

AGGREGATE NATIONAL STUDIES									
Study Category	Author, Title, Date of Publication	General Description	Methodology	Data Source(s)	Period covered by data	Nature of impact(s) considered	Quantitative Findings/Measures of Impact	Comments	Applicability to future needs assessment
NADIRI AND MANUNEAS	Nadiri, M and Manuneas, T., <i>Contribution of Highway Capital to Output and Productivity Growth in the U.S. Economy and Industries</i> , 1996	Disaggregated data for 35 industry sectors, Nadiri's econometrically estimated the determinants of cost savings and productivity growth for each industry, resulting from dollar volume of public highway capital investments.		Disaggregated data for 35 industry sectors,	1950-1989	Contribution of highway capital to private sector industry costs and productivity growth.	For all industries, private sector cost elasticity with respect to highway investment is - .044.	Variation in cost elasticities among industries reflect intensity of highway use. Industries with large negative cost elasticities were probably intensive users of the highway network while industries with small cost elasticities were less intensive users. Changes in the economy would almost certainly result in different findings by industry today.	Recent findings (from 80s and 90s) probably more applicable, although logistics practices have changed substantially since 80s. Production now relies on very cheap and efficient transportation; transportation costs have fallen as share of production costs.
							Cost elasticities with respect to highway capital for each of the 35 industry sectors indicated that an increase in highway capital reduced cost in all but three industry sectors. There is a fairly wide range in the magnitudes of the cost elasticities across industries.		
							During 1950s, highway network contribution to annual productivity growth was 31 percent; 25 percent in the 60s; 7 percent in 1980s		
							Net rate of social return on highway capital was about 35%; declined to about 10% in the 1980s, or just about equal to rates of return on private capital		
LACKSHMANAN LITERATURE SURVEY (selected results reported)	T.R. Lakshmanan, <i>Review of International Studies of the Productivity Effects of Highway Infrastructure</i> , July 1996	survey of other national studies	various econometric studies						
Johansson, 1992; Johansson and Karlsson, 1994						productivity impacts	highway elasticity = .12 - .18		

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Keeler and Ying, 1988						cost effects	cost elasticity w. respect to highway capital stock = negative .07		
Aschauer 1990						per capita income	total elasticity = 0.22 - 0.37		
Munnel 1990						GNP	elasticity w. respect to core public capital = 0.31 - 0.39		

IMPACTS OF NEW HIGHWAY LINKS

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RURAL/UN DERDEVELOPED AREAS									
FAUCETT	Jack Faucett and Associates and Economic Development Research Group, <i>Economic Effects of Selected Rural Interstates at the County Level</i> , 2005.	Before-after case studies of impacts of construction of new interstates - for areas near rural interstates.	Not rigorous or statistically controlled studies of before after effects. Anecdotal.	Nine Interstate or near interstate corridors examined: county level data before and after completion of interstate sections. Some comparisons of similar counties without interstates.	various - generally between 1960s and the present	total employment; employment by sector.	Wisconsin I-43 Corridor - manufacturing employment increased by about 30% in corridor counties Virginia I-81 Corridor - about 18% increase in manufacturing employment between 1971 and 2000 I-16 - Laurens County Georgia (between Savannah and Macon) - 40% increase in population and 100% increase in employment between 1969 and 2002. Area developed as major logistics and warehousing center.	Counties with partially successful employment expansion programs will have more successful programs if interstates are developed.	New interstate links can have positive economic impact in lagging economic areas, but not a sufficient condition for economic growth.
REPHANN AND ISSERMAN	Rephann, T., and Isserman, A., <i>New Highways as Economic Development Tools: An</i>	Evaluates impacts of new interstate highway links on economic development in rural and	Counties that received or were proximate to new highway investments were matched against those that did not, using statistical (Mahalanobis distance) matching.	Units of observations are counties. 142 interstate "treatment" counties; 192 off interstate (no	1962-1984 (treatment period)	total income; population; per capital income; residential adjustments; dividends, interest, rents;	interstate highways have a positive economic impact on urbanized counties (i.e., counties w. cities of 25,000 or more	Authors conclude that the main beneficiaries in terms of economic growth are not	Rural and isolated areas may not benefit from new interstate highway investments per se; rural areas that already have some degree of urbanization,

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	<p><i>Evaluation Using Quasi-Experimental Matching Methods, Science and Urban Economics 24: 723-751, 1994</i></p>	<p>economically lagging regions. Uses a quasi-experimental matching method.</p>	<p>Counties were matched against other attributes as in a controlled experiment. Temporal, industrial, and spatial effects considered.</p>	<p>treatment) counties.</p>		<p>earnings by sector</p>	<p>isolated rural regions or even counties close to a new highway. Instead, the main places that benefit are close to large cities or with some degree of prior urbanization.</p>	<p>such as systems of small cities of around 25,000 are more likely to benefit from new highway investments</p>
<p>the largest impacts occur in spillover counties -- i.e., counties near or containing large cities. Initial impacts center on population growth; over time, the increased population effects industrial development, and these areas develop viable economic bases based on primary and secondary industries.</p>								
<p>Uncompetitive counties -- counties without a city or nearby metropolitan area -- exhibit little effect on total income or earnings.</p>								

IMPACT OF HIGHWAY INVESTMENT ON CONGESTION RELATED ECONOMIC FACTORS

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NCHRP 463	NCHRP Report 463, <i>Economic Implications of Congestion</i> , 2001.	Examines how urban traffic congestion affects producers of economic goods and services. Examines direct goods movement impacts, as well as impacts on business costs from increased commuting time of workers.	Business production function model was developed to relate levels of business activity to differences in relative costs of labor and materials, including worker commuting and business product/service delivery costs			Impacts on business costs - changes in direct production costs, access to production inputs and markets	<p>For tested scenarios, annual changes in business costs associated with product and service deliveries ranged from \$20 million/year to \$1 billion/year in a given region</p> <p>Business cost impacts from reduced congestion in the CBD and resulting reductions in CBD truck delivery costs were most concentrated within the CBD; by contrast, reduced truck delivery delay in industrial zones had economic impacts that were dispersed throughout the region.</p> <p>Reductions in commuter congestion and delay were partially capitalized into reduced worker wages and thus business costs. Costs of excess delay have the greatest impact on high value added, skilled labor occupations, where labor demand elasticities are high, and workers are better able to extract wage concessions from employers. Capitalization effects up to one-half the personal value of time. Thus, half is internalized, and half may be incident on businesses for some sectors.</p> <p>About one-half the value of excess congestion delay may be capitalized into higher wages and business costs for high value added, skilled technical occupations.</p>	Study includes impacts on freight (truck) Study could not effectively measure long term impacts of congestion on business and residential location decisions.	Congestion reduction in metropolitan areas has measurable impacts on business costs and productivity in the short to mid run. Over the longer term, failure to solve major congestion in metropolitan areas may result in loss of economic competitiveness, and some relocation of firms and households to periphery or to competitor regions experiencing less congestion

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PORTLAND CASE STUDY	Economic Development Research Group, <i>The Cost of Congestion to the Economy of the Portland Region</i> , prepared for Portland Business Alliance, Metro, Port of Portland and the Oregon DOT, 2005	Case study of the Portland Metropolitan area. Compares planned regional transportation investments (baseline) against a doubling of transportation investments over the next 20 years.	TREDIS proprietary analysis package.		Current and future benefit and cost flow forecasts	Benefit measures include congestion-related travel time savings and vehicle operating costs for households and businesses, safety, business access improvements.	Targeted highway investments which effectively relieve congestion in metropolitan areas such as Portland can yield an economic return on investment of about 2 dollars for every dollar invested.	Not necessarily generalizable to all areas. Results depend on the specifics of the area, and also the extent to which highway investments can be effectively used to relieve congestion.	Not directly applicable. Applicability of results to other metro areas depends on the specifics of the area, and also the extent to which highway investments can be effectively used to relieve congestion.
		A specific basket of improvements are not specified in the report, but include major highway expansions, arterial street expansions, improved highway connectivity, and transit improvements.	Direct user benefits (i.e., travel time savings) derived from travel demand forecasts					Does not include potential induced development impacts	
								Unable to determine in the report the impacts of highway investments vs. transit investments, but focus of study is highway capacity enhancements.	

FREIGHT									
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FHWA OFFICE OF FREIGHT MANAGEMENT AND OPERATIONS LITERATURE SURVEY	FHWA Office of Freight Management and Operations, Public Policy Impacts on Freight Productivity, 2006	Survey of the literature				Relationship between highway investment and freight productivity	1994 DRI/McGraw Hill study found gains - largest productivity gains from increased labor productivity; 1988 study by Keeler and Ying found greatest benefits between 1950 and 1973 with marginal benefits thereafter "close to normal"		
						Relationship between highway investment and industrial productivity			
						What sectors has productivity effect been most pronounced			
						What is the nature of the productivity effect (e.g., time savings, logistics restructuring, network effect, externalities effect)			