# Sprawling Cities and Transport: preliminary findings from Bristol, UK

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**Abstract**

Urban sprawl is one of the key issues facing cities today. There is a large volume of literature on the topic but despite this there is little agreement as to its characteristics and effects. The paper discusses some of the most contested issues of urban sprawl. It looks at the various definitions of sprawl; examines the effects of sprawl, assessing these in relation to planning and market led approaches; and discusses methodological approaches relating to measures of sprawl in terms of its impacts and forms.

## 1.0 Introduction

The phenomenon of urban sprawl has received extensive attention in the literature particularly since the 1980's, but despite this wealth of information the nature of sprawl and its impact on city form and urban function remains un-illuminated. Much of this debate assumes an ideal urban form - of the compact, self sufficient city- the roots of which can be traced to cities of the past, including the Mesopotamian city, the Greek polis, and the medieval walled city, despite their diverse nature certain common elements can be extracted. These cities had small populations by modern standards, were limited in physical size with a clear demarcation between rural and urban, and provided the focus of economic and cultural life.

Sprawl is compared to this ideal, and for the most part, emerges as a poor loser. Whether justified or not sprawl is perceived as a negative urban form with costs including un-aesthetic development; poor access to services for those with limited mobility such as the young and elderly; increased trip lengths, congestion and increase in fuel consumption due to low densities; overwhelming dependence on automobile use; higher costs of neighbourhood infrastructure; and loss of agricultural land and open space. These perceived negative effects are tackled with growth management policies which attempt to restore a more compact urban form by channelling development to the downtown, and attempting to set physical limits to growth through growth boundaries and land preservation.

The paper will work towards a definition of sprawl and will summarize the debate aiming to throw light on the variety of perspectives by which sprawl is approached, in the main between those advocating a planning paradigm and those taking an urban economic approach.

## 2.0 Definitions

Sprawl has become an umbrella term, encompassing a wide range of urban forms, indeed, "the term has become so abused that it lacks precise meaning, and defining urban sprawl has become a methodological quagmire (Audirac, Shermyen, & Smith, 1990). Given that there is no agreed definition, it is not surprising that there is also little agreement on the characteristics, causes and impacts of sprawl. It is agreed that sprawl occurs on the urban fringe in rapidly growing areas but apart from this there is little

consensus. The various elements which feed into a definition of sprawl, will be discussed under urban form, land uses, and the functional relationships between land uses and users.

### 2.1 Definitions of Form

A variety of urban forms have been covered by the term "urban sprawl" ranging from contiguous suburban growth, linear patterns of strip development, leapfrog and scattered development (Ewing 1994, Pendall 1999, Razin & Rosentraub 2000, Peiser 2001). In terms of urban form, sprawl is positioned against the ideal of the compact city, with high density, centralized development and a spatial mixture of functions, but what is considered to be sprawl ranges along a continuum of more compact to completely dispersed development. Sprawl is a matter of degree, not an absolute form.

At the more compact end of the scale suburban growth has been identified as sprawl. This is defined as a contiguous expansion of existing development from a central core (Self 1961, Gottmann & Harper 1967, Gottdiener 1977, Hall 1997). This characterization of sprawl is typical of the early literature of the 1950's and 1960's, but this more compact form is not classifed as sprawl in later literature.

"Scattered" or "leapfrog" development lies at the other end of the scale (Clawson 1962, Harvey & Clark 1965, Lessinger 1962, Weitz & Moore 1998). This form exhibits discontinuous development away from an older central core, with the areas of development interspersed with vacant land. This is generally perceived as sprawl in the current literature, although less extreme forms are also included under the term. Commentators such as Ewing (1994) distinguish between "scattered" and "leapfrog" development, where "leapfrog" development assumes a monocentric city, while "scattered" development may be multi centred.

Compact growth around a number of smaller centres which are located at a distance from the main urban core is also classified as sprawl (Clawson & Hall 1973). This is superficially similar to the poly-nucleated city (which is not referred to as sprawl), where the downtown is served by several more distant centres. The distinction between the two depends on the level of services offered by the centres and the level of interaction of

the city centres with the surrounding suburbs. Linear urban forms, such as strip development along major transport routes have also been considered sprawl.

One problem with these definitions is that developments as diverse as contiguous suburban growth and scattered development are both classified as sprawl, however, the forms and resulting impacts are vastly different. The literature uses different definitions of sprawl or none at all, which creates difficulty in identifying the phenomenon and when comparing the impacts of sprawl. It may therefore be more useful to define sprawl, not as an absolute form, but as a continuum of development from compact to completely scattered. This idea is acknowledged by ( Harvey & Clark 1965) who identify three forms of sprawl: low density continuous development, ribbon development and leap frog development, and acknowledges that these comprise different levels of sprawl which require varying levels of capital expenditure.

### 2.2 Definitions Based on Land Use

Land use patterns are the second element which can be used to define sprawl. The Transportation Research Board (1998) lists the characteristics of sprawl which apply to the U.S. as low density residential development; unlimited and non contiguous development; homogenous single family residential development, with scattered units; non residential uses of shopping centres, strip retail, freestanding industry, office buildings, schools and other community uses; and land uses which are spatially segregated. Further characteristics are given as heavy consumption of exurban agricultural and environmentally sensitive land, reliance on the automobile for transport, and construction by small developers and lack of integrated land use planning.

The characteristics provided by the Transportation Research Board (1998) are broad and cover almost all post World War 11 development in the U.S., the authors themselves claim that “sprawl is almost impossible to separate from all conventional development.” (Transportation Research Board 1998, page 7). Unfortunately, while this ensures that no aspect of sprawl is omitted, it does little to differentiate sprawl from other urban forms. Sprawl is most commonly identified as low density development with a segregation of uses, however, it is not clear which other land use characteristics must be present for an area to be classified as sprawl. Use based definitions are less common than those based

on forms, and are often combined with definitions which include descriptions of urban forms (Downs 1999, Johnson 2001).

### 2.3 Definitions Based on Impacts

The other alternative method of definition is based on the impacts of sprawl. The idea was first put forward by Ewing (1994), and later by Johnson (2001) and Razin & Rosentraub (2000). It provides an alternative to definitions based on urban form, and is based on the idea that the distinction between sprawl and other forms is a matter of degree. Sprawl is thus difficult to distinguish from other forms and in any case it is the impacts which make sprawl undesirable not the form itself. Ewing (1994) has identified poor accessibility of related land uses, and lack of functional open space as a way to identify and define sprawl. It is suggested that sprawl can be defined as any development pattern with poor accessibility among related land uses, resulting from development which is not concentrated and which has homogenous land uses.

The problem with a definition based on function is that it assumes there are negative consequences to sprawl and creates a temptation to label any development with negative impacts as "urban sprawl". Indeed, defining sprawl in terms of its costs, such as poor accessibility and lack of open space should be avoided, as this creates a tautology when discussing the impacts of sprawl. This method also means the urban sprawl is identified indirectly, when it is a type of urban form, and should be defined as such.

Despite this diversity of forms and definitions, there is an assumption that the urban form is monocentric, most definitions identify sprawl as leap frog or scattered development, with a focus on the density of development and its distance from the city centre. However, too many urban types are lumped together under the term sprawl, and more distinction is needed to identify various types of sprawl, as each type will have different characteristics and impacts. In addition, development at the urban fringe is simply classed together with no distinction of its internal form, such as inner and outer suburbs.

### 2.4 Density

Many definitions of urban sprawl use the concept of low density to identify sprawl, however, this is neither quantified, nor explained adequately. What is considered low – density is relative and varies with each countries cultural expectations. For instance, in

the U.S. low density is development of two to four houses per acre while in the U.K. low density would not consist of less than eight to twelve houses per acre. However, in definitions of sprawl low- density is not usually quantified.

The impression of low density urban form varies depending on the variables used for the numerator, and particularly the denominator of the density calculation, a number of methods are listed by Churchman (1999). Density in terms of sprawl represents the relationship between the number of people living in or using an area and a given land area, which gives some indication of the intensity of land use. Residential units are used for the numerator. The variable used for the denominator varies depending on the definition of land area. Gross density, the simplest measure, uses the total land area of the suburb as the denominator, this includes vacant, agricultural and un-developable land, as well as land devoted to residential use, commercial use, services and streets. Gross density is not the most useful measure, as it includes un-developable and reserved land and as a result underestimates density, since this land is not available for development anyway.

More discriminating density measures are gross residential density and net residential density. Gross residential density includes residential land area and streets, but excludes land in commercial and service uses. Net residential density includes residential land area but excludes land devoted to streets and other transport uses. These two measures include only built up areas, and overestimate density by omitting vacant land which is available for development.

A more useful descriptor of density would include all urban land areas, including residential, industrial, institutional, service, commercial, vacant land in leapfrogged tracts and agricultural land which has been withdrawn from active use for land speculation. Agricultural land, parks, and land unsuitable for building, e.g. marshy land would not be included as there is no potential for development.

**3.0 Context**

The fact that cities are growing, is often neglected by commentators on sprawl, however, this focus on the city in isolation, without regard to wider regional and national processes, leads to inappropriate interpretations of the impacts of sprawl and methods

for its containment. The following section will therefore provide a discussion of urbanization and its effect on urban form.

### 3.1 Urban Growth

Recent statistics on urbanization indicate that 46 percent of the worlds population lived in urban areas in mid-1995, with an even higher figure of 75 percent for more developed regions. In the U.S. the urbanization rate has been growing or constant. The 1900's – 1920's saw higher levels of urban than rural population for the first time. The trend to urbanization peaked in 1950 –55 with a rate of 2.7 percent, with a drop to 1 percent in 1970 - 1975. Since then there has been a slight increase, with an expected stabilization at 0.5 percent by 2030 (United Nations, 1998).

These rather bookish figures illustrate that the growth of cities is a significant phenomenon. There is some discussion of urban growth following a pattern of "urban transition" ( United Nations, 1998). The first phase is of fastest growth in the core of the city, termed urbanization in the U.N. report; the second phase is suburbanization with fastest growth just outside the city core; the third phase is counter urbanization a term coined by Berry (1976), with population in the core and suburbs moving out to more rural areas, and the fourth phase is re-urbanization with an increase in population in the core of the city. According to this model, the phenomenon of urban sprawl would fall into the third phase of growth

At the city scale, the 1950's – 1960's saw growth within the official municipal boundaries, with later suburbanization and overspill either annexed or incorporated as separate towns. The above description of transitions merely describes the movement of population at the scale of the city, and between official city boundaries. Urban population is still growing if the problem is examined at a regional and national scale. These urban concentrations of population take the form of megalopolises (a term coined by Jean Gottmann), or metropolitan regions, which are urban regions consisting of several large cities and suburbs that adjoin each other. Most management of sprawl takes place at the scale of the city, however, sprawl is part of overall regional growth and may be more effectively dealt with at this level.

Urban regions are growing, and the consequences for urban form are a

> "breaking out of the old bounds, walls, boulevards, or administrative limits which set it apart, the city has massively invaded the open country, though parts of the countryside may have kept their rural appearance. The growth in size of population has also meant a spectacular growth in area for the modern metropolis." (Gottmann & Harper, 1990), page 101.

This fact is ignored by current commentators -that the increased population cannot physically be accommodated within existing city limits, the result of an increase in urban growth is therefore urban sprawl.

This trend to outward growth can be traced to the beginning of the twentieth century. The growth of the cities created congested and unpleasant urban cores, with overcrowding and poor quality housing. This was one factor pushing population outward, however, changes in urban form are also related to changes in society, the accompanying technological and economic progress created greater fluidity in the population, with changes in transport and technology allowing the outward dispersal of manufacturing, retail trade and housing, and increases in the standard of living increasing the spatial demands of the city dwellers (Gottmann & Harper 1990). New technology and changes in a city's functions inevitably lead to new urban forms. The city is no longer restricted in size and its dispersal is simply part of larger social and technological changes.

*Figure 1 shows that at different scales the form of the city appears differently, and thus id of sprawl. Imp to note in data collection and measurement anas pg 1432. context is important, and to illustrate data collections issues. Polycentric clusters show up at smaller scales but not at larger scales which looks like sprawl. 'processes are different at each scale and this is reflected in the different form at each scale '" fine structure may reflect local zsoning rules or developers detailed design strategies while coarse structure may reflect regional planning regional transporation facilities or land speculation based on anticipated regional growth. Anas 1433*

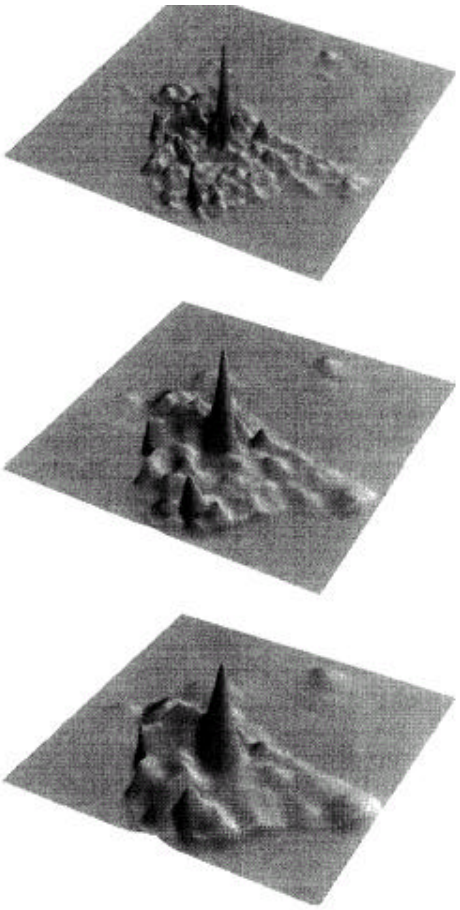

*Figure* 1. Employment Density, Los Angeles County, 1990, at Different Resolutions.
*Source:* Authors' plots of data from Southern California Association of Governments.

### 3.1 Consumer Demand

The U.S. can be taken as an example to illustrate these changes. In recent academic literature the major focus is on the effects of sprawl, with little discussion of its causes. In the popular press, however, there are many historical summaries of the causes of sprawl, but these focus on general suburban growth, rather than pointing to factors which cause the scattered form of development which is sprawl at its most distinct. The main causes of suburban growth are given as changes in housing demand and transportation changes.

Accompanying the increase in the population of cities was an increase in the demand for housing. The lack of available housing in the central cities meant that the population had to be accommodated elsewhere. In the case of the U.S. the outward movement of residential population began in the nineteenth century. This trend increased in the post war era, and included the movement of not only residential development but also manufacturing and services, fuelled by higher levels of income, increased personal mobility and improvements in transportation. The movement is seen by advocates of the free market approach as a result of consumer demand for low-density single family housing on large lots, ( Cullingworth 1960, Self 1961, Audirac, Shermyen, & Smith 1990, Danielsen, Lang, & Fulton 1999). According to this view demand is driven by individual preferences,

> "the ideal of owning a single family home, the need for an adequate environment for raising a family, a strong desire for privacy, and the appeal of a rural ambiance are among the most prominent reasons for choosing suburban and exurban locales."( Audirac, Shermyen, & Smith, 1990, page 473).

Evidence for this is based on consumer preference surveys: in Florida the Bureau of Economic and Business Research Survey, 1989, showed that least preferred locations were suburbs of major cities and the suburbs and downtowns of small cities; and the most preferred locations were the downtowns of major cities and rural and semi rural areas ( Audirac, Shermyen, & Smith 1990). Further evidence, is provided by the American LIVES survey, 1995 and the NAHB 1995. The LIVES survey showed that 20 percent preferred New Urbanist communities with higher density subdivisions, 50% preferred New Urbanist design with standard subdivision densities and 30% preferred standard suburban communities. The NAHB survey traded off house size with commute time to work and services, and showed that 83% preferred a detached house in the suburbs over a town house in the city. Surveys, however, provide only indirect evidence, another approach could look at the market demand for different housing types through data on house sales.

It is agreed that there is consumer demand for single family low density housing, but there is also the view that this demand has been manipulated by public subsidies. In the U.S. these took the form of federal assistance on mortgages through the 1932 Federal Home Loan Bank Act and the Veterans Administration, which financed existing mortgages and provided mortgage insurance. These provided home financing to a wider

range of income groups through low down payments, with lenders insured against mortgage defaults. Further incentive was provided by deductions to income tax through home ownership – deductions were given for payment for real estate taxes and interest on home mortgages(Jackson, 1985). The importance of this argument is that it affects whether consumer demand can be altered by government policy. This appears to be the case but there is also evidence that the preference for single family housing changes with household size and level of income, with demand for better quality housing rising as income rises (Clawson, 1971).

### 3.2 Transportation

Accompanying the growth of the cities and the changes in housing demand was a change in the mode of transportation, with the development of the private automobile and the corresponding growth of the highway system. There is some debate in the literature over the influence of public subsidies versus market forces in the growth of automobile use. There are claims that this growth, and by extension the increase in urban sprawl, is due to government subsidies for automobile use( Ewing 1994, Jackson 1985). This increase in private transport and the subsequent decline of public transportation to the suburbs is attributed to government having "taxed and harassed public transportation, even while subsidizing the automobile like a pampered child" ( Jackson 1985, page170).

This change in mode of transportation, by providing increased mobility and allowing for the outward movement of the population is perhaps the single most important enabling factor leading to urban sprawl. It should be noted that the growth of the suburbs with the increase in automobile use is a North American phenomenon and does not explain the development of urban sprawl in the U.K. In Britain the growth in the public transportation network was more important in the development of suburban housing. In London, for example, the growth of the suburbs began with the extension of the rail network to the suburbs in the 1860's, producing a radial pattern of growth along the lines of transportation. The latter development of a more widely spread, circular pattern of growth was also a result of the development of public transportation, in this case by motor bus. The private automobile played little part in the development of urban sprawl.

New modes of transport can be seen merely as an enabling factor allowing access to undeveloped areas at further distances from the city. However, it is also claimed by

Clawson (1971) that the economic advantages of suburban living are more important in the creation of sprawl than changes in transportation. This may certainly be true in Europe.

### 3.3 Administration

The other aspect of urban growth which is often neglected is the change in the administration of the city. There are two issues, both of which are important for data collection. In the first instance, the legal boundaries of the city may not coincide with the functional or economic units of study. In these cases the suburban or sprawl areas may lie outside the legally defined city. Data collected for the legal city may not cover city – periphery interactions. The question to be asked is what is the appropriate area of study, and for which areas are data available. A concept such as the U.S. census SMSA (standard metropolitan statistical area), includes functionally related areas in a region. Although this is convenient for data collection, some thought must be given to deciding the spatial area that best represents the relation of the centre or centres to the periphery.

The second consideration is the change to the boundary of the city due to annexation of areas on its periphery. These changes to the legal boundaries of the city are important when comparing data over different time periods. Although the city is nominally the same, it can refer to a different spatial area at different periods in time (Clawson 1971). . In these instances care must be taken to adjust the data for differences in spatial area.

## 4.0 Effects of Sprawl

The effects of urban sprawl are one of the most hotly debated issues in the literature, with sprawl often branded as the cause of all the evils of modern urban life. This negative view is richly illustrated by a glance at popular works in the urban literature, titles such as: Fighting Sprawl and City Hall, Divorce Your Car, and Home From Nowhere, illustrate the polemical nature of the discussions. There are a myriad of points both for the costs and benefits of sprawl. Discussions of these often degenerate into long lists which provide no way to sort through the debates. Despite the volume of rhetoric, the verdict is not yet out on the impacts of sprawl, and it should be viewed in the context of social and urban changes discussed in the section above.

Further confusing the issue is the lack of reliable empirical evidence to support the arguments made either for or against sprawl. The summary provided by the Transportation Research Board (1998) lists some of the limitations of the current research on costs of sprawl. This report divides the effects of sprawl into five groups, public and private capital and operating costs, transportation and travel costs, land/natural habitat preservation, quality of life and social issues. The amount of empirical or quantitative work for each category is shown in Table One - discussions using quantitative analysis based on census or case study data are most often found in literature discussing transportation and travel costs, social issues and public and private operating costs; literature using econometric modelling or simulation are found mostly in public and private capital and operating costs; literature using descriptive studies are mostly found in discussions of land/natural habitat preservation, quality of life and social issues.

**Table One**

| **Impact Category** | **Levels of Analysis** | | |
|---|---|---|---|
| | *Descriptive: Little or No Analysis* | *Empirical: Census or Case Study* | *Simulation: Econometric or Modelling* |
| Public and Private Capital and Operating Costs | ≈ 15% | ≈ 50% | ≈ 35% |
| Transportation and Travel Costs | ≈ 10% | ≈ 80% | ≈ 10% |
| Land/Natural Habitat Preservation | ≈ 45% | ≈ 35% | ≈ 20% |
| Quality of Life | ≈ 40% | ≈ 50% | ≈ 10% |
| Social Issues | ≈ 30% | ≈ 60% | ≈ 10% |

( Transportation Research Board, 1998), page 115

Further issues adding to the poor quality analysis of the costs of sprawl, as summarized by the Transportation Research Board (1998), are the widespread use of secondary data despite the quotation of a wide variety of data sources in the literature; unclear definitions of the costs being measured, for instance, density is improperly defined and this makes it difficult to measure travel behaviour or infrastructure costs which are related to the density of a region; a focus on only a few aspects of sprawl, without looking at the causal elements; few empirical studies and many case studies which are difficult to generalize from; the benefits of sprawl are often ignored; quantitative analyses

are mostly found for physical infrastructure, rather than for social costs or quality of life – when these are some of the most hotly debated issues in the literature; most discussions focus on the new growth areas, without looking at the impacts on the city core or inner suburbs; the literature looks only at one point in time without examining the effects over a longer time scale; few feasible alternative forms are proposed as a solution to the negative impacts of sprawl; and modelling of the analysis is too simplistic. In general, most findings are either descriptive or where empirical work is carried out, the conclusions vary depending on the viewpoint of the researcher. These critiques point to a need for clearer definitions, more quantitative measures of sprawl, a broader view both in time and space, and greater comparison with alternative urban forms.

The effects of sprawl are too numerous to discuss fully. The following discussion will look at the major debates in the literature as a way to examine the most pressing concerns and to illustrate the problems mentioned above. One way to provide some general organization of the debates is to note that most of the arguments either support urban sprawl or advocate compact development. Those from the planning family usually support compact development and advocate greater regulation and planning to solve the 'problems' of sprawl. The other main champions of the sprawl debate are those who take an economic perspective – in this group there are both supporters of compact development and of sprawl, however, in both cases the view is that the economic market will ensure efficient development.

The debate on sprawl can therefore be reduced to an older set of arguments, between those advocating a planning approach and those advocating the efficiency of the market. Those supporting planning justify intervention on the grounds that the market is not efficient due to externalities, or unintended effects of actions, the costs of which are not borne by the producer; the existence of public goods which are freely available and therefore not provided by the market; and lack of equity in that the goods and services are not distributed evenly among areas. Those advocating the free market approach assume competitive and efficient markets; point out that actions should be taken to place the cost of externalities on the producer rather than using regulation; and that public goods are limited and can be provided by the market. (Richardson & Gordon 1993)

### 4.1 Summary of Effects

Discussion of the effects of sprawl belong to the more recent literature. In the post war period, despite criticisms of urban growth, suburbanization was seen in a positive light, as a means to provide housing for the burgeoning population of the cities ( Self 1961, Clawson & Hall 1973). At this point in time the impacts of sprawl were less widely discussed than its causes. Table Two provides a summary of the major costs and benefits of sprawl.

**Table Two**

Italics indicate positive impacts

| Effect of Sprawl | Condition Exists | Condition is Strongly Linked to Sprawl |
|---|---|---|
| ***Public/Private Capital and Operating Costs*** | | |
| Higher infrastructure costs under sprawl than compact development | General agreement | Some agreement |
| Higher public operating costs | Some agreement | No clear outcome |
| More expensive private residential and non-residential development costs | Some agreement | No clear outcome |
| More adverse public fiscal impacts | Some agreement | Some agreement |
| *Lower public operating costs* | Some agreement | No clear outcome |
| *Less expensive private residential and non-residential development costs* | Some agreement | Some agreement |
| *Fosters efficient infill development* | No clear outcome | No clear outcome |
| ***Transportation and Travel Costs*** | | |
| More vehicle miles travelled | General agreement | General agreement |
| Longer travel times | No clear outcome | No clear outcome |
| More automobile trips | General agreement | General agreement |
| Higher household transportation spending | No clear outcome | No clear outcome |
| Less cost efficient and effective transit | General agreement | Some agreement |
| Higher social costs of travel | Some agreement | Some agreement |
| *Shorter commuting times* | No clear outcome | No clear outcome |
| *Less congestion* | General agreement | No clear outcome |
| *Lower governmental costs for transportation* | No clear outcome | No clear outcome |

| | | |
|---|---|---|
| *Automobile most efficient mode of transportation* | General agreement | Some agreement |
| ***Land/Natural Habitat Preservation*** | | |
| Loss of agricultural land | General agreement | General agreement |
| Reduced farmland productivity | Some agreement | No clear outcome |
| Reduced farmland viability(Water Constraints) | No clear outcome | No clear outcome |
| Loss of fragile environmental lands | General agreement | General agreement |
| Reduced regional open space | General agreement | General agreement |
| *Enhanced personal and public open space* | Some agreement | No clear outcome |
| ***Quality of Life*** | | |
| Aesthetically displeasing | Some agreement | N o clear outcome |
| Weakened sense of community | Some agreement | Some agreement |
| Greater stress | Some agreement | Some agreement |
| Higher energy consumption | Some agreement | Some agreement |
| More air pollution | Some agreement | Substantial disagreement |
| Lessened historic preservation | Some agreement | No clear outcome |
| *Preference for low-density living* | General agreement | Some agreement |
| *Lower crime rates* | Some agreement | No clear outcome |
| *Enhanced value or reduced costs of public and private goods* | Some agreement | No clear outcome |
| *Fosters greater economic well being* | Some agreement | Some agreement |
| ***Social Issues*** | | |
| Fosters suburban exclusion | Some agreement | Substantial disagreement |
| Fosters spatial mismatch | General agreement | Some agreement |
| Fosters residential segregation | Some agreement | No clear outcome |
| Worsens fiscal stress | Some agreement | Some agreement |
| Worsens inner city deterioration | Some agreement | Some agreement |
| *Fosters localized land use decisions* | General agreement | Some agreement |
| *Enhanced municipal diversity and choice* | General agreement | Some agreement |

Based on ( Transportation Research Board, 1998)

## 4.2 Land Speculation

The first major debate discusses whether land speculation fosters an efficient land market, infill development and therefore higher densities, or whether it contributes to sprawl. This was a major issue in the literature of the 1960's and 1970's reflecting the emphasis on causes of sprawl rather than costs, the literature also emphasizes reasons for discontinuous/scattered development rather than suburbanization. It also interestingly examines the influence of individual actors which is not common in more recent literature. This issue brings to the fore the need to look at sprawl over longer periods of time.

The first issue is whether land speculation is part of an efficient land market. Under traditional theories of the land market the expected pattern of development would be continuous development from the urban centre. Efficient development would first make use of the land closest to the centre, as this is the highest value, is the most accessible and utilizes existing public services. Discontinuous, scattered development can therefore be seen as a result of market failure. On the other side of the debate scattered development is seen as part of an efficient land market which provides the highest price for land owners, and allows for appropriate provision of infrastructure and services.

Land speculation is seen as the cause of discontinuous development, at least in the short term (Archer 1973, Ottensmann 1977). The process as described by Clawson (1962) is one in which land is withdrawn from the land market and its price is placed above its current market value in anticipation of future demand for higher value urban uses. The time at which the particular parcel is released onto the market depends on the rate of development of surrounding tracts, the availability of capital to the speculator and the cost of holding land in taxes. When demand is high and profits are greater then more land parcels will come onto the market. Due to individual differences in parcel characteristics and land owners individual preferences, land development is haphazard, leading to scattered development. The withheld land is often vacant since land cannot be used for other purposes, such as farming, as it is necessary to maintain flexibility of use so that the parcel is available for sale when prices are high.

On the other hand, over a longer time period land speculation creates an efficient allocation of land uses. Although initial development is low density, the vacant land is later developed at higher densities as infill development or is used for higher value

commercial uses. This is dependent on land owners allocating a high price for land based on its prospective value in the future. Land is therefore not developed under existing lower value uses, but only when the more productive uses are economically feasible ( Harvey and Clark 1965, Ohls & Pines 1975, Peiser 1989). It is well established in the literature that density of development increases with land value. This assumes that land values on infill sites will be higher than land at the urban fringe, this is not always the case due to zoning restrictions and decline of the inner cities, and ignores the question of overall density – development will continue at the urban fringe, even as higher density infill development occurs, as fringe land will continue to be attractive (Breslaw 1990)

Although the issue of land speculation is not discussed in the current literature, it provides some understanding of the working of the land market, highlights the causes of scattered development rather than suburbanization and points to the need to look at the whole cycle of development in an area, not just at its inception but also at build out. Further questions for study are the role of land use policies in controlling speculation and subsequent scattered development, the timing of this infill development, that is how long it takes for these higher density uses to emerge, the necessary conditions for this and the effect this has on the overall density of development in the region.

### 4.3 Costs of Sprawl - Gordon & Richardson versus Ewing

The second debate which returns to the costs of sprawl is essentially one between advocates of a compact city form with development control through planning (Ewing 1997) and those supporting the dispersed pattern of development with market led development (Gordon & Richardson 1997a, Gordon & Richardson, 1997b).
Gordon and Richardson look at several costs of sprawl: lack of open space and use of agricultural land, low density residential development as caused by income tax breaks and subsidies to the automobile and highway, wasteful use of energy, lack of public transit, traffic congestion and trip times, the decline of the downtowns, and residential segregation between suburbs and inner cities.

They do not attempt to claim that these costs are non existent, merely that do not hamper efficient development at higher densities, or are not caused by urban sprawl. For instance, Gordon and Richardson agree that low density development makes public

transit unfeasible, however, they also claim that ridership is in decline despite increases in public subsidies and that more compact development in the form of New Urbanist neighbourhoods does not make a difference in transit use. Another claim is that suburbanization has not increased congestion, and that commuting trip times of central city and suburban residents are similar, due to the movement of industry to the suburbs; a third claim is that infrastructure costs savings at higher densities are small.

Despite the impact of this debate, Gordon and Richardson do not provide any empirical analysis to support their claims, and rely on secondary evidence. Underlying the refutations of sprawl's costs is a perception of city form as a more dispersed polycentric city not as emanating from a central core,

> " the central city vs. the suburbs is yesterday's battle. Even "edge cities" are becoming old news. Today's contest, …is between the suburbs and the exurbs." (Gordon and Richardson, 1997b)

The counterpoint by Ewing (1997) shares similar deficiencies in empirical evidence, and contains an implicit assumption of the ideal city as a compact form surrounding a central core. He attempts to refute each of the arguments of Gordon and Richardson, however, while it is established that the negative impacts exist, he does not manage to tie these directly to sprawl as a causal factor. Many of the costs mentioned are just the costs of modern urban living, regardless of urban form. Ewing rightly points out that Gordon and Richardson do not provide a clear definition of sprawl, but he does not address the influence of definition on their relative findings. Additionally, much of the disagreement on the costs of sprawl is due to the lack of empirical evidence, and the comparison of costs based on different methods of measurement. For instance, when discussing the level of congestion in sprawl communities, Gordon and Richardson quote travel times of 18.2 minutes for central city residents in urbanized areas and 20.8 minutes for those outside central cities for all modes of travel, based on 1990 NPTS files. Ewing finds trip times of 40 minutes less for those in most accessible locations over those in least accessible locations, using auto trips only. The main discrepancies are in the definition of the comparison areas – Gordon and Richardson base this on density, while Ewing uses accessibility; and the modes of travel measured – all modes versus auto trips. Further confusion is added by the use of secondary data, indeed Ewing does not cite any source of data.

### 4.4 Costs of Sprawl – Gordon & Richardson versus Pendall

The debate between Gordon and Richardson (1997a) and Pendall (1999) on consumer preference for low density living further illustrate the methodological problems plaguing the costs of sprawl literature. Pendall attempts to refute Gordon and Richardson's claim that consumer preference leads to low density development, instead he aims to show that land use controls and fiscal arrangements can influence density. The implication is that the market is flawed and that policy intervention can create higher density development. Gordon and Richardson quote consumer preference surveys, for example, the Federal Home Mortgage Association's National Housing Survey, as evidence of a desire for low density living. On the supply side, they claim that even where higher density development is allowed, developers do not build at higher densities and that sales of higher density development are slow. However, no empirical studies are used and no literature is cited. Pendall uses OLS regression to test seven factors which influence density, with findings that land use controls have a significant impact. From this he concludes that government actions can be more important than consumer preference on densities and spatial patterns. However, the argument is very indirect, and although it establishes a causal relationship between land use control and density, it ignores the issue of consumer preference and the workings of the land market. Once again data is flawed or missing, and empirical studies while of sound methodology do not directly measure the cost of sprawl, and perhaps stretch too far in their conclusions.

### 4.5 Municipal Fragmentation

One factor which deserves some mention as exacerbating the costs of sprawl is municipal fragmentation. This is a problem for the U.S. where regional government is weak, and control over land use falls to local municipal authorities. Planning is therefore uncoordinated and fragmented. Policies to prevent sprawl therefore have little effect, as they are uncoordinated and not implemented over a wide enough area (Clawson1962, Razin & Rosentraub 2000)

### Conclusion

The search for an ideal city form is a long standing one, at present this is presented as a compact city form, surrounding a central core. The pervading form however, is one of 'urban sprawl', this paper has attempted to clarify some misinterpretations of this pattern of urban growth. The major concern of the current literature is on the effects of sprawl,

while its causes are largely agreed upon, there is little consensus on whether sprawl is a positive or negative form. Much of this confusion is due to the unclear definition of what the term means, and what characterizes this pattern. Most definitions are based around the concept of density and land uses. Further work is needed to clarify the term, but there is also an increasing realization that the term urban sprawl covers many forms of development, which cannot be adequately classified under one definition, so what is needed is some way to define the variety of sprawl types.

The list of costs are endless, but with little empirical work and no consistency in methods of measurement there is no way to evaluate these. An understanding of the impacts of urban sprawl would also be aided by making greater distinction between the types of sprawl and by distinguishing the various residential zones at the urban fringe. There is also little comparison with alternative urban forms, which makes it difficult to evaluate the impacts of urban sprawl. These should be similar in terms of population, functions and growth rates. The literature on costs of sprawl also assumes a monocentric city, however, there is an increasing realization that the present pattern of urban form is one of polycentric or multi-nucleated cities. This has certain assumptions for the methods and scale of analysis and some re-evaluation is necessary.

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