

# Transportation, the Economy, and VMT

*presented by*  
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# Transportation, the Economy, and VMT

- **Enormous Returns on Higher Levels of Highway and Public Transportation Investments**
- **Higher Levels of Investment Will Drive Economic Growth**
- **VMT Is Tied Strongly to the Economy but Some Actions Preserve Mobility While Reducing VMT**
- **Some Means to Achieve VMT Reductions Will Not Be Economically Neutral or Positive**

# **Favorite Quote From the 2006 Interstate Highway System's Fifty Year Celebration**

- **“We did not become a very prosperous country and then we decided to invest in highways. We decided to invest in highways and then we became a very prosperous country.”**
- **(Source: Cited by John Horsley of AASHTO, but probably of unknown origin)**

# Annual Rates of Return On Capital Investment

Source: Nadiri and Mamuneas “Highway Capital and Productivity Growth”, 1996

Annual Rate of Return by Type of Investment				
Type	1960-1969	1970-1979	1980-1989	1950-1989
<i>All Highways</i>	35%	16%	10%	<b>28%</b>
<i>State Highways</i>	47%	24%	16%	<b>34%</b>
<b>All Private</b>	<b>14%</b>	<b>12%</b>	<b>11%</b>	<b>13%</b>

## **Favorite Quote From ENO Forum Chairman Which Reviewed Professor Nadiri's Results**

- **“Professor Nadiri appears to have solved the essential problem associated with production function studies.”**
- **Quotation in ENO Forum Report “Economic Returns from Transportation Investments” by the Forum Chairman, Professor Jose Gomez-Ibanez of Harvard University**

# Another Example- Current Interstate System National Needs – Costs and Benefits

- **Capital needs of \$1.3 trillion over thirty years - \$43B per year (constant \$) for full needs on existing Interstate system (versus \$17B per year current level of IS capital investment)**
- **Serves up to an 80% increase in VMT with less than a 40% increase in lane miles (existing Interstate system only)**
- **User costs – saves user costs of \$220B per year by 2035 - five times greater than the incremental annual capital costs**

# Another Example - Current Estimate of Public Transportation Economic Impacts

- **Each investment of \$ 1 billion in public transportation capital:**
  - Creates or supports 24,000 jobs
  - Increases net business sales \$3 billion per year
  - Increases net GDP by \$1.5 billion per year
- **Each investment of \$ 1 billion in public transportation operations:**
  - Creates or supports 41,000 jobs
  - Increases net business sales \$3.8 billion per year
  - Increases net GDP by \$2.0 billion per year;

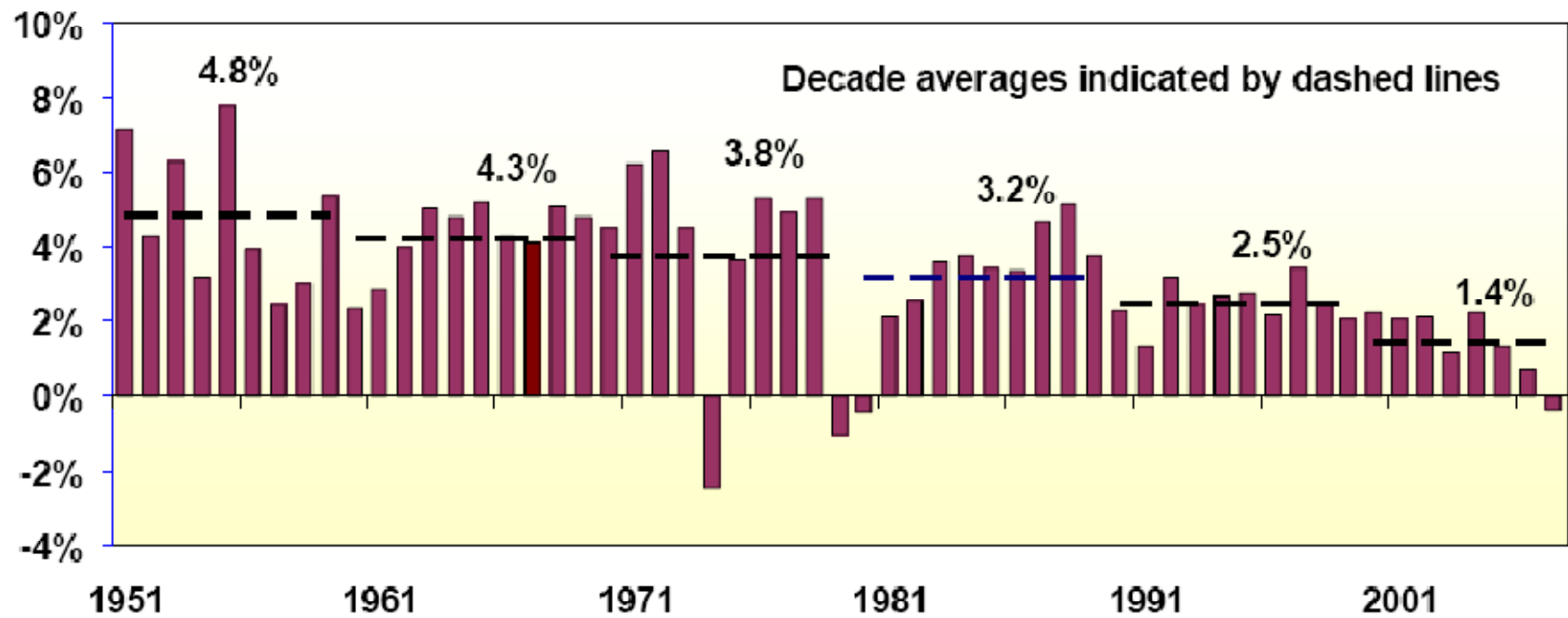
**Source:** Weisbrod and Reno, "Public Transportation and the Economy" October 2009  
(Note - Global Insight's 2003 study estimated \$2.2 billion GDP impact from a combined \$1 billion highway and public transportation spending)

# *Highway and Transit: Economic and Other Benefits from Higher Levels of Investment*

- **Analyses of national highway, public transportation, and other investment needs for these studies indicate that well over \$150 billion per year in additional investments are economically justified, with returns on investment of 2 to 1 or 3 to 1 or more**
- **These investments can also be designed to reduce GHG emissions and to address equity concerns**

# Annual VMT Growth Rates Have Slowed

Annual Average Vehicle Miles Traveled Growth



Source: Federal Highway Administration.

## Recent Forecasts of Average Annual Growth of VMT

- **1.4 % AASHTO Bottom Line Report, 2008 base case and US DOE Alternative Energy Outlook, 2009 base case**
  - up a total of 32 percent over 2010 by 2030
  - up by 74 percent by 2050
- **1.0 % AASHTO's Sustainability goal, 2008**
  - up a total of 22 percent over 2010 by 2030;
  - up by 49 percent by 2050
- **1.8 % National Surface Transportation Policy and Revenue Study Commission, 2007 base case**
  - up a total of 43 percent over 2010 by 2030;
  - up by 104 percent by 2050

## **Steve Polzin CUTR FHWA VMT Spreadsheet Model (with average annual 0.81 percent per year population growth)**

- **1.4 % annual VMT growth to 2035 occurs at 1.5 percent real annual per capita income growth**
- **1.0 % annual VMT growth to 2035 occurs at 0.6 percent real annual per capita income growth**
- **0.75 % annual VMT growth occurs at 0.0 percent real annual per capita income growth**
- **Zero annual VMT growth occurs at -2.9 percent real annual income growth (decline)**

# Per Capita Income - Annual Percentage Changes by Income Level (US Data)

Period	Lowest Quintile	Second Quintile	Third Quintile	Fourth Quintile	Ninety Fifth %
2000 to 2007	-0.9%	-0.3%	-0.2%	+0.2%	+0.2%
1992 to 2000	+2.3%	+1.7%	+1.8%	+2.2%	+2.7%
1980 to 1992	+0.2%	+0.4%	+0.6%	+1.0%	+1.6%
1967 to 1980	+1.0%	+0.7%	+1.3%	+1.6%	+1.6%

# VMT Relationship to Economic Growth

- Polzin formulation shows high correlation between VMT growth and economic growth
- Some studies (Pozdena) show “bi-directional causality”
- Basic economics says that travelers receive net benefits (“consumer surplus”)
- Can economic growth occur independent of VMT growth?
- Answer is dependent on whether the economic benefits of mobility are foregone due to measures to reduce VMT

# Relationship of Income Growth to VMT

- All likely levels of future income growth have positive VMT growth – also due to population growth
- If the Polzin formulation is accurate, one solution to achieving lower VMT growth is very low growth in personal income or a decline in personal income
- Preferred future is reasonable growth in personal income
- What are impacts on economy if we try to slow vmt growth while income grows at reasonable rate (1.5%?)

## Relationship of Income Growth to VMT

- **Measures such as investment in public transportation and more compact development can slow VMT growth without negative impacts on mobility or on personal income**
- **These can have only modest impacts – public transportation now accounts for only 1 percent of total personal travel and doubling it to 2 percent will impact on about one year's worth of VMT growth**
- **Land use changes will be only slightly greater but will occur over a very long time**
- **Pricing will impact negatively on personal income**

# Pricing Impacts on VMT and Income

- Pricing: VMT fees, fuel taxes, congestion fees, etc.
- Preliminary estimate: if personal income growth is 1.5 percent per year, reducing VMT growth from 1.4 percent to 1.0 percent per year requires net travel price increases of at least 20 percent by 2030 and 40 percent by 2050
- Personal income losses would be at least 2 percent of all personal income in 2030 and at least 4 percent in 2050
- Losses could be double (4 to 8 percent loss) depending on elasticity assumptions (on which there is debate)

## *Pricing Measures Also Present Equity Issues*

- **Congestion pricing has greater benefits for higher income than for lower income single occupant (drive alone) work trips, although both groups get much lower benefits from pricing itself than the costs of the tolls they pay**
- **Equity issues for lower income groups created by pricing can be addressed through reinvestments in highways, public transportation, system operations, and commuter and ridesharing programs**
- **Equity issues for lower income groups can also be addressed by rebates**

# Puget Sound RC Daily User Benefits Versus Tolls From Tolling Application (\$ Thousands)

User Group	Total of All Savings (\$Millions)	Tolls Paid by Group (\$Millions)	Benefit/Cost Ratio: Total User Benefits per Dollar of Tolls
<b>Drive Alone Home Based Work</b>			
Low Income	\$2.5	\$111.5	.02
Low Middle Income	\$56.7	\$391.6	.14
High Middle Income	\$345.1	\$1,054.1	.33
High Income	\$980.8	\$1,745.2	.56
<b>Drive Alone Non Work</b>	\$739.4	\$4,203.8	.18
<b>Carpool and Vanpool</b>	\$446.7	\$1,978.3	.23
<b>Public Transportation</b>	\$156.1	\$0.0	NA
<b>Light Truck</b>	\$1,914.7	\$2,147.5	.89
<b>Medium Truck</b>	\$693.1	\$707.3	.98
<b>Heavy Truck</b>	\$770.1	\$861.1	.89
<b>Totals For All Groups</b>	\$6,102.3	\$13,200.3	.46

# Return on Investment by User Group: from Pricing, from Reinvestment and Combined

User Group	Pricing: \$ of Benefit Per Dollar of Tolls Paid	Reinvestment: \$ of Benefit Per Dollar Reinvested	Combined: \$ of Benefit Per Dollar Combined
Low Income SOV Work Trips	\$ .02	\$1.95	\$1.97
Low Middle Income SOV Work Trips	\$ .14	\$1.95	\$2.09
High Middle Income SOV Work Trips	\$ .33	\$1.95	\$2.28
High Income	\$ .56	\$1.95	\$2.51
Drive Alone Non Work	\$ .19	\$1.95	\$2.14
Carpool and Vanpool	\$ .23	\$1.95	\$2.18
Heavy Trucks	\$ .89	\$1.95	\$2.84
All Vehicle Classes Combined	\$ .46	\$1.95	\$2.41

Sources: PSRC Traffic Choices Study and CS Analysis for Bottom Line Report.

# Distributional Impacts of Carbon Tax and Lump Sum Rebates (Source: MIT)

Income Decile	Carbon Tax as Percent of Income (Income Loss)	Lump Sum Rebate as Percent of Income (Income Gain)	Net Impact on Income (Gain or Loss)
1	-3.7	5.6	1.9
2	-3.0	4.0	1.0
3	-2.3	3.1	0.8
4	-2.0	2.4	0.4
5	-1.7	2.1	0.4
6	-1.5	1.6	0.1
7	-1.3	1.3	0.0
8	-1.2	1.2	0.0
9	-1.0	0.9	-0.1
10	-0.8	0.6	-0.2

# VMT Relationship to Economy - Summary

- **Some strategies reduce VMT but replace mobility (at some price): carpool/vanpool, employer-based commute strategies, public transportation, bicycle and pedestrian, land use, operations, congestion and bottleneck relief, freight diversion**
- **Pricing strategies reduce VMT, mobility, and net income**
- **Pricing strategies must be associated with mitigation and equity measures, particularly for low and middle income groups**
- **Reinvestment of pricing revenues into public transportation and highways can replace some lost economic benefits**