

The Contribution of Highways to GDP Growth

Barbara M. Fraumeni

Muskie School of Public Service, USM, Portland, ME
& the National Bureau of Economic Research

2008 World Congress on National Accounts
& Economic Performance Measures for Nations
Arlington, VA May 14, 2008



Good and Bad News

- **Highways are not computers**
- **The rate of growth of highways is below the rate of growth of GDP**

Themes From the 1st Project (Stocks Only)

- **Benchmarks matter**
- **Not all construction is new construction**
- **Wealth vs. productive stocks – no longer an issue**

Details Matter

Pavement Curves

Experimental Bridge Estimates

- 1983, 1996, 2006
- Quality-adjustment is load bearing capacity
- Quality-unadjusted stock is # of bridges *length*number of lanes
- Increases the ROG of the structure stock on average by .2 to .4 percentage points

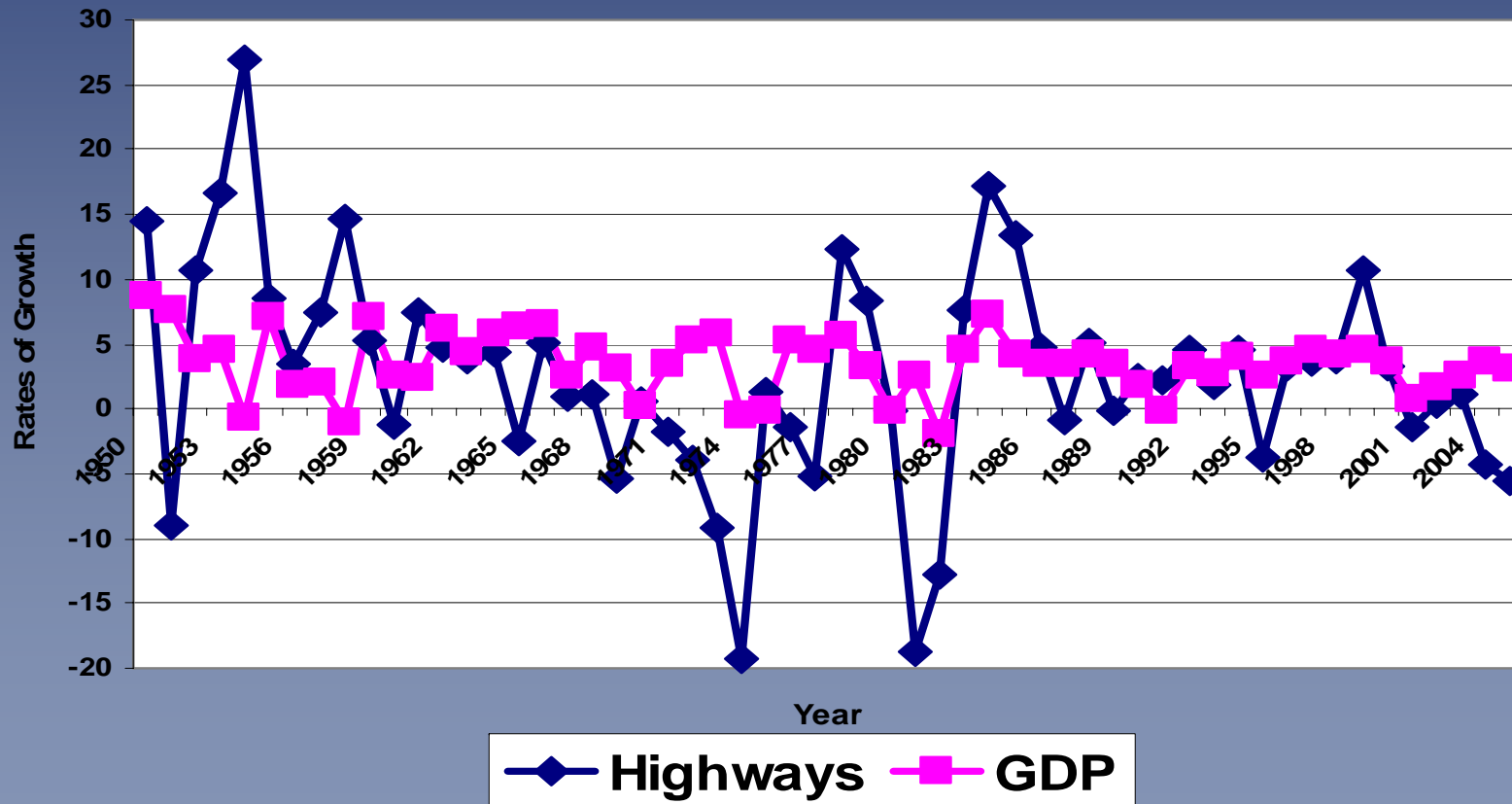
Contributions - 3 Types

- **Product - Activity of building roads, etc. (1929-2005)**
- **Income – Using roads in production**
 - **As part of GDP (1929-2005)**
 - **As part of Gross Output (1958-2005)**

Approximate Contribution Components

- **Nominal dollar share in GDP or Gross Output**
- **Rate of growth (ROG) in real (2000\$) component**
- **Computers: Share small, but ROG is huge**
- **Highways: Both are small**

Highway Capital Outlay and GDP in 2000\$ Rates of Growth 1950-2005



Contributions Using Capital Input

- **CSF = net return plus depreciation**
- **Net rates used**
 - **Private 11%**
 - **Government 4.4%**

Rates of Return

- **Doing as BEA might do – Sept. 2006 R&D report**
 - R&D net ROR is 15%
 - Approx. 4 percentage points higher than all private net ROR
- **Used the ratio of average R&D net ROR (15%) to all private assets net ROR (11%) to adjust a 6% R&D net government ROR**
- **4.4% net all government assets net ROR**

Contribution of Highway Capital Input to Growth in GDP

- **2002\$ component ROG from total highway capital stock**
- **Nominal highway capital input share in GDP**

3 ROR Scenarios

- **Only government ROR**
- **Private for interstates, government for rest**
- **All private**

Gross Output Version

- **Nominal shares from capital input plus other types of highway outlays**
- **Note that capital input is $> 50\%$ of highway gross output**
- **Two ROGs impact on overall ROG**
 - Highway capital stock
 - Other than capital outlay for highways

Gross Output Growth Rate

- In nominal \$s, sum up capital input plus other than capital outlay on highways
- In that nominal sum, determine share of capital input and share of other than capital outlay on highways
- **ROG =**
 - share of capital input * ROG of capital stock
 - PLUS**
 - share of other than capital outlay on highways * ROG of other than capital outlays on highways

Use of BLS Output Data 1959-2005

- **Implicit price deflator from selected government sectors to deflate other than capital highway outlay**
- **Nominal adjusted and normalized U.S. gross output**

ROG Comparisons

% Avg. ROG 1959-2005

Capital outlay		1.28
Capital input (stock)		3.00
Gross Output	Gov't ROR	1.85
	Gov't & Private ROR	2.17
	Private ROR	2.25
GDP		3.34

Contributions Estimates

Very Small

- **Average 1930-2005**
 - Capital outlay .03%
 - Capital input to GDP .03% to .07%
- **Average 1959-2005**
 - Gross Output .01% to .04%

Conclusion

- **Highways have a small, but appreciable impact on GDP growth**
- **Future work**
 - **Urban/rural by functional type splits cannot be developed**
 - **Mamuneas (of Nadiri & Mamumeas) is developing an econometric model**