

The Impact of Highways and Other Major Road Improvements on Urban Growth in Ohio



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January 2003



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Policy Summary

The Impact of Highways and Other Major Road Improvements on Urban Growth in Ohio

By David T. Hartgen, Ph.D., P.E.

This study carefully reviewed growth in 20 Ohio urbanized areas to assess the link between urban growth and road investment. Almost 2,500 census tracts were analyzed including 138 separate major road projects. The analysis indicates that growth in Ohio is complex and depends heavily on the underlying local economy. Growth occurred primarily where there was room for it. Factors other than road investments (e.g., population density, school quality, housing quality, water, sewer, etc.) appeared to be the primary drivers of local growth. About 70 percent of the population growth took place in census tracts without major road improvements. In the few cases where growth seemed to have a statistically significant impact, the effect on traffic was about the size of locating one fast food restaurant along the road. A reasonable explanation for the weak relationship between roads and growth is that major road improvements are built to accommodate prior growth, not spur it. The study concludes by noting that road improvements should generally be used to improve mobility by reducing congestion, improving safety, and reducing travel times. Major road improvements should be targeted to locations where their impacts on mobility will be the greatest.

Of the many issues confronting urban America, few generate as much emotion as traffic, growth, and sprawl. The spreading out of urban regions of all sizes is a widely recognized phenomenon, along with steadily increasing traffic and development at the fringes of regions. To citizens stuck in traffic the links between these phenomena seem clear: As major roads are completed, subdivisions and businesses spring up, congestion ensues, and road widening is repeated.

But all growth is not sprawl. Population growth in inner-city tracts is viewed as beneficial in-fill development that raises population density and seems unconnected to road improvements, while the haphazard sprawl at the edge of regions seems dependent on road access. But many factors influence where growth occurs: regional economic health and industry mix, state

investment policies, local zoning flexibility, prior growth and density, infrastructure, schools, taxes, crime, utility rates, business and community attitudes, and road access, to name just a few. If growth is to be managed by road investment policy, then prudence dictates that a clear link between the two be established.

This study carefully reviewed the magnitude and location of growth in 20 of Ohio's urbanized areas to isolate the impact of major road improvements on these patterns. The study used a computerized mapping system called a geographic information system (GIS) to track growth and relate it to specific road improvements within

each region. The study also used consolidated county data on growth of population, households, employment and income, to develop an overall picture of growth on the state and local levels. Nearby

This is a policy summary of *The Impact of Highways and Other Major Road Improvements on Urban Growth in Ohio* by David T. Hartgen, Ph.D., P.E. Please visit www.buckeyeinstitute.org to download a copy of the full report or contact the Buckeye Institute to request a copy.

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counties in other states were also included to ensure a full picture of growth in several urban regions close to neighboring states.

Uneven Growth Across Ohio

Growth during the 1990s was not uniform across Ohio. Suburban counties near Columbus (Delaware and Union), Cincinnati (Warren and Butler) and Cleveland (Medina) led the state in population, housing and job growth. But not all growth was suburban: Some counties distant from urban regions and not on the Interstate system also posted strong gains, and major metropolitan counties lost population even though the densities of some individual tracts rose. Some rural counties in the south, east, and northeast regions of the state lost population. Job growth was more positive: All but three counties posted gains. Per capita income was highest in three suburban counties (Geauga, Delaware, and Warren), and lowest in the southeastern counties, but posted gains in all counties. The county-level analysis concluded that growth in Ohio cannot be described by simple explanations such as “suburban” or “Interstate”, but rather depends heavily on the characteristics of the underlying local economy.

Ohio’s urbanized areas have been growing in population faster than the state (10.3 percent versus 4.7 percent). The urbanized areas also spread out 12.7 percent during the decade, reducing overall population density by 2.1 percent. Generally, the smaller urbanized areas spread out faster than the larger ones.

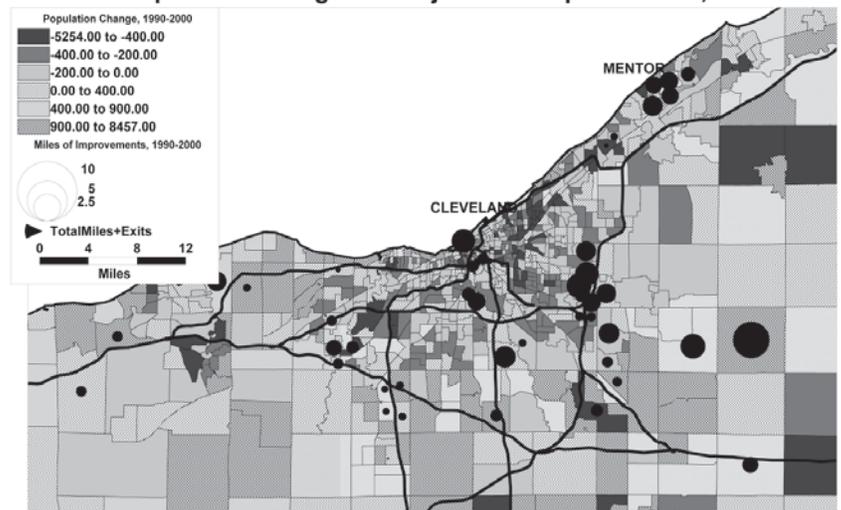
Overall traffic (measured in vehicle-miles-of-travel) in urbanized areas increased 24.7 percent over the decade. This growth was slightly faster than the traffic growth for the state as a whole (21.8 percent) but slower than U.S. traffic growth (28.0 percent). Freeway traffic increased 31.5 percent over the decade. Freeway capacity (lane-miles) also increased as roads were widened. Thus, freeway traffic per lane increased about 20.4 percent; the increase was between 15 and

30 percent for most of Ohio’s urbanized areas. Traffic volumes per lane were generally lower in the smaller cities. The highest average daily freeway lane volume (in Cincinnati) was slightly less than the U.S. average for large cities.

Detailed data for 2,468 census tracts in and near Ohio’s 20 urbanized areas were consolidated and organized according to their location within urban regions, their closeness to city centers and to the Interstate system, and prior growth and population density. Detailed information on all major road improvements completed in Ohio during the 1990s was obtained from the Metropolitan Planning Organizations with the assistance of the Ohio Department of Transportation. About 138 separate major projects (large enough to influence growth) were identified, including new freeways, new urban arterials, urban arterial widening, new exits, and other major projects such as new bridges. *The major projects affected about 243 tracts, or about 10 percent of the total.*

Detailed statistical analysis was then conducted to relate the tract growth with the major road improvements, prior Interstate construction, prior population and population density, and tract location within each urbanized area. Separate analyses were developed for each of Ohio’s eight largest cities (Cleveland, Cincinnati, Columbus, Dayton, Akron, Toledo,

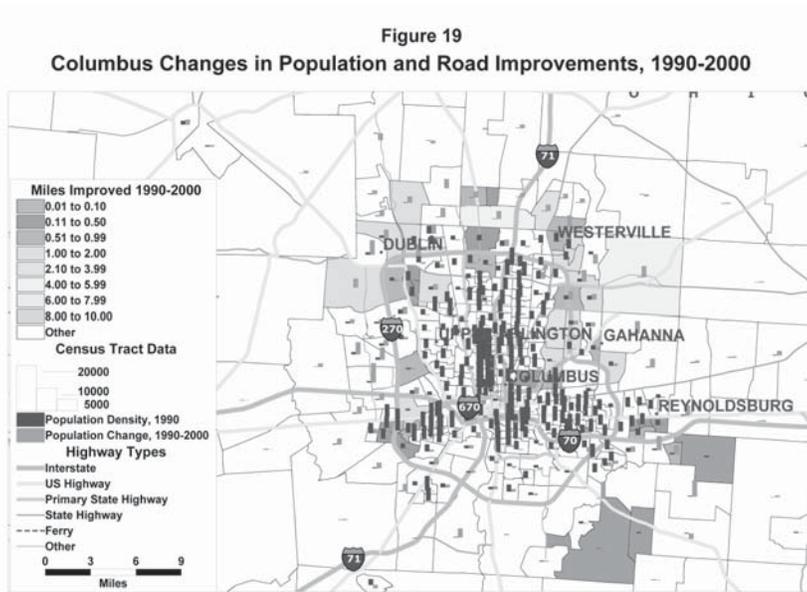
Figure 12
Cleveland Population Change and Major Road Improvements, 1990-2000



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Youngstown-Warren, and Canton), and for four geographic clusters of the 12 smaller urbanized areas.

prices rise, average household size declines, and some residential land is converted to other uses. Zoning regulations prohibiting higher density development may also push growth to nearby lower-density tracts. In the Columbus area (Figure 19 from the full report) growth was most rapid in the northern suburbs, but also occurred in many other tracts inside and outside the beltway.



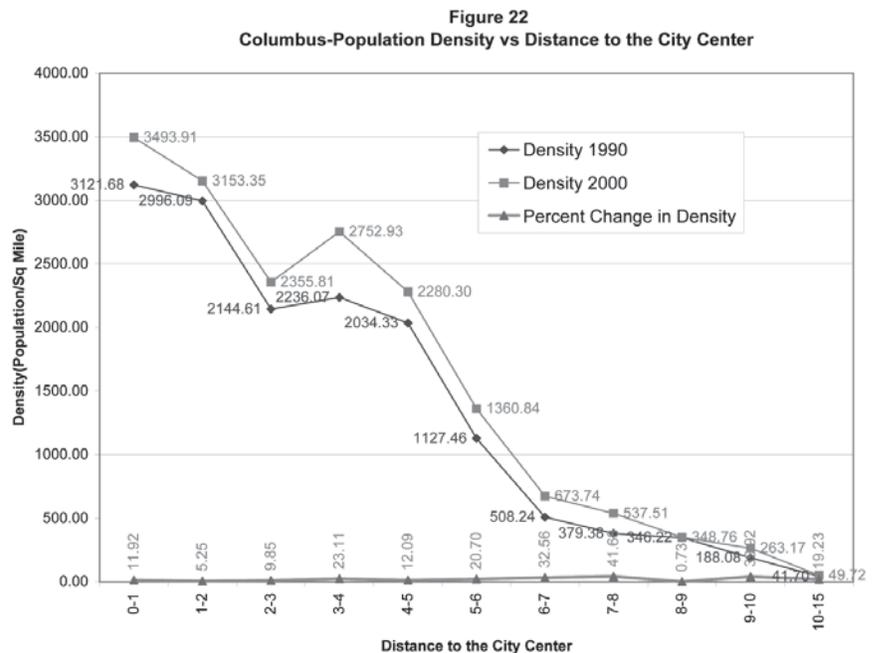
With the exception of Cincinnati's inner two-mile ring, and the inner two-mile ring of the five medium-sized cities, growth occurred in all rings of all cities. Figure 22 (from the full report) shows that in Columbus, the density of all the city's one-mile rings actually increased during the 1990's, even as the city spread out. Distance to prior Interstates and distance to city center were not important or only modestly important in influencing growth.

Growth Throughout Urbanized Areas

In all 20 urbanized areas, growth occurred primarily in those areas that had low prior density. Growth slowed as prior density increased. *Growth during the 1990's went primarily where there was room for it.* Although high growth areas tended to be on the edges of urban regions, many tracts within regions also grew and some tracts on the edges of regions did not grow.

Figure 12 (from the full report) shows that in the Cleveland area growth occurred throughout the region but was greater in the suburbs. The growth rate for low-density tracts near the edges of regions was typically between 200 and 1,000 persons (75 to 300 households) per decade. This growth rate slowed if the tract had prior growth, because as tract populations approach local zoning limits, land assembly becomes more difficult, land

A second important finding was that factors other than road investments were the primary drivers of local growth. The growth models were generally weak, explaining less than 20 percent of variation in local growth rates. Population growth within urbanized areas is a complex phenomenon, not strongly related to either prior growth or to major road investment.



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Table 21: Growth of Tracts in Ohio's Urbanized Areas, 1990-2000

Road Improvement	Number of tracts*	Miles Improved	1990 Population	Change in Population, 1990-2000	Percent Change, 1990-2000	Average Change in Population
Added Freeway	47	59.36	168,158	28,171	16.7	599
Added Urban Arterial	43	42.39	164,754	25,306	15.3	588
New Exit	16	12.25*	68,559	21,616	31.5	765
Widen Urban Arterial	133	112.70	519,858	87,406	16.8	675
Other Action	8	4.44	19,751	2,857	14.4	357
Other Mileage	10	42.64	31,523	2,814	8.9	281
All	243	273.77	918,517	139,587	15.2	574
No projects	2,225	0	4,149,850	300,147	7.2	134

* 18 tracts had more than one improvement, and several partial exits were improved

of the road improvement. The average effect is about 150-500 additional persons (about 600-2,000 daily trips) per mile of major road improvement. This effect is smaller than an average McDonald's restaurant, which generates about 2,500 trips per day. In several urban areas the effect was larger:

Other important factors in determining local growth rates might include taxes, school quality, housing quality, infrastructure provision, zoning regulations, and community and business attitudes.

Modest Effects for Major Road Improvements

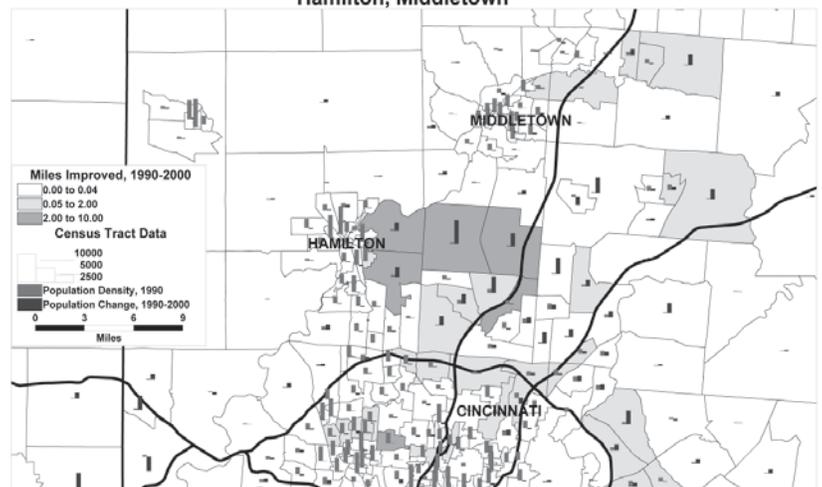
Most growth in the 20 urbanized areas occurred in census tracts that had no major road improvements during the 1990s. Table 21 from the full report shows the growth by tract group, indicating the population growth that occurred in these regions in the 1990s. About 70 percent of the population growth took place in census tracts that had no major road improvements.

Much of this growth occurred within the urban regions and inside beltways. Tracts with major road projects tended to grow more rapidly, but, with scarce funds constraining the road projects, most projects were likely sited to accommodate prior growth and pre-existing transportation problems.

However, detailed computer modeling for each region showed that major road improvements are only modestly correlated with population growth, and the effect varies substantially by urban region and by the nature

- In Cleveland, 1,945 additional persons per mile of added urban arterial;
- In Cincinnati/Hamilton, 4,528 additional persons were added per new freeway exit;
- In Toledo, 614 additional persons per new exit;
- In south-east small cities, 596 additional persons per new exit.

Figure 36
Population Density, Population Change and Road Improvements, 1990-2000
Hamilton, Middletown



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Figure 36 (from the full report) shows strong growth in the northern Cincinnati suburbs that had major road improvements, but also strong growth in other tracts. In other areas, the effects of road improvements were more modest. In southeast small cities, for example, only 72 additional persons were added per mile of widened arterial.

These findings mean that while major road improvements are correlated with tract growth, their impact is generally modest compared to common land use improvements. A reasonable explanation for this relationship is that major road improvements are built to accommodate prior growth, not to spur it.

Major road improvements were not very common. In the cities reviewed, major road improvements occurred in only about 10 percent of tracts over a decade, or about 1 percent per year. Therefore, policies that use road improvements to propel or direct growth are not likely to influence a significant share of development.

Conclusions

The study concludes that contrary to popular view, major road improvements are not strongly correlated with tract growth. Compared with common land-use developments, they have at most a modest effect on increasing traffic. The greater determinant of growth within Ohio's urban regions is a tract's prior population density.

The implications of this study for Ohio's land use policy planning are clear: Road improvements are a generally blunt, and largely ineffective, way to attract development to specific locations within urban areas. The control or prohibition of road improvements is not an effective way to control growth.

Road improvements should generally be used to improve mobility by reducing congestion, improving safety and reducing travel times. Major road improvements, generally the responsibility of the State, should be targeted

to locations where their impacts on mobility will be the greatest.

Since local governments are primarily responsible for local zoning, their decisions concerning allowable population density will be the primary determinant of the magnitude of future growth within the urban region. If densities are zoned low, then growth will simply go to other locations where it can be accommodated. Local officials therefore have their region's growth policy and eventual shape largely in their hands, and can direct and modify growth by local planning policies. In the absence of such policies, actions to limit growth by stalling or canceling needed road improvements are likely to backfire, producing greater congestion as increasing traffic spills onto inadequate roads. Neighborhoods and suburban communities need to work cooperatively to develop sensible growth management policies for sub-regions of metropolitan areas. In doing so they should focus on effective policies, particularly density, infrastructure, schools and tax rates, rather than on road improvements.

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ABOUT THE AUTHOR

David T. Hartgen, Ph.D., P.E., is Professor of Transportation Studies at the University of North Carolina at Charlotte and the U.S. editor for the international academic journal *Transportation*.

OTHER URBAN SPRAWL RESEARCH FROM THE BUCKEYE INSTITUTE

STUDIES

Samuel Staley, Matthew Hisrich, *Urban Sprawl and Quality Growth in Ohio*, December 2001.

PERSPECTIVES

Samuel Staley, Matthew Hisrich, *Could Suburbanization Improve Ohio's Air Quality?* - July 2002.

Samuel Staley, Matthew Hisrich, *Restricting Housing Not Answer to Local Growth* - January 2002.

Samuel Staley, Wendell Cox, *Rail Transit Unlikely to Stimulate Urban Redevelopment* - July 2000.

Samuel Staley, *Ohio Farmland Preservation Efforts Trivial, Off Target, and May Encourage Urban Sprawl* - June 2000.

POLICY NOTES

Is Rail Transit a Success Story? - November 2002.

Transit Lessons from Aborad - November 2002.

Rail is Not a Solution to Congestion - October 2002.

Managing Cars Key to Ohio Congestion Relief - January 2002.

Rail Transit Initiatives Unpopular at the Ballot Box - July 2001.

Rail Transit Fails to Reduce Congestion - February 1999.

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