



*Econ Journal Watch,
Volume 5, Number 1,
January 2008, pp 32-45.*

Highway Penetration of Central Cities: Not a Major Cause of Suburbanization

WENDELL COX¹, PETER GORDON², AND CHRISTIAN L. REDFEARN²

A COMMENT ON: NATHANIEL BAUM-SNOW, “DID HIGHWAYS CAUSE SUBURBANIZATION,” *QUARTERLY JOURNAL OF ECONOMICS* 122(2), MAY 2007: 775-805.

ABSTRACT

NATHANIEL BAUM-SNOW HAS DONE INTERESTING WORK ON THE IMPACT OF highways on the process of suburbanization. His basic idea is to estimate the statistical links between a central city’s new-highway penetration and population change. The article’s title is “Did Highways Cause Suburbanization?” published in the *Quarterly Journal of Economics* 2007. He has published related work in the *Journal of Urban Economics* (2007b). There are three judgments we would make about the article: two are positive but the third questions what can be reasonably learned from the author’s findings.

(1) *Remarkably good:* Baum-Snow’s *QJE* paper “assesses the extent to which the construction of new limited access highways has contributed to central city population decline” (775). To do so, he uses “planned portions of the interstate highway system as a source of exogenous variation” in transportation conditions. Baum-Snow’s investigation appears to give a remarkably detailed treatment of the variables included in the model. He reports on numerous robustness tests. We do not know and cannot comment on the numerous underlying judgment calls he had to make in the details of his investigation, but the ambition, care, and thoroughness with which he has developed and utilized the data used in his model are remarkable and impressive. Indeed, the “highways caused suburbanization” thesis is one that has been suggested many times, but Baum-Snow may be the first to seriously attempt to test it.

1 Conservatoire National des Arts et Metiers. Paris, France 75141.

2 School of Policy, Planning and Development, University of Southern California. Los Angeles, CA 90089.

(2) *Statistically remarkable*: Based on the new highway variable developed in the paper, Baum-Snow's econometric results lead him to conclude that "one new highway passing through a central city reduces its population by about 18 percent." That is remarkably large. The size of the effect is shown by doing the math on the counterfactual of not having built the highways in question: Baum-Snow notes that, in fact, between 1950 and 1990 the aggregate population of central cities in the United States declined by 17 percent despite national population growth of 64 percent, but, by contrast, the estimates from his model imply that, had the interstate highway system not been built, the "aggregate central city population would have *grown* by about 8 percent" (775). This remarkable result should prompt flashing lights for anyone working on related issues of urban economics and demographics. Given the substantial decline in household sizes that has occurred since 1950, this would have required 40 percent more housing units to be crowded into the cities—a densification that has occurred in no constant-geography, fully developed central city. Again, we make no criticism of the way Baum-Snow carried out his econometric investigation. On the customary presumption that it was done in a workmanlike, honest way, the fact that it produced the reported results is important news that should alert us.

(3) *Remarkably quiet on alternatives*: Having obtained the remarkable results he got, Baum-Snow wants us to believe that they are reasonable estimates of the true impact of highways on central city population. The second sentence of the paper is as follows: "This paper demonstrates that the construction of new limited access highways has contributed markedly to this central city population decline" (775). In his conclusion he writes:

I evaluate the importance of highways for explaining central city population decline by examining the counterfactual evolution of aggregate city population where no highways were constructed. A coefficient of -0.09 implies that had the interstate highway not been built, aggregate central city population in MSAs in the primary sample would have increased by 8 percent between 1950 and 1990. (800)

Nowhere does Baum-Snow suggest that there are reasons to question these results and only briefly does he mention other possible explanations for suburbanization (775, 801). He cites "changes in the amenity value of suburbs relative to central cities" (775), but only fleetingly and calls it a "complementary explanation." He does not look beyond his investigation at anything that would cast doubt on his results. In answer to the question posed in the title of his paper, "Did Highways Cause Suburbanization?" Baum-Snow is effectively saying: Yes, to an economically significant extent. He writes: "Estimates presented below indicate that highways can explain about one-third of the change in aggregate central

city population relative to metropolitan area population as a whole” (775). The suggestion that we should take the model estimates as reasonable estimates is remarkable. Baum-Snow’s investigation appears to be well-done, but there is also considerable evidence to suggest that the large correlation he estimates is spurious. Again, Baum-Snow suggests that central city populations would have grown had the interstate highways not been built, but there is much evidence to suggest that, under that counterfactual, central city populations still would have declined, though perhaps not by as much as they actually did.

Suburbanization has, for a long time, been a trend based on consumer preferences and larger trends, notably rising wealth and transportation and communications improvements (including the highways Baum-Snow investigates). Jackson (1985) finds U.S. suburbanization began at the end of the 19th century. Indeed, he refers to “streetcar suburbs.” The 20th century U.S. experience is shown in Figure 1, which shows the percentage of US population living in metropolitan areas, and breaks that percentage down into central cities population and suburbs. The growth of the suburbs relative to the central city is seen well before 1950. Moreover, in the figure the relative decline of the central cities is understated because central cities have been annexing suburbs for many years.³

The simple broad narrative is that, by and large, suburban living expanded throughout the twentieth century *because it could*. Around the world, as incomes rise, people choose the mobility of the automobile; they overwhelmingly prefer the range and choice of personal transportation. As they choose automobility, origins and destinations disperse; and as these disperse, the attraction of the auto grows. It is a self-reinforcing cycle that is facilitated by better highways. But as with most public sector infrastructure developments, these usually follow rather than lead.

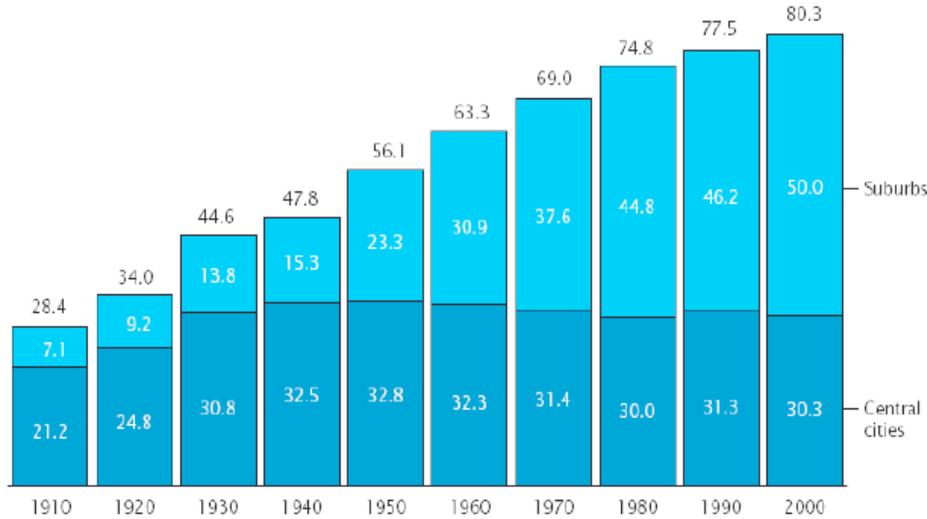
As suggested earlier, we think that the history of urban dispersal is a natural trend reflecting consumer preferences and the historical developments of transportation modes and living standards that enabled dispersal. Dependency on a “central city” or “central business district” that might be in the area is generally much less important than has been supposed. Thus, we doubt that penetration as such is a significant cause of suburbanization.

In this view, *highway penetration of central cities remains a minor factor* in the story. The central cities’ importance would have continued to decline even if the interstate highway system had not been built. The reasons for doubting Baum-Snow’s result are not esoteric or arcane. Rather, they are obvious and well-known.⁴

3 Nicole Stelle Garnett (2007): “By 1920, ‘exit’ [from central cities] had become a mass phenomenon” (6). She also notes that exit is now over. “The exit story ... no longer captures the American suburban experience. For a majority of Americans, suburbs have become points of entrance to, not exit from, urban life. Most suburbanites are ‘enterers’—people who were born in, or migrated directly to, suburbs and who have not spent time living in any central city” (1).

4 Also, there was undoubtedly some displacement of population, inside and outside central cities, as housing units were demolished and people were forced to move as a consequence of highway construc-

Figure 1: Percent of Total Population Living in Metropolitan Areas and Their Central Cities and Suburbs, 1910-2000 (%)



Source: Hobbs, Frank and Nicole Stoops. 2002. Demographic Trends in the 20th Century. U.S. Census Bureau, Census 2000 Special Reports, Series CENSR-4.

Empirical work must meet two standards. It must meet the rules of evidence that statisticians have developed and it must be plausible in light of what we know about the topic. The Baum-Snow paper, in our view, only meets the former standard. Deirdre McCloskey has famously described economists as looking for their lost keys under the lamppost because the light is better there; she criticizes them for failing to get beyond the light of the lamppost (McCloskey 1990, 73). Similarly, Thomas Mayer (1993) has described the problem as economists fashioning and polishing one very strong link, rather than tending to the entire chain of a learned line of argument. We suggest that, unfortunately, Baum-Snow's narrow focus on the results of an econometric test serves as a good example of the problem described by McCloskey and Mayer.

**THE MECHANISM POSITED BY BAUM-SNOW:
THE ASSUMPTION OF GREAT DEPENDENCE ON THE CENTER IS MISGUIDED**

In explaining the central-city-penetration effect, Baum-Snow sketches the mechanisms at work with the standard monocentric model of cities: "In its simplest form, this theory assumes all employment occurs at a central location and the rental rate of land adjusts as a function of distance from the center to com-

tion. But we have no data on the extent to which this occurred and expect that it was relatively minor.

pensate for different commuting times of identical agents. A standard extension allows for heterogeneity in various factors that affect the demand for space and the value of commuting time” (785). The primary explanation Baum-Snow offers for his highway effect, then, is that primary employment activity is monocentrically distributed, and better highways enable people to move their residence away from the center and yet still get to their jobs on a daily basis without spending too much time commuting.

Relying on the standard model in this way to sustain the idea that highways are crucial drivers of suburbanization depends crucially on the idea that good and speedy access to activities in the central city allows the suburbs to grow. This has been a common presupposition in urban and transportation studies, but in fact it is much less sound than is often supposed. Rather, decent road transportation makes suburbs highly viable so long as they can connect to needed resources, *wherever they come from*. One study has shown that in 2000, in the largest U.S. metropolitan areas, less than ten percent of the jobs were in the downtown, 15 percent were in subcenters (many outside the central city) and 78 percent were dispersed everywhere else (also much of it outside the central city; Lee, 2006). This suggests two problems with Baum-Snow’s theoretical model. First, the monocentric model in no way describes the real world. Second, “the center” of the monocentric model is not well represented by the Census Bureau’s central city; highway penetration or access to the conventionally defined central city is not what the monocentric model is about. For example, among the 30 largest central cities in 1950, there was a variation in land area from approximately 40 square miles to 450 square miles. Our Figure 1 reveals that in 1950, the central-city areas “penetrated” accounted for 58.5 percent of metropolitan area population (which in turn was 56.1 percent of the U.S. population). But this is not what the monocentric model describes. The real “centers”, the downtown areas, were typically small, generally accounting for under three square miles (most under two), even in 2000 (with the exceptions of New York and Chicago).⁵

The spatial pattern that we are describing has been in effect for some years. Although there are no historic data on intra-metropolitan employment location changes, we do know that commuting times have been remarkably stable for many years (Hafeez 2000). This means that we can infer that people and jobs have for many years co-located to the suburbs. That suggests a long history of significant suburbanization of employment. And that tells us that it is unlikely that highway access to the central city was crucial to suburban development.⁶

Later in his paper (801), Baum-Snow notes how employment, in addition to residence, has become more decentralized, and suggests that this too helps to explain his results about central-city highway penetration. He does not acknowl-

⁵ <http://www.demographia.com/db-cbd2000.pdf>.

⁶ We thank an anonymous referee for pointing out that the link between improved highways and better accessibility has been found to be weak by Winston and Langer (2006).

edge, however, that, if employment also becomes decentralized, the assumption of needing speedy access to the central city is weakened. Were he to look at just how extensive this phenomenon is, he might re-examine his reliance on the monocentric model. In fact, there is good reason to believe that highway development aids suburbanization *regardless of whether it connects to the central city*—most commuting and a great deal of travel and trade is suburb-to-suburb. The interstate highway system did facilitate suburb-to-suburb commuting (without being the main causal factor) but that is another study.

The author bases his analysis on the monocentric model because its comparative statics suggest that rising income and cheaper travel cause suburbanization. If monocentric thinking has misled Baum-Snow, it wouldn't be the first time that it has misled researchers. The model has analytical appeal, for its tractability. Also, in the days of primitive transportation it had some validity. But the convenient assumption of monocentricity is implausible, to say the least, when less than ten percent of large-metropolitan area jobs are in the downtowns.

BAUM-SNOW'S INVESTIGATION

Before advancing our criticisms of Baum-Snow's paper, we should explain his investigation in a bit more detail. Again, we will not criticize the investigation as such, but rather the failure to consider evidence beyond the model and the investigation.

Baum-Snow identifies planned highway "rays" from suburbs to center cities, as shown in an early draft (from 1947) of the interstate highway plan (776). These are plausible instrumental variables because they cannot be said to be endogenous or responsive to suburbanization that may have occurred in later years. "[A] 'ray' is defined as a segment of road that connects the central business district (CBD) of the central city with the region outside the central city. If a highway passes through the central city, it counts as two rays whereas if a highway terminates in or near the central city it counts as only one. Rays must pass within one mile of the CBD and serve a significant area of the MSA out of the 1950-definition central city to be counted" (780-781). The author reports tests that show the subsequent change in rays was responsive to population change whereas planned 1947 rays could not be explained in this way. These rays are plausibly exogenous.

For controls, the author adds a constructed income variable, a Gini coefficient, central city radius, metropolitan area growth as well as fixed effects. The latter are actually poor proxies for other influences because a long time span is being considered; the cities have changed considerably and whatever the fixed effects variables describe in 1950 has very little meaning in 1990.

Mieszkowski and Mills (1993)⁷ note that, "the trend toward suburbanization

⁷ We want to thank an anonymous referee of reminding us of this important paper.

has been prewar as well as postwar, and has been international in scope.” (135). But more importantly, these authors tried to assess and compare two dominant theories of suburbanization, the one “favored by urban theorists and transportation experts,” (and similar to the Baum-Snow model); the other “stresses fiscal and social problems of the central cities: high taxes, low quality public schools and other government services, crime congestion and low environmental quality. These problems lead affluent central city residents to migrate to the suburbs, which leads to further deterioration of the quality of life and the fiscal situation of central city areas, which induces further out-migration.” (137). They conclude “[o]ur judgment is that both the natural evolution and the fiscal-social approaches are important” (144).

EVIDENCE AGAINST THE PENETRATION THESIS: WESTERN EUROPE

If, as posited by Baum-Snow, the number of rays is associated with significant population loss in the constant-geography central cities, then the same effect should be found outside the United States. The only reference that Baum-Snow makes to any evidence beyond the post-WW II experience in the United States is a glancing remark in a footnote (777).

Indeed, the best place to test the thesis is in countries with cities with greater variation in ray penetration. In the United States, rays have penetrated the cores of all metropolitan areas over 1,000,000 population in 1990, and of most, if not all, over 500,000. Moreover, no central city that has ever achieved 400,000 population in the United States is not served by at least one ray. In Western Europe, however, rays have not penetrated into the core of many central cities. For example, the cores of London, Paris, Copenhagen, Milan, Antwerp, and Manchester are not penetrated.

Table 1 shows a list of fully developed Western European central cities that have (ever) achieved 400,000 population and have not materially increased their land area since 1950. The Table shows peak population, the 1990 cycle population, and the percentage changes in population at 1990.⁸ It also shows whether the central city had ray penetration as of the year 1990.

The numbers in Table 1 make for some obvious calculations. We may compare population decline of cities with rays to cities without rays. Also, we may measure the declines, as of 1990, from the city’s peak population.

Table 2 summarizes the results. It shows that the annualized average population decline for the Western European central cities, from the city’s peak popu-

⁸ As the table shows, not all countries conduct their population census in the same year. We have chosen the generic title “cycles,” indicating the general period of each country’s census year. The growth rates are average annual rates between the dates noted in each row of the table. Hereafter, when our discussion refers to 1990 data, we mean data from that cycle.

Table 1: Fully Developed (as of 1980) Central Cities in Western Europe⁺ Achieving Peak Population of 400k or More in the 20th Century with No Material Land Area Expansion since 1950

Central City	Freeway Ray in 1990?	Peak Population	Peak Population Year	1990 Census Cycle Population	1990 Census Cycle Year	1990 Change from Peak (Annualized%)
Amsterdam	N	866	1960	695	1990	-0.73%
Athens	Y	886	1981	772	1991	-1.37%
Barcelona	Y	1,753	1981	1,644	1991	-0.64%
Belfast	Y	444	1951	295	1991	-1.02%
Bilbao	Y	433	1981	370	1991	-1.56%
Birmingham	Y	1,113	1951	966	1991	-0.35%
Bologna	N	487	1971	404	1991	-0.93%
Bremen	N	606	1970	533	1987	-0.75%
Bristol	Y	468	1971	408	1991	-0.68%
Cologne	Y	1,014	1970	928	1987	-0.52%
Copenhagen	N	768	1950	467	1991	-1.21%
Dublin	N	566	1971	478	1991	-0.84%
Dusseldorf	N	705	1961	564	1987	-0.85%
Edinburgh	N	471	1951	401	1991	-0.40%
Essen	Y	730	1961	623	1987	-0.61%
Florence	N	456	1971	403	1991	-0.62%
Frankfurt	Y	672	1961	618	1987	-0.32%
Genoa	N	844	1971	679	1991	-1.08%
Glasgow	Y	1,088	1931	658	1991	-0.83%
Gothenburg	N	451	1970	422	1990	-0.33%
Hague	Y	605	1960	442	1990	-1.04%
Hanover	N	576	1961	494	1987	-0.59%
Leeds	Y	511	1961	424	1991	-0.62%
Lisbon	N	818	1981	663	1991	-2.08%
Liverpool	N	857	1941	482	1991	-1.14%
London	N	4,536	1901	2,504	1991	-0.66%
Lyon	Y	570	1936	415	1990	-0.59%
Madrid	Y	3,159	1971	3,010	1991	-0.24%
Manchester	N	766	1931	403	1991	-1.06%
Milan	N	1,713	1971	1,369	1991	-1.11%
Naples	N	1,278	1971	1,067	1991	-0.90%
Nuremburg	Y	499	1981	470	1991	-0.60%
Oslo	N	488	1970	458	1990	-0.32%
Paris	N	2,906	1920	2,157	1990	-0.42%
Rotterdam	Y	730	1960	579	1990	-0.77%
Sheffield	N	513	1951	432	1991	-0.43%
Stockholm	N	808	1960	674	1990	-0.60%
Stuttgart	N	649	1961	552	1991	-0.54%
Thessaloniki	N	406	1981	384	1991	-0.56%
Turin	N	1,191	1971	963	1991	-1.06%
Vienna	Y	2,031	1911	1,540	1991	-0.35%
Zurich	N	440	1960	365	1990	-0.62%

Note: Populations in thousands. Sources: Multiple sources, including national census data and reference volumes (almanacs, atlases & Statesman's Yearbooks).

⁺ EU-15 (excluding East Germany), plus non-members Switzerland, Norway and smaller nations in this geography. London central city is pre-1966 boundaries (former London County Council).

lation to its 1990 population, was actually slightly larger for cities without rays. The typical time period between the year of peak population and 1990 is 31 years, meaning that over this period the average annual population loss was 0.79 percent for cities without rays—again larger than the 0.73 percent average annual loss in cities with rays. (Note that this result is not a function of outliers in either group: median gross losses show the same pattern.) These data make no reference to 1950 or any base year because we are not here looking for instrumental variables but simply showing that there has been substantial suburbanization with and without rays and certainly without anything like the U.S. Interstate Highway System.

Table 2: Summary of Results: Western Europe Central Cities Population Change from Peak and Freeway Rays

Central Cities	Number	Number Gaining Population	Number Losing Population	Mean Change in Population (Annualized%)	Median Change in Population (Annualized%)
With Rays in 1990	17	0	17	-0.71%	-0.62%
Without Rays in 1990	25	0	25	-0.79%	-0.73%

The following examples describe population losses that have occurred in essentially stable geography central cities between their peak population years and the early 1990s and which were also fully developed by 1980.⁹

- The central city of Copenhagen reached its population peak in 1950 and lost nearly 40 percent of its population by 1990. Copenhagen’s core is not penetrated by a single ray, yet its population loss was nearly as great as some of the highest loss rates in the U.S. Rust Belt. (Over a similar period, Detroit, Cleveland and Pittsburgh lost about 45 percent of their population.) Copenhagen’s loss¹⁰ was near double that of Chicago and 1.5 times that of Philadelphia.
- The central city of Paris reached its peak population 1920 and has lost one-quarter of its population by 1990,¹¹ yet has no ray penetration. The Paris population loss is similar to that of Philadelphia and greater than that of Chicago.
- The central city of Liverpool reached its population peak in 1940 and lost

9 Years indicate decadal census rounds. Actual census years may vary slightly (see <http://www.census.gov/ipc/www/cendates/cennaeni.html>).

10 <http://www.demographia.com/db-kbn.htm>.

11 <http://www.demographia.com/dm-par90.htm>.

more than 40 percent of its population by 1990, yet has no freeway ray penetration.

- The central city of London reached its peak population in 1900¹² and lost 45 percent of its population by 1990, yet has no freeway ray penetration.

The virtually universal dynamic of constant geography fully developed central city population decline is also evident in smaller cities. This includes examples such as the constant-geography central city of Antwerp¹³ and of Brussels.

Again, we have not attempted to replicate Baum-Snow's analysis here but that is not our point. Besides, such an effort would be complicated, would need to include the constant geography of central cities that have materially expanded their land areas, and would need to take into consideration the much later freeway building and population growth patterns of Western Europe, much of which was barely recovering from the devastation of World War II in 1950. It seems clear, however, that any such replication would yield results materially different than those of Baum-Snow for the United States. In particular, the assertion that without freeway rays there would have been population growth in central cities (775) is indisputably at odds with the European experience. In fact, in every European central city that had achieved a population of 400,000 by or before 1950, the population had declined, with and without freeway rays. In some cases, the decline goes back to the early 20th century. It might be suggested that the population loss has been driven by other factors. That is precisely our point.

The dominance of suburban growth is not limited to Western Europe and the United States. Nearly all metropolitan area population growth has been in the suburbs in Japan, Canada, Australia and New Zealand in recent decades.¹⁴

ANOTHER FACTOR THAT CLOUDS THE EMPIRICS: CENTRAL-CITY GREEN-FIELDS IN 1950

Baum-Snow goes to admirable lengths to maintain constant geography to estimate population changes for central cities. This was a necessary filtering, otherwise the population trends in the constant-geography cities would have been camouflaged by the additional population added through the years within the expanded borders.

However, a second and important filtering of the data does not appear to

12 London County Council area, which was the central city before creation of the Greater London Council in 1965, generally called "Inner London." <http://www.demographia.com/dm-lonarea.htm>.

13 While Antwerp combined with some of its suburbs in the early 1980s, the 1990 district of Antwerp represents the constant-geography central city of 1950.

14 See: <http://www.demographia.com/db-highmetro.htm>. This analysis uses central city boundaries that are not adjusted for constant geography. It is likely that the use of constant geography would show virtually all metropolitan growth in these nations to have been outside the earlier constant-geography central city boundaries.

have been performed. Some central cities were not completely built out in 1950—that is, they had substantial greenfield areas. Suburban development has occurred on greenfield land in every U.S. metropolitan area since and has accounted for virtually all population growth in the corresponding urban areas.¹⁵ As a result, urban footprints as they existed in 1950 could well have lost population, however, the population loss could have been camouflaged by growth in the undeveloped areas; any penetration effect, as suggested by Baum-Snow, could be obscured.¹⁶

Based upon the urban development trends that have occurred since 1950, it is likely that all cases of higher constant-geography 1990 population increases are the result of development on greenfield land. Ideally, the complication would be overcome if one could do the analysis upon constant-geography urban footprints within the constant-geography central cities. In many cases the urban footprint covered the entire 1950 geography of the central city (and more), but in some cases it did not.

Consider some rather substantial examples of the problem:

- Much of Staten Island, one of the five boroughs of the central city of New York, was undeveloped in 1950. A substantial portion of Staten Island's near doubling of population over the period occurred on greenfield land. This growth reduced New York's overall population loss.
- Within Los Angeles, much of the San Fernando Valley was not developed in 1950. The San Fernando Valley represented nearly one-half of the city of Los Angeles land area. Between 1950 and 1990, the population of the San Fernando Valley nearly quadrupled, rising by 900,000, representing 60 percent of the city's growth.

We cannot speculate on the impact of including New York and Los Angeles in Baum-Snow's data set, much less any other central cities that were not fully developed in 1950. Suffice it to say that given the general density decline¹⁷ that has occurred in the cores of U.S. central cities over the period, it is likely that any constant-geography central city population gain observed was largely the result of new development on greenfield land. Our guess is that an analysis limited to an appropriate data set—central cities without substantial greenfield land in 1950 or the urban footprints within central cities—would find population declines in virtually all. Like the European experience, that would suggest that important factors in addition to ray penetration are driving depopulation.

¹⁵ This fact can be verified by reviewing the population, land area and density changes in urbanized areas as defined by the United States Bureau of the Census. An urban area may also be called an urban agglomeration, which means the urban footprint.

¹⁶ If the existence of substantial greenfield land is not a basis for excluding a central city from the sample, it would seem that Baum-Snow spent considerable effort determining the 1990 population of 1950 constant geography central cities. It would have been much simpler to have used central counties, which have had no boundary changes, and for which population data are readily available.

¹⁷ A principal factor has been a reduction during the period of average household size by 22 percent.

CONCLUSION

At first glance, Professor Baum-Snow's work seems sound and convincing because of his care and rigor in applying "best practice" of statistical norms to the canonical model of urban areas. Yet, a second glance compels us to take a closer look at the data for the U.S. cities and beyond. Baum-Snow invokes the well worn monocentric model to support the link between better highways and central city decline. The model does suggest an explanation for suburbanization from rising incomes and lower travel costs. But the monocentric model tells the story in a specific way that is narrow, implausible and unnecessary. Incomes and accessibility also enter into our simpler discussion of the dynamics of urban growth. Where we part company, then, is on the importance of improved access *to and from the "central city."* The monocentric story is actually inapplicable, first, because these "central cities" tend to be large and poorly represent the core of the mythical monocentric model, and, second, they began declining well before there was an interstate highway system.

Our look at Western Europe confirms that suburbanization is the norm, in line with our simple dynamics of growth discussion. Suburbanization abroad occurred without the highway penetration story that Baum-Snow elaborates. There are, then, strong reasons to doubt the conclusion that highway penetration of central cities was a major cause of suburbanization in the United States.

Our bigger point is that it is possible to do the research correctly and still reach the wrong conclusions.

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ABOUT THE AUTHORS



Wendell Cox is an international public policy consultant specializing in urban policy, transport, and demographics. He is visiting professor at Conservatoire National des Arts et Metiers, Paris (a national university). He has completed projects in North America, Europe, Asia, Australia, South America and Africa. Clients have included government agencies, public policy institutes, and industry organizations. His books include *War on the Dream: How Anti-Sprawl Policy Threatens the Quality of Life* and *The Wal-Mart Revolution* (co-authored with Richard Vedder). He is co-author of the *Demographia International Housing Affordability Survey* and author of *Demographia World Urban Areas* (the only worldwide source on population densities for all urban areas over 500,000 population in the world). His email address is: demographia@gmail.com.



Peter Gordon is a Professor in the University of Southern California's School of Policy, Planning and Development. Gordon's research interests are in applied urban economics. He is the co-editor (with David Beito and Alexander Tabarrok) of *The Voluntary City* (The University of Michigan Press, 2002). Gordon and his colleagues have developed the Southern California Planning Model, which they apply to the study of economic impacts. He has consulted for local, state and federal agencies, the World Bank, the United Nations and many private groups. Gordon received the Ph.D. from the University of Pennsylvania. His email is pgordon@usc.edu.



Christian L. Redfearn is an assistant professor in the School of Policy, Planning, and Development at the University of Southern California. He joined the faculty at USC after completing his Ph.D. in economics at the University of California, Berkeley. An urban economist, he is engaged in research projects that focus on the evolution of metropolitan land and real estate markets. Specific examples of his current research involve neighborhood evolution, housing price measurement

issues in a complex urban setting, trading property rights and externalities in historic preservation districts, the hierarchy of urban land markets, as well as the spatial organization of metropolitan employment and its persistence over long periods of time. He has published recently in the *Journal of Urban Economics*, the *Journal of Regional Science*, *Real Estate Economics*, and *Environment & Planning A*. His email is redfearn@sppd.usc.edu.

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