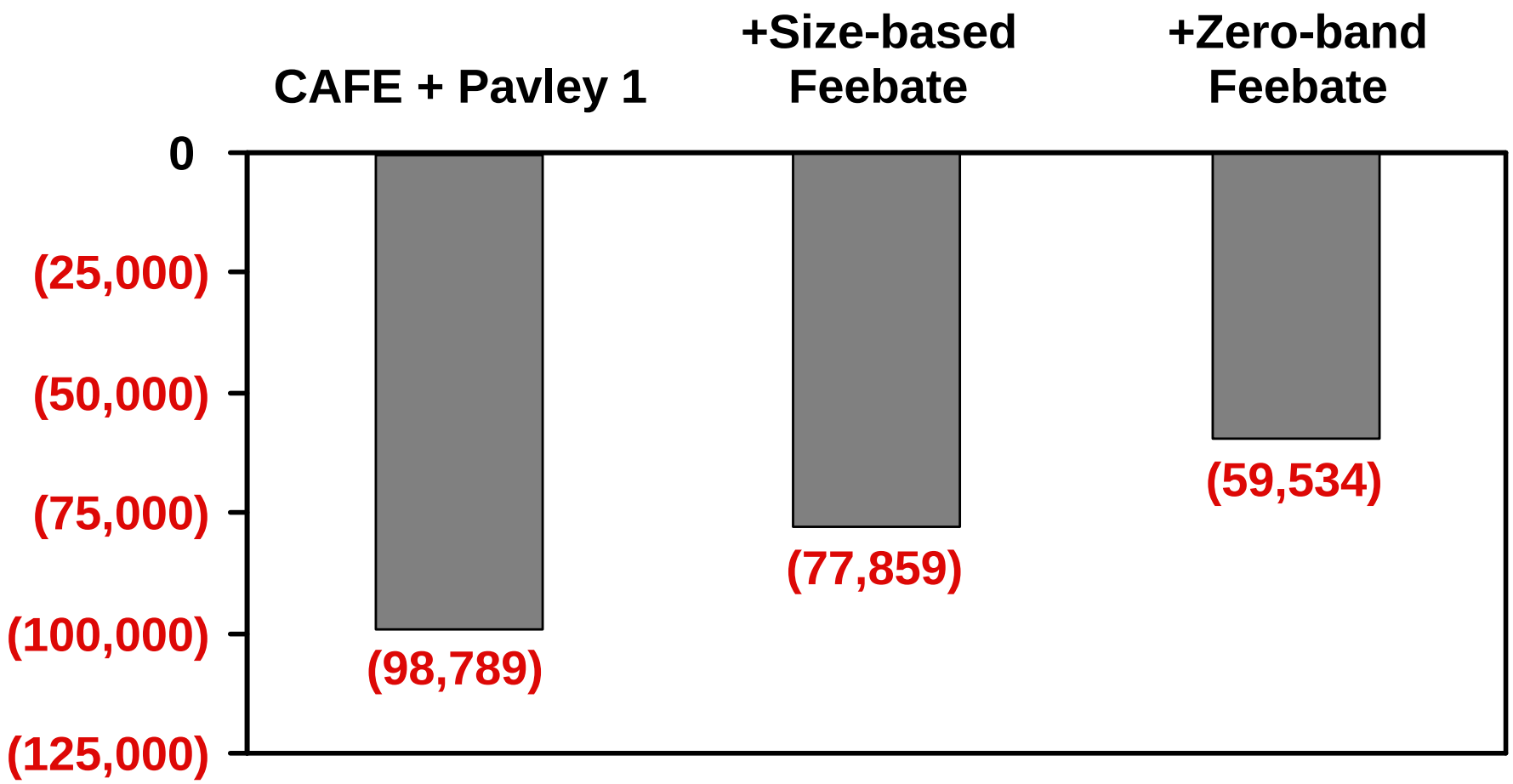


Total Unit Sales

Simulation Results: Change in Retail Sales (Units)

Price Elasticity				Size-Based Feebates		Zero-Band Feebates	
		"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"
1.00	Unit Change vs. Base 2006 Market	(95,814)	(98,789)	(73,769)	(77,859)	(54,779)	(59,534)
	Percent Change vs. Base 2006 Market	-6%	-6%	-5%	-5%	-4%	-4%
0.67	Unit Change vs. Base 2006 Market	(64,195)	(66,189)	(49,425)	(42,165)	(36,702)	(39,888)
	Percent Change vs. Base 2006 Market	-4%	-4%	-3%	-3%	-2%	-3%

Change in Unit Sales

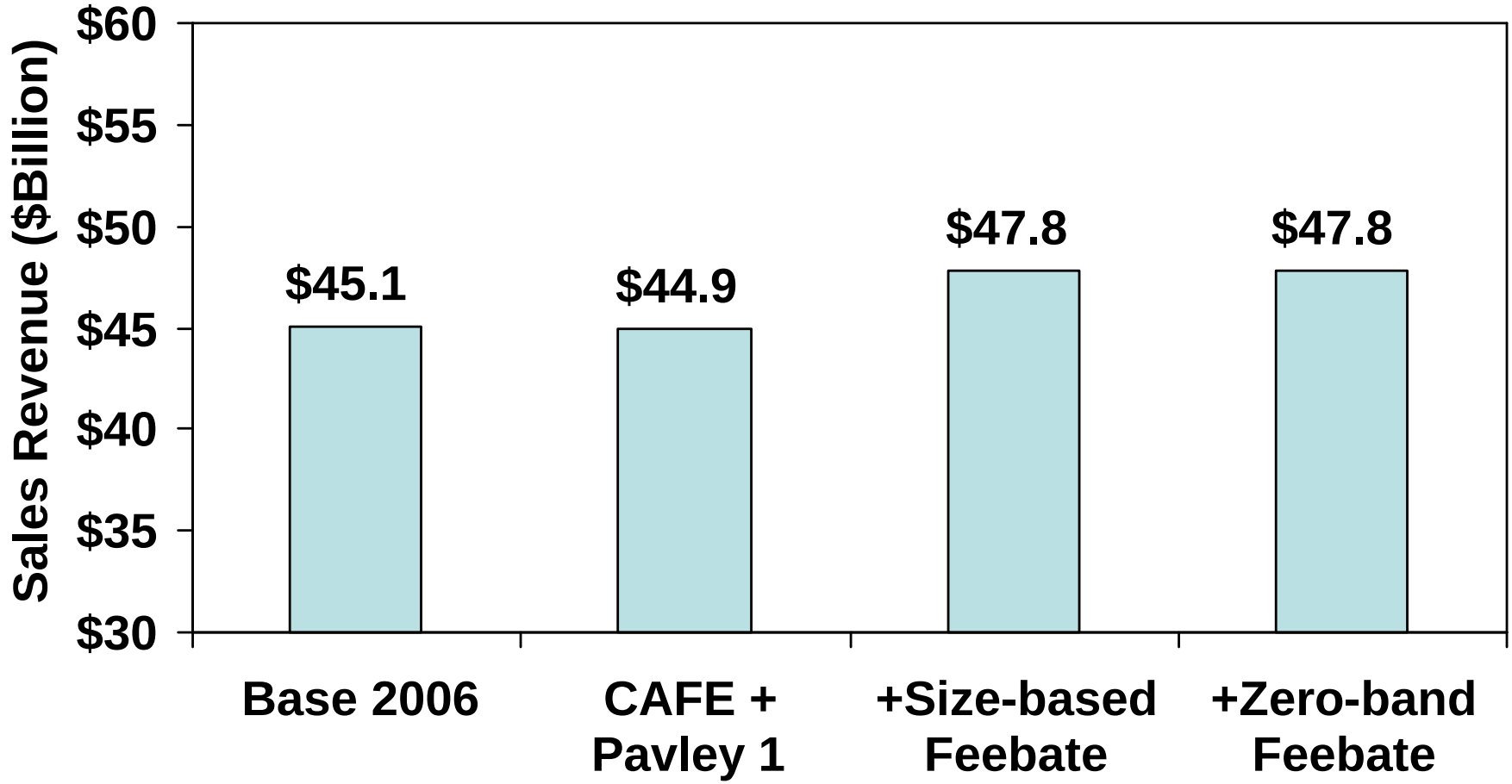


Revenue

Simulation Results: Retail Sales Revenue

Price Elasticity		Base 2006 Market	Size-Based Feebates		Zero-Band Feebates			
			"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"
1.00	Revenue	$45.1B	$44.9B	$44.9B	$47.7B	$47.8B	$47.8B	$47.8B
	Percent Change vs. Base 2006 Market		-0.4%	-0.4%	6.2%	6.4%	6.3%	6.5%
0.67	Unit Change vs. Base 2006 Market	$45.1B	$45.9B	$45.9B	$48.5B	$48.6B	$48.3B	$48.5B
	Percent Change vs. Base 2006 Market		1.8%	1.8%	5.7%	5.9%	5.3%	5.6%

Sale Revenue

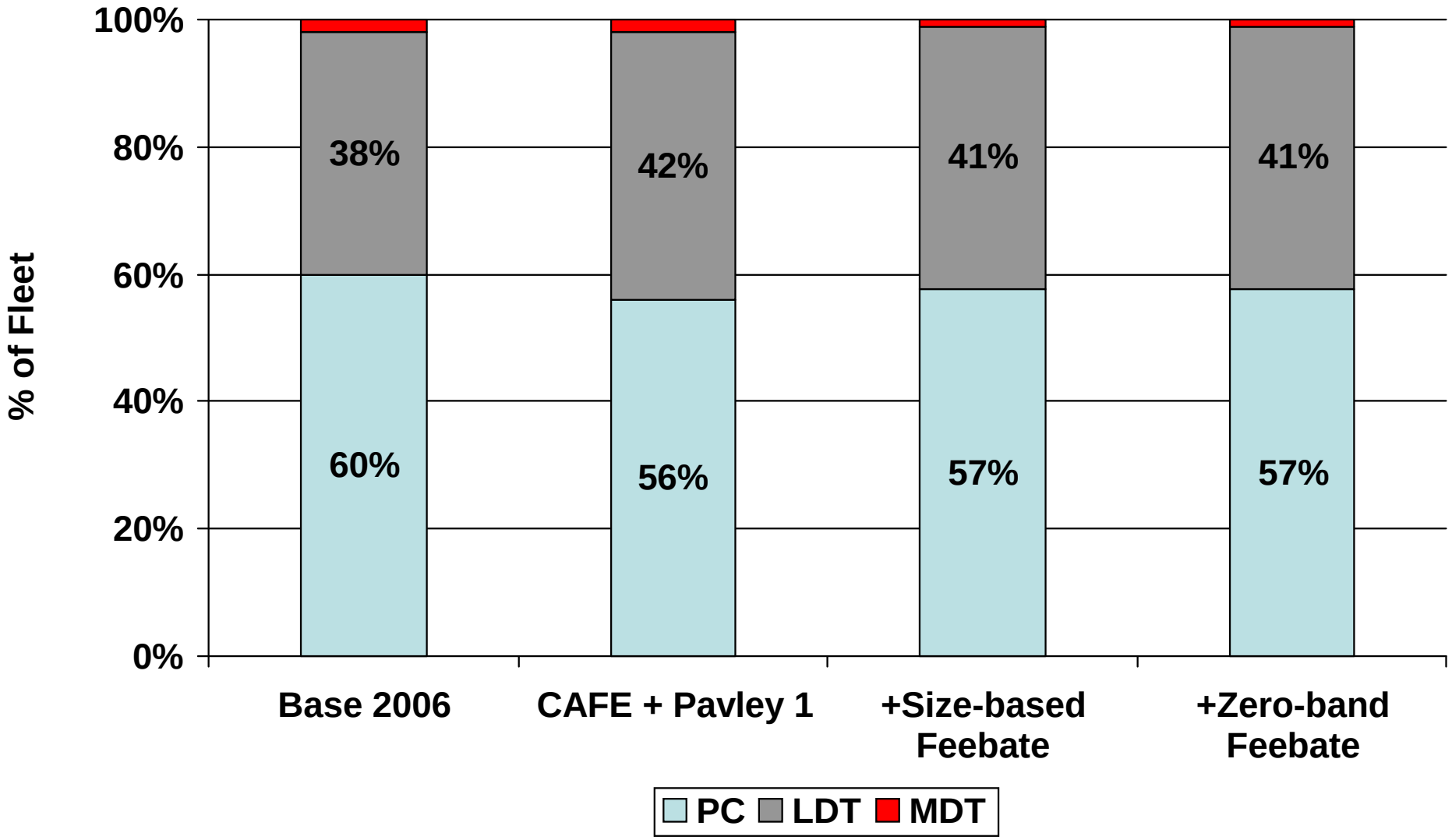


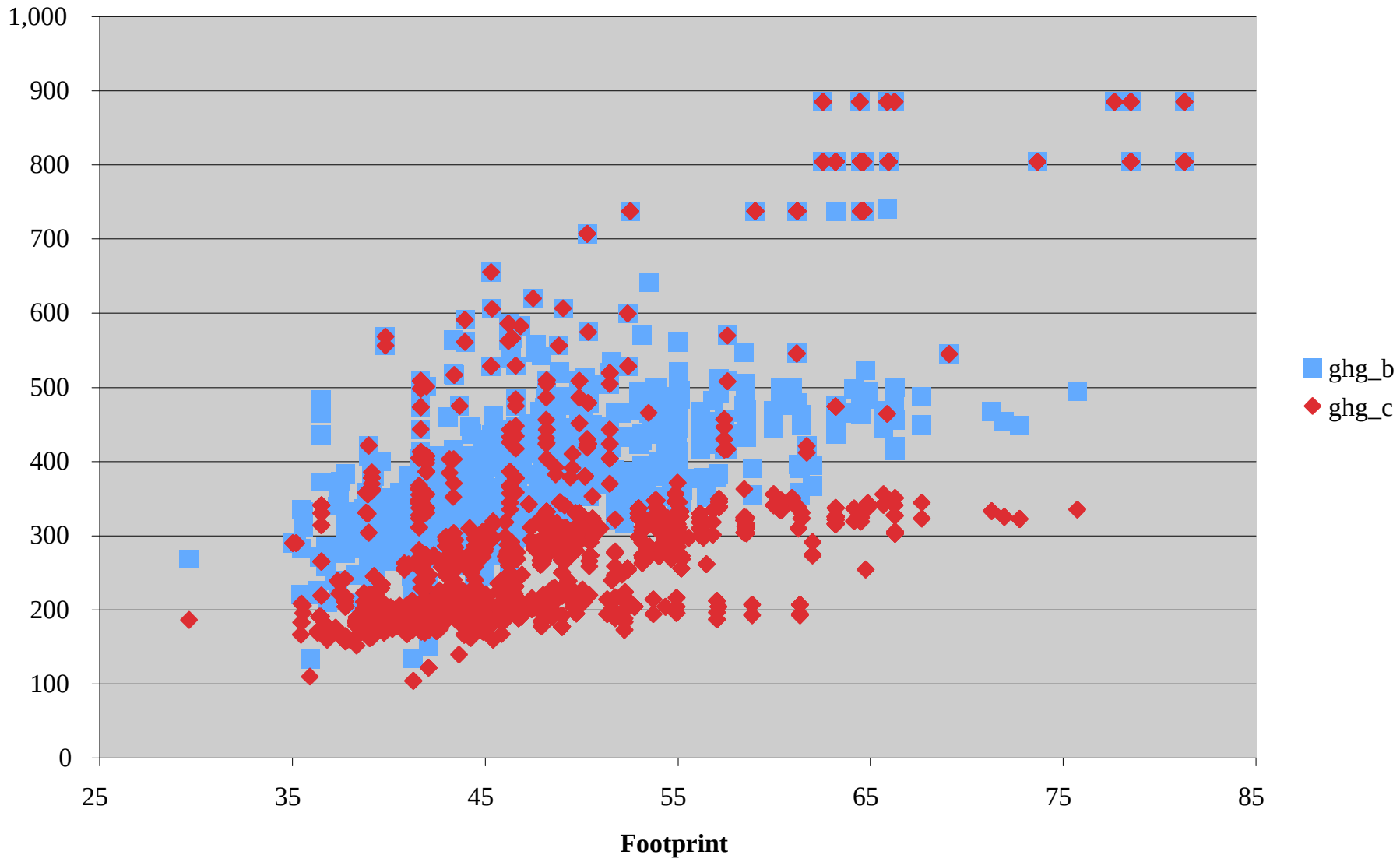
Mix

Simulation Results: Retail Sales Mix

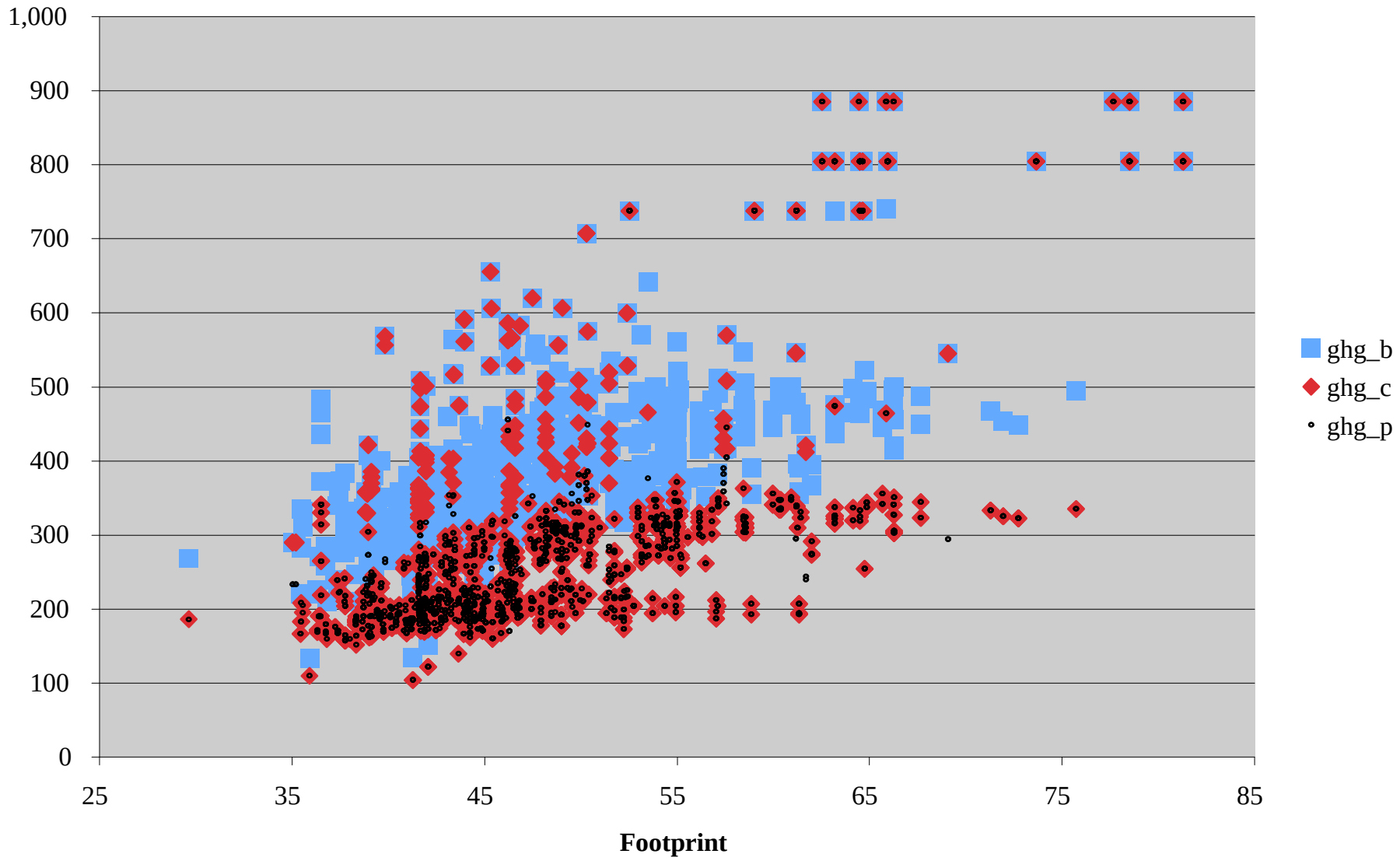
				Size-Based Feebates		Zero-Band Feebates	
	Base 2006 Market	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"	"2020 CAFE"	Plus "Pavley I"
PC/LDT1	60%	56%	56%	56%	57%	57%	57%
LDT2	38%	42%	42%	42%	41%	42%	41%
MDT	2%	2%	2%	1%	1%	2%	1%

Mix of Vehicles

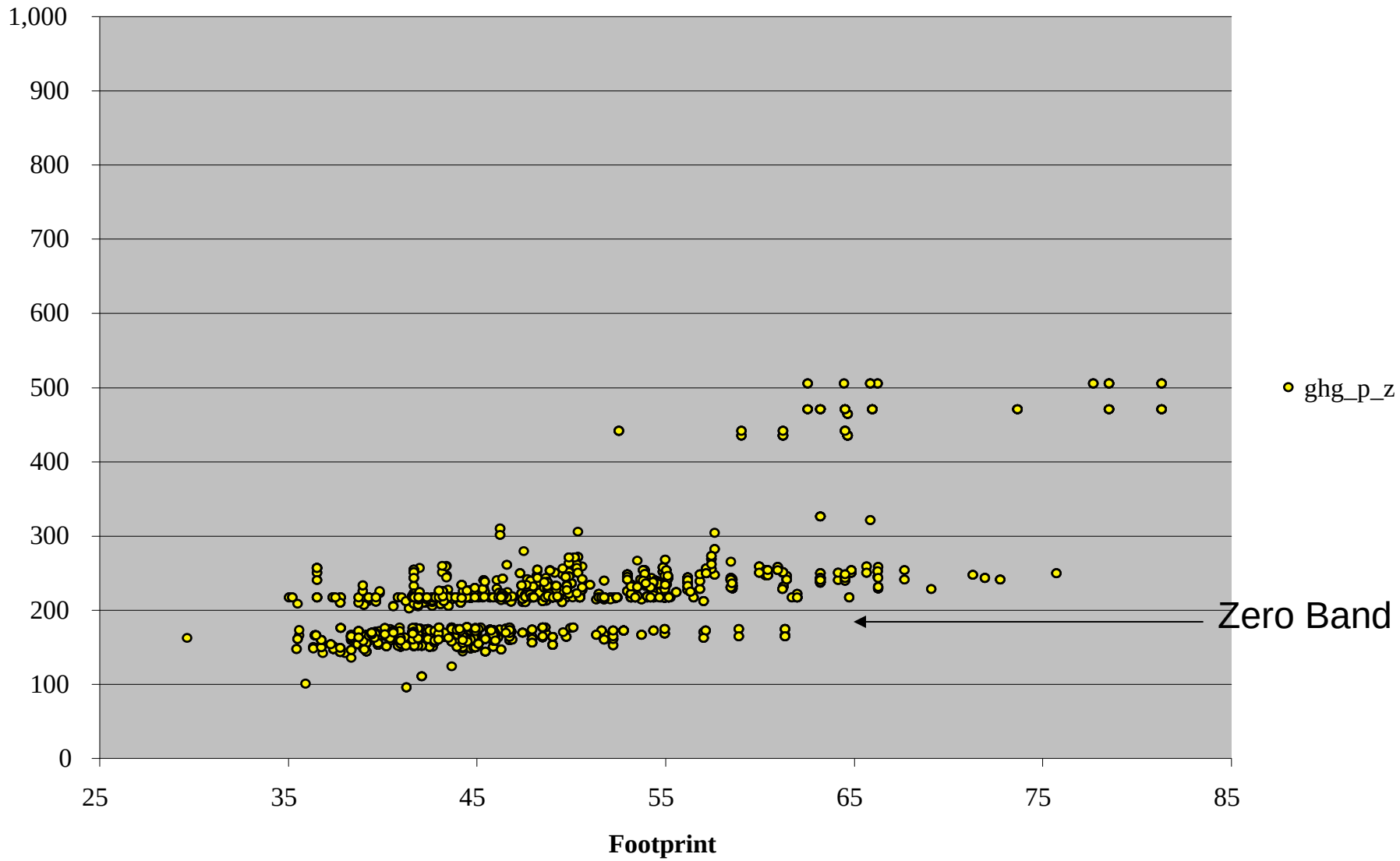


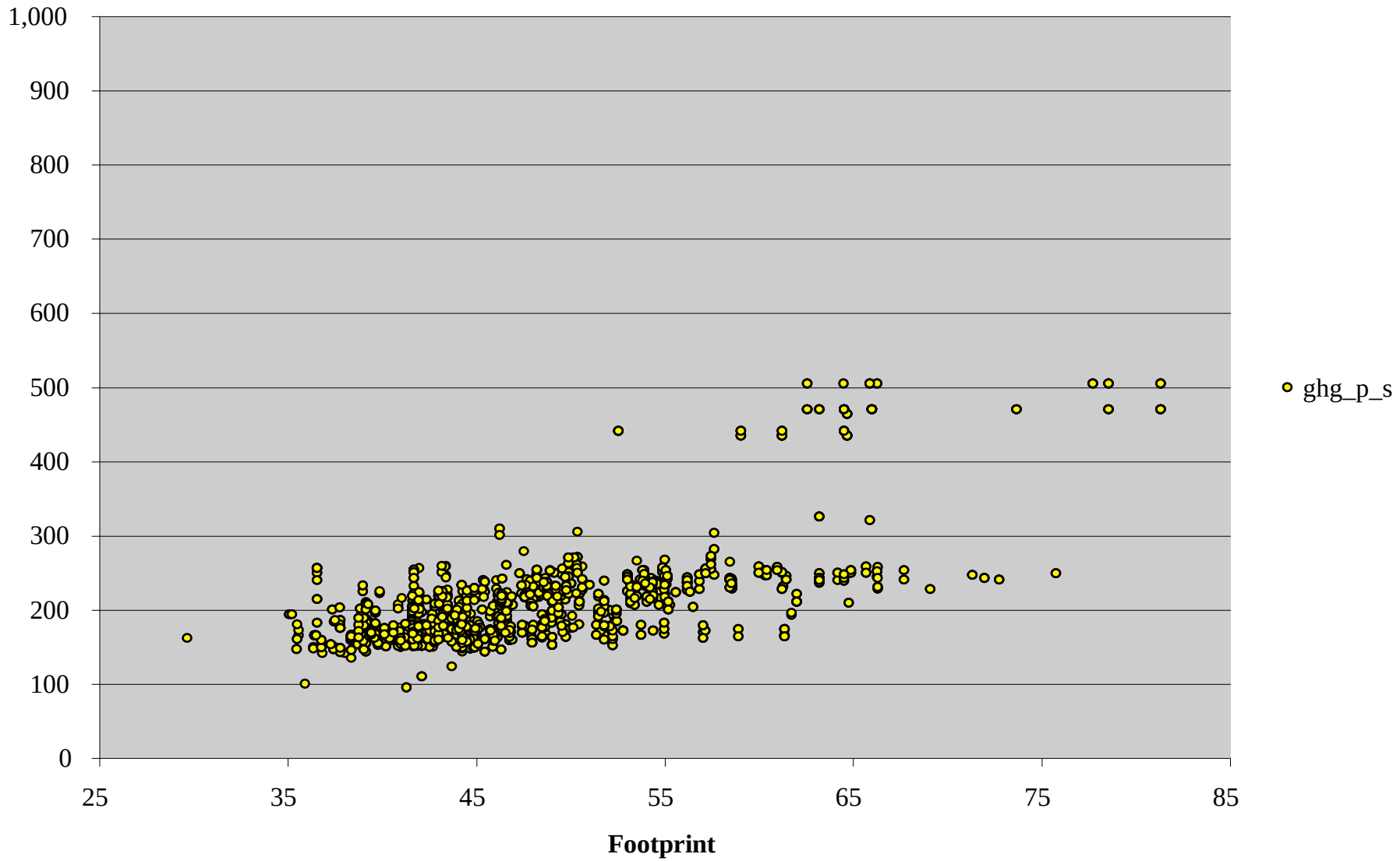

GHG Emissions versus Footprint: Base to "2020 CAFE"
1,000
900
800
700
600
500
400
300
200
100
0
25
35
45
55
65
75
85
Footprint
ghg_b
ghg_c

GHG Emissions versus Footprint: Plus "Pavley I"



GHG Emissions versus Footprint: Zero Band




GHG Emissions versus Footprint: Size Based
1,000
900
800
700
600
500
400
300
200
100
0
25
35
45
55
65
75
85
Footprint
ghg_p_s

Conclusions

- A feebate program could achieve up to 20% incremental reduction in GHG per mile over “2020 CAFE” plus “Pavley I”)
- A feebate program implemented today could start California on the path to “Pavley II” reductions in GHG
- Costs of GHG reductions increase at an increasing rate for regulations or feebates