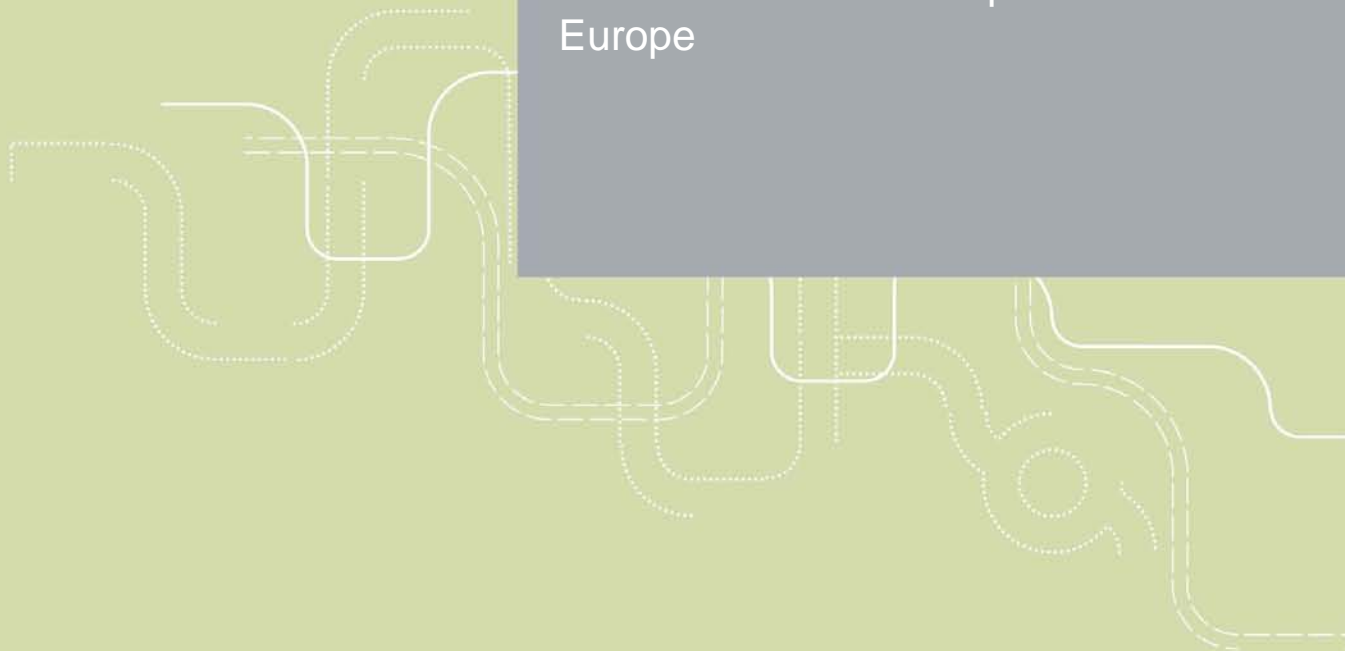


Petter Christiansen
Tanja Loftsgarden
TØI Report 1136/2011

tøi Institute of Transport Economics
Norwegian Centre for Transport Research



Drivers behind urban sprawl in Europe



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Petter Christiansen
Tanja Loftsgarden

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Summary:

This report undertakes a literature review of drivers behind urban sprawl. It reviews various definitions of urban sprawl and accounts for different types of urban sprawl and how it has evolved historically. Drivers are classified into four different categories; economy, society, transport and political factors. While there are several drivers behind urban sprawl, it is difficult to demonstrate which of them are most important. That is so because drivers are closely connected and may interact with each other.

Sammendrag:

Det engelske uttrykket urban sprawl brukes gjerne om byer som eser ut i flere retninger og legger beslag på stadig større areal, ofte med lav utnyttelsesgrad. Rapporten foretar en litteraturgjennomgang av drivkrefter bak urban sprawl i et europeisk perspektiv. Rapporten redegjør for hva som legges i begrepet, ulike typer av urban sprawl og hvordan dette har utviklet seg historisk. Drivkreftene er inndelt i fire grove kategorier; økonomi, samfunn, transport og politisk styring. Rapporten konkluderer med at det er en rekke ulike faktorer som kan fungere som en drivkraft bak urban sprawl, men det er vanskelig å fastslå hvilke faktorer som er viktigst. Det henger sammen med at drivkreftene er nært knyttet sammen og kan samvariere.

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Preface

The City of Oslo and Akershus County Council have commissioned a study to describe and assess the driving forces behind urban sprawl in a European perspective. This report provides input aimed at increasing partners' understanding of driving forces, both in general and as a basis to assess their own situation in a structured way.

Petter Christiansen and Tanja Loftsgarden have authored the report. Arvid Strand has been responsible for quality assurance.

Oslo, February, 2011
Institute of Transport Economics (TØI)

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Summary:

Drivers behind urban sprawl in Europe

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A literature review has been undertaken to identify the driving forces behind urban sprawl in Europe. The drivers have been classified into four categories: economy, society, transport, and policy and regulatory framework. While the drivers behind urban sprawl are several, it is difficult to determine which forces that are the most important. This is so because drivers are context dependent and can vary between regions and countries. Furthermore, drivers are often closely connected, and can interact with each other.

Background

Considerable amounts of research have been done on the relationship between spatial structure and transport. In summary, studies have shown that residents in centers have shorter trips and lower car use. The prescription has therefore been that cities' spatial development should be concentrated around existing centers. Urban sprawl may be the opposite of such a development. Consequently, it is of interest to understand the driving forces behind urban sprawl, in particular because this aspect might have received less attention than the relationship between spatial structure and transport. The study has been funded the City of Oslo and Akershus County Council.

No common definition

Despite the fact that there is considerable literature on this subject, there is no common definition of urban sprawl. In this respect there are clear parallels to the sustainability concept. A common denominator for the majority of the definitions is, however, that urban sprawl is characterized as low-density development and inefficient use of land. A simple definition is *excessive spatial growth*. Cities must grow to accommodate a growing population, but may use more space than is deemed acceptable or reasonable. Land use is therefore often not optimal, since it can be more concentrated and compact.

Economy

Local and international economic conditions can play a crucial role with regard to urban sprawl. On a general level, restructuring of the economy contribute to the centralization of the population. Major cities and regions will serve as important driving forces behind the knowledge economy as the Lisbon strategy sets out. EU policies will also contribute to urban sprawl. Infrastructure investment is considered as an important instrument promoting EU's cohesion policy and the

common market. EU countries are increasingly integrated into a common economy. Good accessibility is therefore necessary for the transportation of both goods and passengers.

Economic factors, such as competition between cities, land prices and purchasing power and market failure, are also driving forces behind urban sprawl. For instance, centralization may contribute to increased pressure on housing and housing prices, and they are usually highest in the center. Thus, it can be cheaper to purchase apartments that are located in areas characterized by lower density. It is also necessary to point out that competition between cities can be an important driving force. The literature review shows several examples in Europe where this has been a challenge. Local governance authorities want to attract new residents and businesses to generate tax revenue. Municipalities can therefore facilitate new areas and use tax incentives to increase demand from households and economic activities.

Societal factors

Socioeconomic factors can affect land development. An important driving force behind urban sprawl may be that there is a tendency that people want to move out of the inner city to more rural areas outside of urban areas. This applies particularly to young couples with children. They want to establish themselves in more rural residential areas with large lots and access to green areas. This may partly be because housing prices are lower outside the urban areas, and that families can fulfill their desire for a bigger house than they would be able to afford in the city, as well as access to gardens or green areas in relation to housing. Thus, it may be difficult to reduce urban sprawl. Cultural and individual factors may therefore be a crucial driving force. Urban sprawl can also be linked to a historic overall economic growth in Europe. Settling near green areas and larger homes has become affordable. Not least, economic growth may be a prerequisite for the acquisition of private cars, something which families may see as a necessity when living outside city centers.

Transportation

Transportation related factors are prerequisites behind urban sprawl. Train, metro, bus and car have provided greater freedom and opportunities with regard to localization of individuals, businesses and industry. Technological improvements and falling transport costs have made it possible for businesses and industries to locate away from transport hubs such as railway stations and ports. Moreover, it has become possible to travel longer distances within the same travel time. Therefore, one can live farther away from the center or the workplace without increased travel time. In this regard, improvements related to the flexibility and development in ICT may also be a driving force. Ability to work while commuting and compensation for travel time as part of work time, may reinforce incentives to live further away from centers and place fewer restrictions on mobility. These factors vary between European countries.

Policy and regulatory framework

The policy and regulatory framework plays a major role when it comes to driving forces behind urban sprawl. This also applies when it comes to controlling and reducing urban sprawl. The potential for controlling land development depending on many factors, it can be difficult to make general observations. Yet, there are differences across Europe in terms of the potential to control land development. One hypothesis is precisely that countries with a strong control over land use policy, and with less dispersed and fragmented governance system, have the best potential for managing and planning land developments. It is also important to point out that cities or municipalities may promote urban sprawl, because it is in their interest to do so. Some municipalities may facilitate urban sprawl to attract new inhabitants and increase the population.

In the end, while a variety of factors may function as driving forces behind urban sprawl, it is difficult to determine which factors are the most important. One reason for this is that driving forces are context dependent and vary between cities, regions and countries. Moreover, the driving forces are closely linked, and may interact strongly with each other.

1 Introduction

The City of Oslo and Akershus County Council have commissioned a study that describes and assesses the driving forces behind urban sprawl in a European perspective. This report provides input aimed at increasing partners' understanding of driving forces, both in general and as a basis to assess their own situation in a structured way. Our approach has been to conduct a literature review by the use of keywords and the snowball effect.

This document is divided into four chapters. In the next chapter (Chapter 2) we first explain and highlight different definitions of urban sprawl. Moreover, we will look at various types of urban sprawl and illustrate how it has evolved historically. Chapter 3 investigates driving forces behind urban sprawl. Driving forces can roughly be categorized into four categories: economy, society, transport and political governance. Finally, the main driving forces are summarized in chapter four.

2 Urban sprawl

2.1 No common definition

Despite considerable literature on the subject, there is no agreement on a common definition of urban sprawl. Perhaps the simplest definition comes from Brueckner (2000). He argues that urban sprawl can be characterized as "*Excessive spatial growth of cities*". It is recognized that cities must grow to accommodate a growing population. However, the point is that cities grow too much than what is deemed acceptable or reasonable. Development can be more concentrated and compact. In other words, cities take up too much space and land development may be ineffective.

Another definition explains characteristics and processes behind urban sprawl. For example Carruthers and Ulfarsson (2002:314) define urban sprawl as

unplanned, uncontrolled and uncoordinated single- use development that does not provide for a functional mix of uses and/or is not functionally related to surrounding land uses, and which variously appears as low-density, ribbon or strip, scattered, leapfrog or isolated development.

This definition contains three elements. First, it argues that urban sprawl is largely characterized as insufficient political control of land development and it does not promote a functional mix of uses. Second, urban sprawl is not functionally related to surrounding land use. Finally, urban sprawl is characterized by, among other aspects, low-density or scattered development. An objection against this definition is that it links urban sprawl to unplanned, uncontrolled or uncoordinated development. Loftsgarden and Christiansen (2010) have, for instance, pointed out that municipalities can promote urban sprawl policies in order to attract new citizens. Urban sprawl can therefore be a result of political considerations or priorities.

Peiser¹ (2001) has a similar definition of urban sprawl:

the term is used variously to mean the gluttonous use of land, uninterrupted monotonous development, leapfrog discontinuous development and inefficient use of land

These two definitions are quite similar, but the main difference is that the latter does not relate political governance to the definition.

Erwing (1997:32) refers to three characteristics of urban sprawl:

(i) leapfrog or scattered development (ii) commercial strip development and (iii) large expanses of low density or single use developments-as well as by such indicators as low accessibility and lack of functional open space

¹ Cited in Couch et al. (2007:353)

Galster et. al (2001) define urban sprawl as

a pattern in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity

The advantage of this definition is that it allows urban sprawl to combine several characteristics. Galster et al. also suggest looking at urban sprawl as a process. It coincides with Couch et al. (2007:4-5) understanding of the phenomenon. They argue that it is more fruitful to understand urban sprawl as a process rather than a special type of land use. The point is that social, economic and environmental factors may contribute to a relative reduction in the demand for space in the city, while demand may increase in the outskirts. Urban sprawl, they believe, can be understood as the process by which this development takes place.

These examples illustrate that there is no common definition of urban sprawl and we have no ambition of developing a new one. In our view, this does not have a significant impact on how drivers should be understood. Characteristics as low density and inefficient use of land are a common denominator. It conforms to our understanding of the concept and the way we subsequently examine urban sprawl.

2.2 Urban sprawl can take several forms

Urban sprawl can naturally occur in different ways, and it varies between different countries and regions. In figure 1 Batty et. al (2003) have structured different types of urban sprawl. These can be useful in understanding different characteristics associated with this term. The left photo illustrates an urban design which, from a theoretical point of view, may be desirable in order to reduce car traffic and facilitate the use of public transport, walking and cycling. The other figures illustrate simplified city structures. They are perhaps more accurate if the basis is to explain how European towns are developed. The figures may also illustrate differences related to car-based and rail-based urban sprawl. "Linear Strip Development" may refer to a development where urban sprawl has occurred as a result of development of rail transport. In such cases population may concentrate in relation to the stations. On the other hand, "Scattered Development" and "Leapfrogging Development" can to a greater extent illustrate urban sprawl as a result of car ownership. For example, such a spatial structure can be a result of good accessibility for cars. Good road capacity can reduce travel time and the population can settle on locations that involve longer travel distances. Furthermore, there may be fewer incentives to concentrate housing related to specific settlement hub. Land development may therefore be more dispersed compared with the example above.

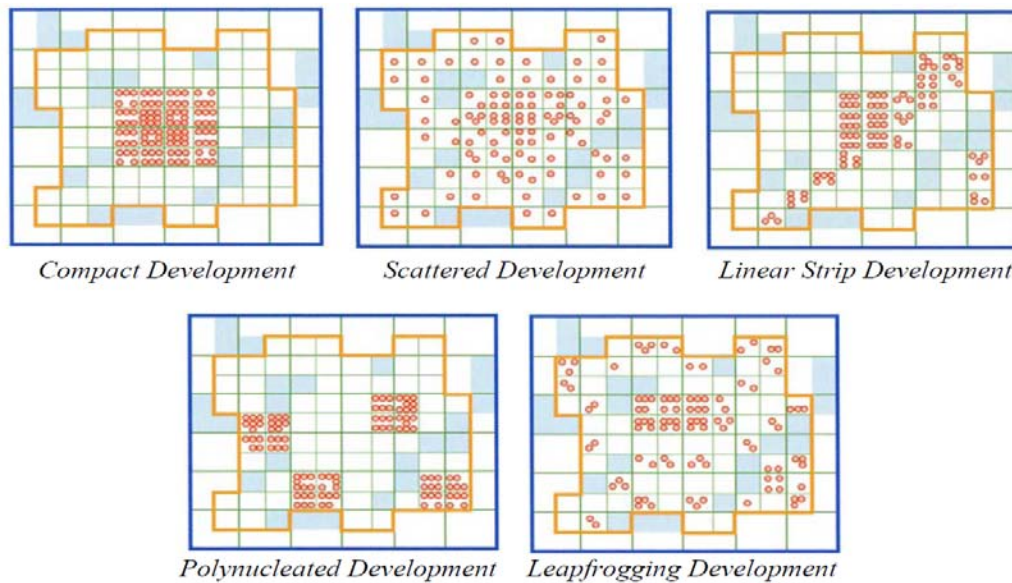


Figure 1 Various areal structures (Batty et.al 2003:6)

2.3 Not a new phenomenon

Although research and attention on urban sprawl has recently received increasing attention, it is not a new phenomenon. Couch et. al (2007) links urban sprawl in Europe to the Industrial Revolution, with London as an example. In the 1800s, London was the largest city in Europe. People flocked to cities to work as cities became economically important. London's urban structure was at the time very dense. Distance between residence and work was usually short, often within the same quarter. This structure led to a number of problems which also exist today, for instance noise pollution (ibid: 7). The industrial revolution also created an emerging middle class and elite merchants, who could afford housing in suburbs. Here they could establish homes with gardens and move away from problems associated with the city. As a result, a geographic class separation developed. Those who could afford it, moved out of the city, while workers continued to live in the city. This development, however, was not possible without improvements in transportation. Railroads and the underground made their entry, which meant that travel time was shorter and made it easier moving out from the city (ibid. 6-15).

The situation in London illustrates in many ways the driving force behind urban sprawl today. Economic restructuring and growth makes cities more important and attracts people seeking jobs and education. Revenues are also increasing. Citizens often want to establish homes outside the city. House pricing and income contribute to this development. Yet, such a development depends on improvements in transport infrastructure and communication. A necessary precondition is acceptable travel time to the city centre. In recent times, bus, rail, car and investments in roads have had a strong influence on urban sprawl.

Urban sprawl has gained speed over the past 50 years. Above we explained that urban sprawl can be linked back to the Industrial Revolution in the 17 - and 1800's. The development has not been linear. Several studies have recently attempted to measure how cities have developed in a historical perspective. A main conclusion is that the urbanization of Europe accelerated after World War II.

Especially cars increased mobility dramatically and made possible formation of further urban sprawl and establishment of suburbs (Antrop 2004). The chart below illustrates urbanization processes in Northern Europe. Urbanization is defined into four categories. “Urbanisation” illustrates people moving from the outskirts to the centre. “Suburbanisation” shows a phase when population in the whole region grows, but the central areas are losing population and the outskirts grow. “Disurbanisation” refers to a situation where the population shrinks in all areas. “Reurbanisation” means growing population first in the centre and later in the outskirts.

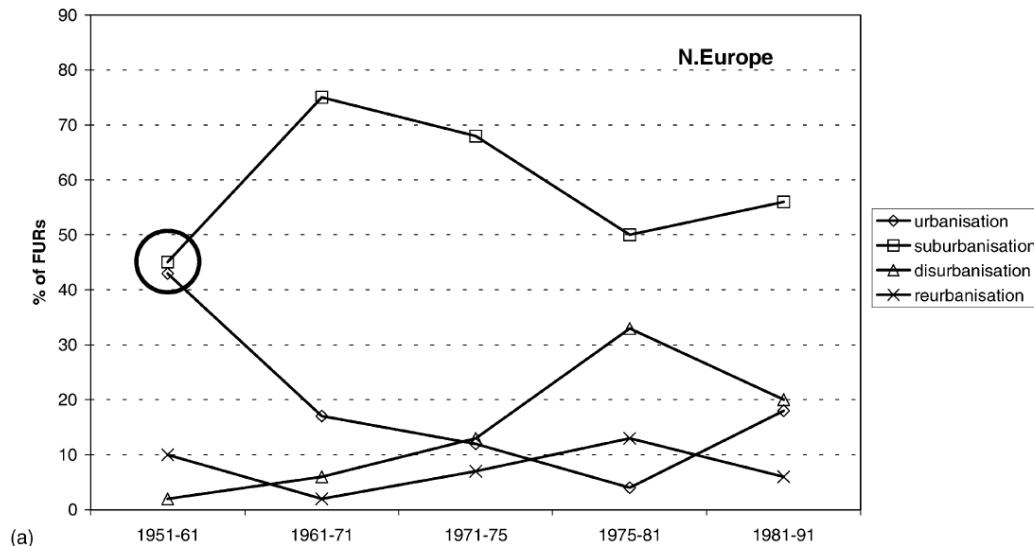


Figure 2 Urbanisation process in Northern Europe (Antrop 2004:15)

Kasanko et. al (2006) has also done a study that analyzes the relationship between land development and population density. In accordance with Antrop (2004), they find that urban sprawl was highest in the 50's and 60's (Figure 2). The conclusion is that European cities have become less compact.

Naturally, not all cities in Europe had identical development. Cities have different backgrounds in managing growth, and the drivers behind urban sprawl vary. Therefore, one cannot expect that urban processes have taken place simultaneously. Kasanko et. al (2006) and Guérois and Pumain (2008) show that cities in southern Europe traditionally had more compact cities compared to northern European cities. This trend, however, is about to change. In the north, urban sprawl is starting to decline, while the tendency towards urban sprawl is increasing in southern Europe. Such a trend is supported by ESPON (2010), which demonstrate geographical variations and trends since 1950 (figure 3). Regions in Europe have different trends. Since 1990, especially the Mediterranean countries had an increase of urban sprawl.

We can also take a quick look forward. Studies have been made which analyze future land-use in Europe. According to Nilsson and Nielsen (2011) urban expansion “(...)will continue at a rate of 0,4-0,7 % per year (...)Discontinuously development containing settlements of less than 20 000 inhabitants and with an average density of at least 40 persons per km², are growing four times faster than urban areas”.

Drivers behind urban sprawl in Europe

Time-lag	North West Europe (+ Denmark)	Western Europe	Mediterranean	New Member States
1950 - 1960	Urban population: 75% Start process of suburbanisation	<i>High variability between cities and countries. No common pattern.</i>	Urban population: 45% Compact and densely populated cities.	Urban population: 40% Compact cities by centralised planning and reliance on public transport.
1960 - 1970		Start process of suburbanisation in many cities.		
1970 - 1980	Revitalisation. Recovering the city centre in terms of both population and urbanisation.	Revitalisation. Recovering the city centre in terms of both population and urbanisation.		
1980 - 1990		Revitalisation. Recovering the city centre in terms of both population and urbanisation.	Increasing the process of sprawl.	Towards the end of 1980s start of political changes.
1990 - 2000	High rates of sprawl in Ireland. Denmark showed the lowest rates of sprawl.	Average rates of sprawl. Steadily growth of German cities.	Rapid increase of urban sprawl.	Post socialist period. Most cities are declining and sprawling. Romania and Poland show the highest shares of declining cities.
2000 - 2005	Continuous long-term decline in UK (Merseyside, Tyne and Greater Glasgow)	Growth of German cities at lower rates. Few German cities show continuous decline (Leipzig being a prototype of decline and sprawl).	Most of the Spanish and French cities show a continuous growth. Sprawl is still important in Spain.	Decline in most Polish cities.

Figure 3 Urban trends in regions of Europe (ESPON 2010:19)

3 Driving forces behind urban sprawl

Urban sprawl is affected by many factors and it may be difficult to determine what factor has the greatest influence. Furthermore, driving forces behind urban sprawl vary between cities, regions and countries in Europe. Therefore, driving forces and potential for urban sprawl is dependent on the political, social and economic conditions in each city. In this chapter we have focused on the driving forces behind urban sprawl in a European perspective. We would like to highlight factors that the literature emphasizes as the most relevant driving forces, but we will also refer to more local driving forces in different regions. This gives us a broad overview of factors affecting urban sprawl. It is necessary to point out that it is difficult to generalize the driving forces and causes behind urban sprawl because of major differences between both countries and cities in Europe. In this chapter we will examine in particular the economic, social, political and transportation factors. Both the national, regional and local drivers will be considered.

It may be useful to look at how others have categorized driving forces behind urban sprawl. We will highlight two examples. Leontidou and Couch (2007) show in figure 4 that globalization, reduced transport costs and increased revenues are macro reasons behind urban sprawl. At the medium level demographic changes, political factors, as well as economic, cultural and social factors contribute to urban sprawl. At the lowest level individual explanations are emphasized. Figure 4 also express direction of the relationships between drivers on the different levels. There is a variety of different driving forces behind urban land-use and the causal effect can go both ways. Thus, it illustrates the challenge related to explain the causal mechanisms. Furthermore, the figure suggests that the driving forces behind urban sprawl may be context-sensitive and that there may be statistic interaction between the various driving forces.

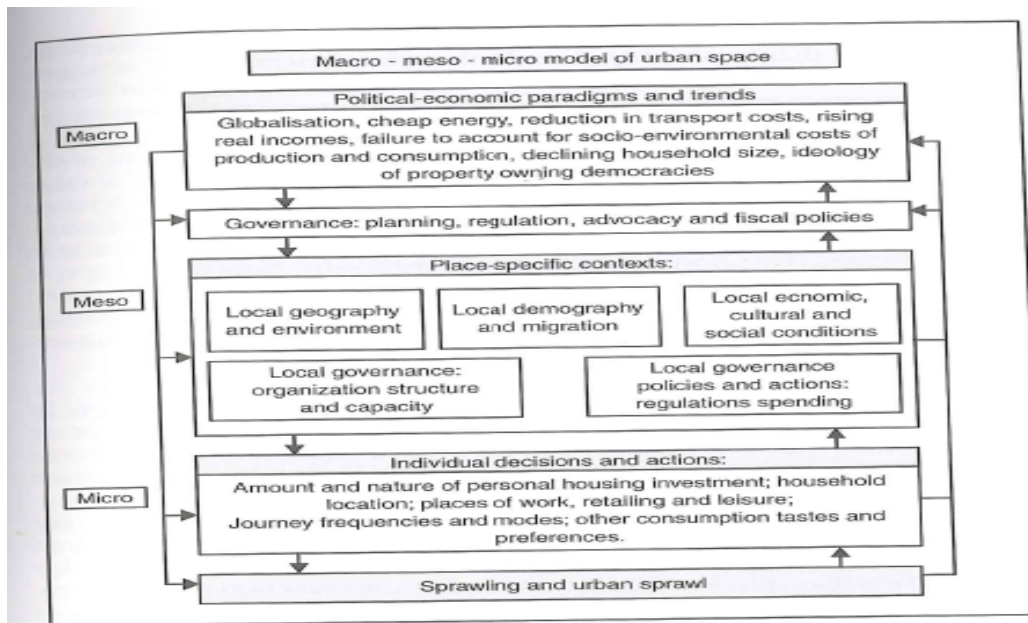


Figure 4 Drivers behind urban sprawl (Leontidou og Couch 2007:245)

A similar structure is made by ESPON (2010). They show both horizontal and vertical drivers, and drivers connected to five subjects. One of the differences between these two figures is that the latter does not link direction or causality between the drivers. We have chosen an approach that resembles the latter.

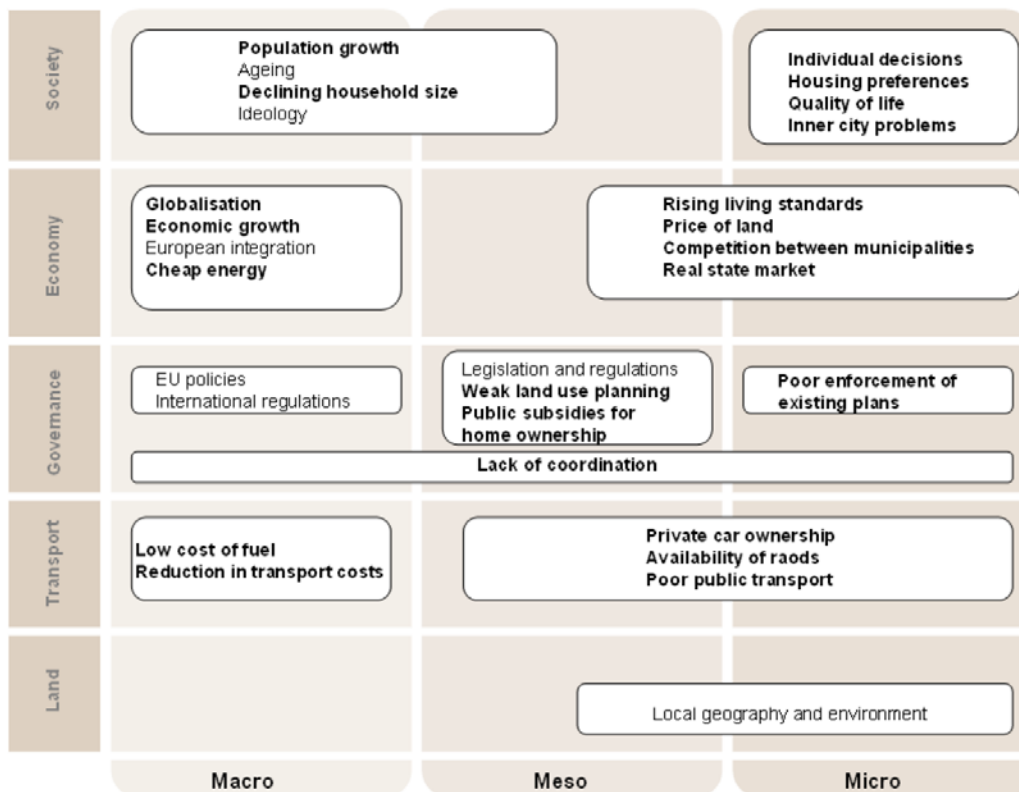


Figure 5 Drivers behind urban sprawl (ESPON 2010:22)

3.1 Economics as the driving force behind urban sprawl

3.1.1 Globalisation

Europe is strongly affected by the international economy and therefore it is natural to look at how globalization might be a driver behind urban sprawl. First, we can look back and see how Europe's role has changed over the past 60 years. An important fact is that Europe has reduced its position internationally in terms of GDP and share of the world's population. The European economy in 1952 accounted for 29 % of world gross domestic product, while 14 % of the world's population was European. In 1998 the figures were respectively 22 % and 8 % (ESPON 2006a). Trade between European countries, however, has gained importance. In particular, the smaller EU countries have an economy oriented towards Europe. Larger countries such as Germany, Britain and France have a larger share of the trade targeting mainly Asia and the U.S. (ibid).

Asia has had tremendous economic growth over the past 20 years, and especially China and India are newcomers who have definitely made their mark on the international arena. This affects Europe in many ways. Cheap labor, cheaper products and increased investment in Asia forces European countries find new areas to compete in and more countries need to restructure their economy. The Lisbon Strategy is in this respect crucial. The objectives are that the EU shall become the most competitive and dynamic knowledge-based economy in the world (ESPON 2006b). It requires specialization and innovation in research and development and new technologies. Such economic development favors large cities with the most advanced economy. They have the best starting point in terms of education, financial resources and the location of large companies. It can therefore be assumed that these cities can expect a population growth. Western Europe has the strongest position, and particularly the "pentagon" area. This region largely corresponds with the area between London, Paris, Milan, Munich and Hamburg. Smaller towns and cities with obsolete industry, however, will probably become uncompetitive and get a reduction in both population and economic growth (ESPON 2006a :34-37).

In other words, the EU seeks to develop a highly specialized knowledge-based (technological) economy. For example, unskilled and low-paid occupations are drawn to emerging economies in Asia, while the highly specialized and advanced industries can have a competitive advantage in Europe. This may draw people to cities and concentrate activities. It will create pressure on the land and be a driving force behind urban sprawl. In a Norwegian perspective, we can expect a similar development. Table 1 shows precisely that central municipalities have increased their share of population and population growth, while the least central municipalities have had a reduced population growth.

Table 1 Population growth and distribution in Norway- 1998 and 2006 (Statistic Norway 2007)

Residence and municipality	Share of population 1998	Share of population 2006	Population growth 1998-2006
Norway	100	100	5
Least central municipalities	14,4	13,3	-3,5
Less central municipalities	7,6	7,3	0,5
Somewhat central municipalities	25,2	24,9	3,9
Most central municipalities	52,8	54,5	8,6

Economic growth can attract people to cities. Such centralization may have negative consequences for rural areas and may also contribute to a self-reinforcing centralization (Langørgeren 2007). Emigration from smaller towns can degrade the quality of rural areas and thus may lead to a stronger centralization (ibid). Statistics Norway has also calculated population projections which show that the tendency for centralized settlements will continue, and that population growth will be greatest in Oslo, Rogaland and Akershus (SSB 2010).

In this context, studies were carried out investigating whether industry structure in a city affects land development. The starting point is that the industry structure affects density and centralization in a city. For example, cities tend to be more compact if they specialize in sectors where employment is centralized (Burchfield et al. 2006). Business sectors are an example of such division, partly because such sectors are particularly dependent on good communication. However, there will probably be more urban sprawl in cities that are dominated by the economy that are not typically located near the city center (ibid).

3.1.2 The European Union

One of the main objectives of the EU cohesion policy is to reduce social and economic regional differences within the European Union. The objective is to promote economic and social development, as well as high employment, balanced and sustainable development (ESPON 2009). In this respect, the EU's structural funds is a key instrument. European Regional Development Fund (ERDF) is especially important with regard to land-use development.

Accessibility is necessary in order to promote economic development. Globalization and a European common market makes good transportation options a prerequisite. Without this, no region could profit in the same way through international labour and will be less attractive for companies and employees (ESPON 2009:13). Therefore, development of infrastructure was a priority for several countries that received financial support from the Structural Funds. Infrastructure investments have increased accessibility between cities in Europe (Interact 2006). For example, Spain has spent most of the funds from the EU budget to expand transportation infrastructure in the country (SURE 2009).

Trans-European Transport network (TEN) is also an area that focuses on infrastructure investments and TEN is strongly related to the common market. A prerequisite for goods, persons and services to flow freely is that the quality of the infrastructure is good. The funding mainly goes to the modernization and development of high-speed trains. In Central and Eastern Europe, the largest share is devoted to the construction of highways (Milanovic et al. 2007:113). Eastern European countries have recently experienced a restructuring of the economy where they are more dependent on international transport. For example, both freight and passengers to the Western European market has increased significantly (ibid).

The theoretical effects of increased investments in infrastructure and increased availability are summarized by Dieleman and Wegener (2004:314). Increased availability may contribute to new areas becoming attractive for residential, industrial and office space and thus can contribute to urban sprawl. Below we will associate this point with some empirical examples.

In Greece, it appears that large-scale infrastructure investments, combined with poor political management, have led to urban sprawl associated with construction of both residents and industries. Transportation-related industries located along highways and formed their own districts. Residents also localized in these areas (Leontidou et al. 2007). Residents often follow jobs and industry. In more recent times investments related to the Olympics in 2004 contributed to urban sprawl. Developments related to the Olympic Games were spread over large parts of Attica. Industrial investments around the highways are also a driver of urban sprawl in Eastern Europe (Milanovic et al. 2007).

On the other hand, the EU can help to reduce urban sprawl. Investments from the structural funds can be used to invest in city centers. Making the center more attractive could help make cities more compact (EEA 2006).

Investments in infrastructure, therefore, affect land development. Engebretsen and Gjerdåker (2010) for example, have studied the effects of infrastructure investments in selected areas in Norway. In one case they refer to a road project between Førde and Florø. Due to infrastructure investment both Florø and Førde developed into an integrated labor and settlement area and commuting increased. It was thus possible for the region to maintain a decentralized settlement structure and prevent migration.

3.2 Micro-economic as a driver behind urban sprawl

Above we have focused on the overarching economic and structural factors that might contribute to urban sprawl. Micro-economic factors are just as important to examine. Local authorities are to a larger extent able to control and affect such factors. International relations are of a different nature, where local authorities have little control.

3.2.1 Market failures and urban sprawl

Brueckner (2000) argues that three market failures may explain some of the causes behind urban sprawl. A growing city requires that developers buy up land,

whether from agriculture or other types of land. In other words, there is competition over land resources and general market principles apply. In simplified terms, two perspectives are prevailing. The developer will consider the area as a potential to develop new property, while the agricultural industry will review it in terms of production potential. The agricultural area is in some cases more valuable as development land and thus farmers earn more by selling the land to developers. According to EEA (2006:20), price of agricultural land is much lower than regulated areas for housing or industry. In addition, local or regional authorities could affect the land being developed or not, by their land-use policy. Yet a third perspective exists. Recreational areas or open spaces in urban structure are important for citizens' wellbeing. There is little doubt that open areas or green spaces are necessary and positive elements in an urban structure. They can, among other things, serve as recreation areas or green spaces. These areas are highly valued by the population. The same applies to agricultural areas. At this point the first market failure, according to Brueckner (2000), enters. The problem is that social values, such as this, are difficult to estimate and they are often not taken into account (ibid). Accordingly, the price does not necessarily reflect the real value. Consequently, the market price may be artificially low as a result of a market failure that does not include the benefits of social values.

The second market failure is, according to Brueckner (2000), that the market does not take into account the cost of reduced accessibility for commuters. Congestion and reduced speed on roads means that inhabitants spend more time on the road. This represents costs for each individual. Commuters who drive on the road contribute as well to form a queue, slowing down other travelers. To consider such costs is both controversial and challenging. The problem is that such costs are not taken into account in the market. Brueckner's point is that individuals have a false sense of commuting costs. It leads again to inhabitants residing further away from work.

The latest market failure according to Brueckner (2000) is related to cities (municipalities) that do not take into account costs related to both physical and social infrastructure resulting from development. New areas will require investments such as roads, water and sewer, schools and other social services. These costs are not necessarily tied directly to those who develop or live in these areas. The costs can instead be spread to all inhabitants of the municipality. The effect is that the price of new homes will be lower than if infrastructure costs had been included. The situation of urban sprawl could be different if the developer paid the full cost of infrastructure investments. It would increase the price for further development, which in turn could reduce the rate of urban sprawl.

This argument is closely related to a hypothesis about higher expenses associated to low density areas. Several papers have tested this hypothesis. Carruthers and Ulfarsson (2007) based their study on U.S. cities and argue that urban sprawl in general contributes to increased expenditure per capita. Solé-Ollé and Horta -Rico (2008) have tested Spanish cities. They show that urban sprawl contributes to higher costs in terms of providing public services.

Miceli and Sirmans (2007) believe the "holdout problem" is a fourth market failure that may explain urban sprawl. This problem is often related to large-scale development projects (shopping malls and new residential areas). The holdout problem occurs when individuals can hold out prices and entail high bargaining

costs. The challenge is that they can try to sell the property at a higher price than the market dictates (ibid). It may thus be an obstacle for a project since they need assembly in order to build a large-scale project. The problem may be particularly applicable in the central areas. Center areas tend to be more concentrated with multiple owners within a given area. The developer is thus dependent on all the owners selling their land in order to realize the project. Those who must sell their land can push the price up. Problems such as this will push developers to the outskirts of cities where ownership is more dispersed. The cost to build a project can thus be reduced and the ability to realize the project can be improved (ibid).

3.2.2 Competition between cities

Municipalities may have different goals and interests when it comes to land development. Antagonism may be particularly evident between the municipalities that are located near an economically dominant community. Contradictions between municipalities can be enhanced as a result of the restructuring of the economy. We pointed out earlier that a characteristic of the European economy is that it generally, economic specialization at large, favours bigger cities. This can again pull people to this region. In such a perspective Harvold et al. (2008) argue that surrounding municipalities of Oslo want to attract new residents. Not least because new citizens give local authorities much needed tax revenues. To attract new residents, surrounding municipalities can offer large areas and low-density development. The idea is that people will settle in the surrounding areas because of the preference for larger homes and outdoor areas. In a time when the Oslo local government enforce a restrictive policy for residential buildings, with few areas with low density, it may be an appropriate policy for smaller municipalities.

Competition between municipalities may also be related to international economic restructuring. Among other aspects, the agricultural industry has undergone significant restructuring (Harvold et al. 2008). Fewer operating units and the closure of farms may increase the incentives for scattered residential buildings.

Similar cases may be applicable in Europe. Dosch (2009) for example, has studied factors that influence land development in Germany. The study concludes that land development alone cannot be explained by the demand for land from population or economy. For example, regions and municipalities have had significant land development despite the fact that there are no economic or demographic pressure factors to warrant such a development. The explanation, according to Dosch (2009), is that local governments want to attract residents and businesses to generate tax revenue. Municipalities facilitate new areas and use tax incentives to increase demand from households and economic activities. In this respect, Loftsgarden and Christiansen (2010) also demonstrated that some municipalities in the planning process have a desire to facilitate scattered development to ensure the municipality's qualities. By facilitating single-family homes in rural areas, local authorities want to attract migrants and increase the population.

Milanovic et al. (2007) points out that Leipzig had strong urban sprawl in the first half of the 1990s. This applied to both the location of shopping centers and industrial and residential use. The incentives for urban sprawl also came from the government. Tax policy and subsidies contributed to developments in previously

undeveloped areas. In the current situation urban sprawl in Leipzig is mainly limited to commercial and industrial sectors. Local governments compete to attract investments, giving investors strong bargaining chips (*ibid*). Similar trends can be tracked in Liverpool (Nuisl et al. 2007). This is a factor that may contribute to scattered settlements, and may be particularly applicable to cities without economic growth. Cities must attract new jobs and can therefore give developers an even stronger bargaining chip. This indicates that it may be easier to control the development of housing rather than industry.

Some areas in the Netherlands have managed to avoid such problems. One reason may be that local level receives more direct support from the government and less tax revenue from citizens. This reduces competition between municipalities (Dieleman and Wegener 2004:320).

3.2.3 Purchasing power and land prices

In the Netherlands the average income has doubled since 1960. It has generated a lifestyle of greater demand for use and possession of cars and better housing (Dieleman and Wegner 2004:316). Milanovic (2007) points to similar tendencies. Western European cities had a tremendous economic growth since World War II and settlement near green spaces has become affordable. Glaeser and Kahn (2003) also believe that economic growth can be a driving force behind urban sprawl. They have done an analysis showing that rich countries have lower density. Still, economic growth is not one of the main reasons, as urban sprawl is such a common phenomenon.

High demand for housing may contribute to urban sprawl (Williams and Shiels 2000). Their example is from Dublin. Central areas have the highest demand, and prices will be high in such areas. This makes buyers seek new homes in more peripheral areas due to lower housing prices. Moreover, these homes are often more profitable to develop (*ibid*). Economic growth and high employment pulled people to the region, but Dublin did not have the capacity to house all. Consequently, due to the lack of affordable housing in this area, people had to settle farther away from the center.

Bertaud (2004) shows correlation between density and land prices. The chart below (figure 6) illustrates that land prices are highest in areas that are dense and closest to the center. The price is reduced in areas further from the center. The figure illustrates several points. First, it is cheaper to purchase a flat located in areas outside the center with lower density. This in turn could help to explain why families with children seek housing out of high density areas. Expansion of the family will normally require larger homes. With a high price per square meter in the densest areas, it will be cheaper to move to less central areas. Furthermore, it may be a lack of large homes in the city, which in turn drive prices up. Moreover, less urban areas may be preferred in large part because of the characteristics associated with such places. Therefore, we can talk about both push and pull factors. Price per square meter (and the lack of large homes) in the city center can act as a pressure to lower density areas. Figure 7 shows average square meters for apartments costing 3 and 3, 4 million kroners in different districts in Oslo and Akershus. It appears that the most central areas are characterized by lower average size in square meters. In other areas, especially east of Oslo, is a fairly larger

apartment for the same price as in central areas. Moreover, areas outside the center may in large part be preferred because of the characteristics associated with such places. Therefore, we can possibly talk about both push and pull factors. Price per square meter (and the lack of large homes) in the center can act as a pressure factor behind the move to areas with lower density. The characteristics of areas outside the center can also be a cause of a desire to settle in such areas. This is a point we will discuss in relation to "societal factors" (next section). Characteristics of areas outside the center can also pull and attract citizens.

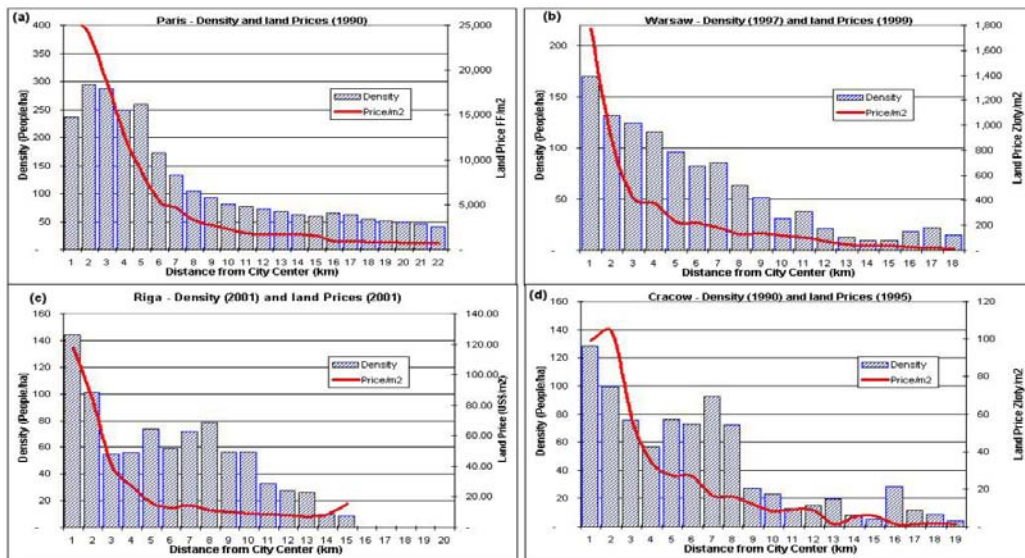


Figure 6 Density and housing prices in four European cities (Bertaud 2004:10)

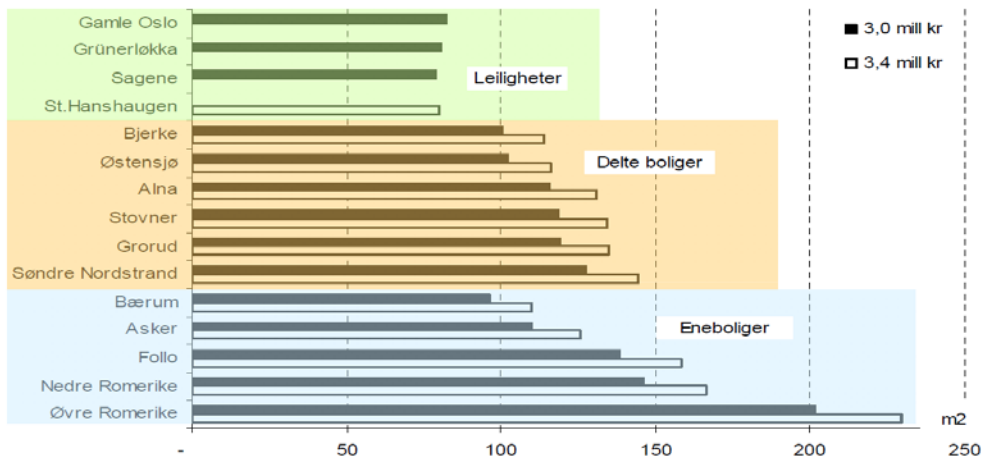


Figure 7 Size of housing in Oslo and Akerhus which costs 3, 0 and 3, 4 million Norwegian kroner (Econ Pöyry 2008:8)

3.3 Societal factors

3.3.1 Population Growth

Population growth has been presented as a primary cause of urban sprawl in Europe in recent decades (ESPON FOCI 2009, Glaeser et al. 2001, Glaeser 2005). The causes of population growth and influx to the cities are related to economic growth as a result of industrialization and technological progress. Urbanization was especially applicable after World War II, when the population of Europe and Norway increased sharply.

Increasing populations in the cities provided pressure on the housing market and more expensive homes. In addition, an increasing population could lead to urban problems, such as traffic, congestion, air pollution, noise and crime. These factors will cause the population to either be forced (due to high housing costs), or choose to move out of cities. In more suburban areas outside cities (suburbs), problems such as these will be less central. These aspects are discussed further under the housing preferences and characteristics of residential areas.

3.3.2 Similar growth in cities in Norway

One consequence of the last decade moving pattern is that the population in cities (the five largest cities in Norway) grows and rejuvenates (Barlindhaug et al. 2010). It is especially younger people who move from the rest of the country to major cities in Norway. The majority move out of the city at some later point. They typically move in their 30-40s, and after having established a family. The motive is essentially a desire for larger dwellings (houses) with a garden and a child friendly environment. This tendency leads to a change in the age composition of the cities, where there is a large number of young adults, as well as many elderly people who do not move out.

3.3.3 Housing preferences and characteristics of residential areas

According to several European studies population growth is no longer the most decisive factor for urban sprawl (ESPON FOCI 2009). In contrast, cultural factors and individual housing preferences in combination with economic factors (eg: market forces, house prices, transport costs) to a greater extent influences the development. Cultural factors and individual housing preferences will also be affected by urban development processes and changes in the population. Population growth will thus be both a consequence of urban development (Green and Owen 1995, Champion and Fisher 2004, Storper and Manville 2006), while population changes affect urban development (Glaeser et al. 2001, Glaeser 2005, Florida 2004, Krugman 2005).

The trend is that younger people, especially singles, move to the city to study or work. Similarly, there is a tendency that established couples move out of the inner city to more rural areas outside of urban areas. This applies particularly to young couples with children. They want to establish themselves in more rural residential areas with large lots and access to green areas (Couch and Karecha 2006; Wu, 2006). This may partly be because housing prices are lower outside the urban areas, and that families can fulfill their desire for a bigger house than they would

be able to afford in the city, as well as access to gardens or green areas in relation to housing.

A survey carried out by Couch and Karecha (2006) in Liverpool show in more detail the reasons people gave, for moving to suburban or peripheral areas. Those who moved to suburban areas reported most a desire to trade up, changes in household size and small housing units in the city. For those who moved to or within the inner city, reasons such as neighbors and social problems, a desire to invest in a home and levels of crime were given as reasons for moving.

The survey also showed that those who moved to both areas had certain preferences in common. For both those who moved to or within the inner city and those who moved to suburban or peripheral areas, crime and a quiet neighborhood were important reasons. Those who reported moving to suburban or peripheral areas also emphasized the proximity to rural areas and nature. Age appears not to be so important. Quiet and safe neighborhoods were reported as important factors by both the young (under 34 years) and elderly (over 60 years).

This shows that the qualities of the big city and rural areas outside the cities are important reasons why people choose to move. It is particularly urban problems such as noise and crime that are mentioned as key factors for leaving the city. Several cities have a lot of traffic creating noise and pollution, and crime can lead to feelings of insecurity. Fewer and lack of green spaces, sports and playgrounds, as well as more expensive homes with less floor space, are also problems associated with cities. This might be especially important for younger families with children wanting to move to more rural areas outside cities. In small town areas, families have immediate access to more green areas and nature, and it will be perceived as more safe for children. Families with children will therefore give priority to these factors as important when it comes to their housing preferences.

An additional aspect associated with this is that people are able to settle in places that provide access to the positive aspects related to both the city and rural areas. Consequently, one can settle in areas characterized by, for example green spaces, and yet have good access to the city's qualities. This depends, however, that it is acceptable transportation opportunities related to time, transport options and cost. Increasing income also generates greater choice in the location of housing, which we'll discuss below.

In addition to housing preferences and the characteristics of urban / more rural residential areas, surveys show that pricing of homes and income are significant reasons for moving. The individual's income is an important factor governing housing preferences. Couch and Karecha (2006) believe that the individual's economy has been a major cause of residential preferences in particular the last thirty years. Size of income affects where one can settle, and can lead to social segregation within and outside the cities. A relocation of families will lead to less diverse cities, where age structure is dominated by younger and older. Fewer families with children will also lead to difficulties maintaining schools and services. This will also lead to social segregation in the suburbs, where they remain disadvantaged and the more affluent move out (Burton 2000).

Williams (2004) points out that urban sprawl, in Britain, will continue as long as people want to settle in villages, suburbs or smaller towns. She found few indications that the preferences are about to change. Prices of homes and income

are found to be significant causes of migration. Leontiduo et al. (2007) also points out that the middle class in Greece wanted to improve the standard of living outside the areas affected by pollution and high density. It should also be noted that much of this development was illegal, indicating the necessity of having political control.

3.3.4 Reasons for moving to and from the cities - a Norwegian survey

A study from 2008 (Sørлие 2008) stated the following causes for moving as particularly important (in descending order): family, housing, location and environment, work.

Work was the most important reason for moving in 1972. Family, housing, location and environment were more important in 2008. According to Sørлие (2008) one reason may be that there are fewer limitations in employment opportunities than before. The last thirty years has been characterized by strong economic expansion and more choices. In addition, flexible working hours has caused greater opportunities and flexibility. Also centralized settlements probably ensure that more people live with more accessible employment opportunities. In addition, more people can commute because of the well-developed infrastructure.

Family as a stronger motive for moving today versus 1972 could be explained by new family structures with more divorces. In addition, there may be an increasing tendency to "overcome" distance. Previously, it was probably more acceptable to have greater distance from family and friends, and such distance might have been more acceptable due to working requirements.

3.3.5 Second homes

Second homes can be another driving force behind urban sprawl. In Sweden, Austria, Greece and Slovenia second homes, or the conversion of second homes to permanent residences, is a phenomenon that contributes to urban sprawl (URBS PANDA 2005). In Värmdö (village outside of Stockholm) thousands of new second homes are converted into ordinary homes each year. Also in Spain, economic development and increased tourism (as a result of the increased level of prosperity?) resulted in an increase in the number of dwellings and second homes along the coast (EEA 2006).

Factors contributing to this development are connected to the general driving forces described in this document. The URBS PANDENS report highlights three factors. First, this may be a result of transportation improvements. Infrastructure investments have allowed longer travel distances without using more time. Second, retirees often move or acquire such properties. With an increasing number of retirees, this trend may intensify. This explanation should also be related to the level of prosperity. Economic growth and increased prosperity may contribute to more second homes. Third, the increased flexibility in work could make it easier living outside city centres. For example, technological advances in ICT made it possible for professionals to work entirely outside the workplace.

There may be many different individual motives for this development. Langørgen (2007), for example, has made a list of positive qualities related to rural and urban living. For cities, factors such as better career opportunities, higher wages, more relevant jobs for people with specialized skills, broader cultural offerings, a greater variety of shops and supply of cafes / restaurants can be important. In rural areas it may be better access to nature, less pollution and noise, less crime, less stressful lives and safer upbringing of children. In Norway, there has recently been a strong tendency to acquire second homes, and this may indicate that the qualities of both cities and rural areas can be combined (ibid).

3.4 Transportation

In many ways there has been a revolution when it comes to opportunities for mobility in the population. Previously, people were largely dependent on walking to their destination. Long distance travel usually required boat or rail. This meant that one could not live far from the work place, and the possibilities for long trips were limited. Companies also had to connect to transportation nodes (railway stations or ports). Such factors contributed to more concentrated cities. During the twentieth century, however, it became more common with motorized transport, particularly cars. The potential for freight transport and individual transport increased significantly, while transportation costs were greatly reduced.

The car and the development of roads is a cause of the influx to cities (Hompland 2001). One can also consider the cause-effect relationship in a different way, that urban sprawl also leads to greater car dependency. An important study in this respect is Newman and Kenworthy (1989), which compared 32 cities in North America, Australia, Europe and Asia. The main conclusion is that denser cities have less car use than rural towns with lower density.

Glaeser and Kahn (2003) also argue, in an American study, that the car is the main explanation for urban sprawl. The reason for this conclusion is that lower transport costs help to spread the cities. In this connection, they show that the car is faster when it comes to travel compared with public transport. Generally, the transportation costs have also been reduced. For instance, Glaeser and Kohlhase (2003) demonstrated that the costs of transporting goods have been reduced by 90% in the last century. Changing land development for both homes and industries has helped in this respect. Moreover, technology has freed companies from locating near transportation nodes as ports and railways (ibid.).

Another point is of course that a car makes it possible to travel longer distances without increasing travel time. Earlier, a 3-4 kilometer walk would take half an hour, while today the car can transport people far greater distances within the same length of time. This means that residents can have easy access to the facilities in cities, while living in areas outside the city. Glaeser and Kahn (2003) show that there is a high correlation between car use and settlement in areas with low density. This is, according to them, the best proof that it is the car that is the driving force behind urban sprawl.

Flexibility and development in ICT can be another driving force behind urban sprawl. Engebretsen and Gjerdåker (2010:75) show that increased commuting to Oslo from the center of surrounding cities can partly be explained by the fact that there has been a transition to more flexible jobs. Technology has enabled

professionals to work outside the workplace, as well as improved opportunities to work while commuting. They find empirical support for such an explanation. The scope of work from home increases with increasing distance to work. In addition, reference is made to studies documenting that between 30 and 50 percent of commuters on intercity routes around the capital are using their travel time to work (ibid). If professionals can also be compensated for travel time as part of work time, incentives to live further outside of Oslo will be reinforced. Sallez and Burgi (2004:123) also argue that ICT has meant that businesses have greater choice in where they can reside. Such a factor will vary between regions and countries in Europe, as we can see in figure 8.

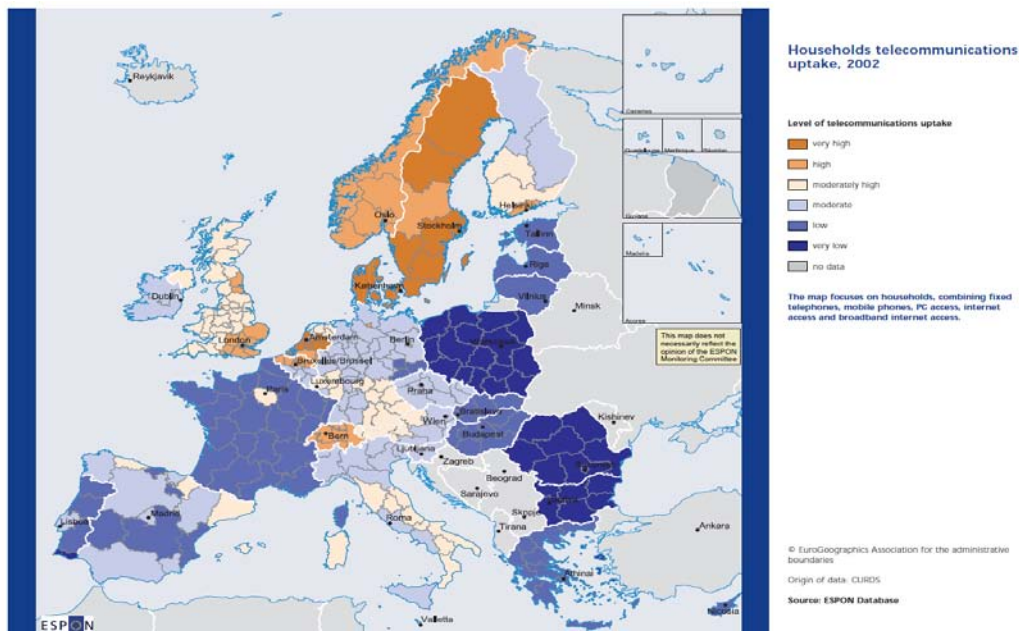


Figure 8 Household telecommunications uptake 2002 (ESPON 2004:17)

3.5 Political factors and regulatory framework

Regulatory framework and political factors can be both a driver behind urban sprawl, but also a factor against urban sprawl. A number of factors act as driving forces, but in the end it is the public authorities that decide how land development should be managed. Inadequate management may therefore be an important driver of urban sprawl, while planning and political control can play a critical role in preventing or limiting such development.

3.5.1 Potential for controlling land use

European countries have different abilities to manage and control land development. In this regard, studies have been carried out designed to provide a systematic overview of existing planning and administrative systems in Europe (PLUREL 2010). Among other things, they examined how the EU has the capacity to control and regulate land development. An assessment of the various countries' management may explain how the public sector has the potential to reduce urban sprawl.

The PLUREL report is mainly based on two factors (see Table 3). The first is about the political structure. This concerns the interaction between local, regional and national levels and at what level the decision-making authority for land-use planning is taken. Furthermore, the size of the administrative units is important. The idea is that a more dispersed and fragmented management system will mean that the region's land use policy will be inappropriate. We can link this point to the Oslo region. A fragmented management of this region can contribute to land-use planning that is sub-optimal for the region as a whole.

The second factor concerns with the type of spatial planning policy. The idea is that stronger control in land-use policies might prevent urban sprawl. Table 2 and 3 below shows how PLUREL (2010) have classified countries according to these two principles. The ranking is based on a qualitative review of all the countries. Countries such as Denmark, Britain and the Netherlands have strong regional or state guidelines for land-use planning. This is in contrast to the new EU member states, which generally have poor control (ibid). Nilsson and Nielsen (2011) also emphasizes that a decentralized system, together with a laissez-faire policy, weakens the potential to control land-use development.

Table 2 Classification of countries potential to control land-use development (PLUREL 2010:60)

Control mechanisms from supra-local levels of the planning system	Most important supra-local level (from land-use change perspective)	Local level	Countries
C) strong, controlled spatial policies	Large (>1M)	any	
	Medium-sized (0.5-1M)	any	Portugal
	Small (<0.5M)	any	Cyprus, Greece, Lithuania
B) medium level of control	Large (>1M)	large (>30)	Denmark, The Netherlands, United Kingdom
		medium-sized (10-30)	Belgium, France, ⁵ Germany
		small (<10)	Italy, Spain
	Medium-sized (0.5-1M)	large (>30)	Ireland
		medium-sized (10-30)	
		small (<10)	Austria
	Small (<0.5M)	large (>30)	Sweden
		medium-sized (10-30)	Finland
		small (<10)	Estonia, Latvia, Luxemburg, Malta ⁶
A) weak level of control	any	large (>30)	Bulgaria
		medium-sized (10-30)	Poland, Slovenia
		small (<10)	Czech Republic, Hungary, Romania, Slovakia

Table 3 Ranking of countries which have the largest potential to control urban sprawl (PLUREL 2010:61)

Value	Countries
7	
6	Denmark, The Netherlands, Portugal, United Kingdom
5	Belgium, Cyprus, France, Germany, Greece, Ireland, Lithuania
4	Italy, Spain, Sweden
3	Austria, Bulgaria, Finland
2	Estonia, Latvia, Luxemburg, Malta, Poland, Slovenia
1	Czech Republic, Hungary, Romania, Slovakia

3.5.2 Political governance and regulatory frameworks, empirical examples

Carruthers and Ulfarsson (2002) argue that local restrictions against development can prevent scattered development. The challenge is that municipalities cannot influence land development in the region as a whole. Municipalities, as we have seen previously, may have different objectives for land development. Fragmented responsibilities can contribute to urban sprawl. Areas with fewer and larger legal responsibility will, all else being equal, have denser land development, compared with a fragmented area (ibid).

Dieleman and Wegener (2004) recently pointed out that urban sprawl is likely to expand without significant interference at the regional or local level. They highlight the Randstad area in Netherlands as a good example, since they have managed to prevent a rapid development of urban sprawl. This is despite the fact that land-use planning must be coordinated among four different regions and between more than 150 municipalities (ibid.). Couch and Karecha (2006) also show that strong planning controls have been effective in reducing urban sprawl. Still, developers often prefer areas outside the cities. The center generally has stringent requirements for planning and environmental aspects, as well as competition with other developers (Williams and Shiels 2000).

There are also several examples of inadequate control and planning that contribute to urban sprawl. Warszawa and Leipzig had in the 1990s, a massive development that was not controlled by the government; often the expansion was illegal (URBS PANDENS 2005). Previously, it was stated that Greece has several examples related to illegal construction. Eastern European countries also have significant problems related to inadequate strategic planning, and there are needs for institutional reforms (Milanovic 2007). SURE (2009) also points out that lack of administrative capacity is a major problem, especially in Eastern European countries.

In this regard, Nilsson and Nielsen (2011) points out that EU can target its funding and policies towards peri-urban areas and in this way promote a more integrated rural-urban development at the regional level. They therefore call for a new coherent policy from the EU side when it comes to land development.

3.5.3 Local interest and knowledge as the driving force behind urban sprawl

Another driving force behind urban sprawl may be that it is not perceived as an undesirable phenomenon, especially if a densification policy is associated with negative effects. In this respect, Loftsgarden and Christiansen (2010) found indications that local authorities may have a lack of understanding and knowledge of such a strategy. For example, the study showed that a municipality refers to negative consequences of further densification. Arguments such as greater traffic and loss of playing areas were used to legitimize a scattered development. The municipality's argument runs counter to the purpose of a dense development - to create a good environment.

Harvold (2007) is another example. He refers to cases where a county municipality did not impose strict requirements to a dense land-use policy. Moreover, it is argued that there existed a common understanding between the

regional and local level on how scattered land-use should be done (ibid). Control functions may not work when it is in both local and regional interests to facilitate scattered settlements. Such examples are perhaps still most relevant in more rural municipalities and counties.

Tennøy (2010) pointed out that planners' understanding of a problem affects land-use planning. One of her points is that planners ranking of goals, objectives and values need to change in order to change land-use planning. An understanding of a problem affects choice of options, how they are evaluated and what options or measures that is recommended and implemented (ibid). There has been a study to assess how planners understand and assess the means necessary to reduce car use. It appears that instruments such as land-use planning were not taken sufficient account for in the transport analysis. Moreover, it is argued that too few planners believe that the location of housing affects the use of transport. Such results may also be relevant for understanding the driving forces behind urban sprawl.

3.5.4 Urban sprawl and the coordination problem

One further factor may be that spatial planning can be characterized as a complex challenge (Tennøy 2009). The planning system in Norway is intended to coordinate most of what is being built. The challenge is that the planning process includes a number of different actors (public and private), policy areas and sectors. Municipal plans must take into account the requirements, goals, values, interests and knowledge from many different agencies (ibid). Such interests will not necessarily coincide with, for example, the prevention of urban sprawl. According to Tennøy (2009) this contributes to difficulties for authorities to coordinate policy. From this perspective coordination problems can be a driving force behind urban sprawl.

3.5.5 Land-use and building types

The type of buildings and general land-use could be a further issue related to urban sprawl. High utilization of housing (high density) can reduce development pressures, while an opposite development can promote urban sprawl. This aspect has also emerged as political objectives and requirements for utilization of housing. The rationality behind this aspect is simple. High utilization can accommodate more people within a given area. Lower utilization consequently leads to a larger use of areas in order to house the same population. In this way, the development policy can be a driving force behind urban sprawl. Such points can also be linked to other forms of land-use. Hanssen (2002:41) points out that parking space occupy more than 30 % of land in U.S. cities. For Norway's part, few studies have identified such a problem, but estimates vary from 4.5 % to 30 % in Norwegian cities (ibid). Land-use occupied by parking, thereby "seize" areas which could be used for housing or industry. In that way it may contribute to urban sprawl.

4 Summary

The purpose of this document has been to explain driving forces behind urban sprawl in a European perspective. The idea is that it will be useful with knowledge of driving forces or causes behind urban sprawl. Knowledge such as this may be a prerequisite for implementing measures to hinder such a trend. We have examined a broad range of literature and have summarized this into four categories. Many of the drivers are closely linked and it may be somewhat misleading to treat the closely linked forces separately. Below we will briefly summarize some of the key driving forces and perspectives related to urban sprawl in a European perspective.

4.1.1 Economy

Local and international economic conditions can play a crucial role in urban sprawl. At an overarching level, a restructuring of the economy can help to centralize the population in (larger) cities. We can expect that the population will continue to centralize in relation to larger towns or regional centers. They will act as an important driving force behind the knowledge economy as the Lisbon strategy proposes. EU policies can also contribute to urban sprawl. Support for investment in infrastructure is considered an important instrument promoting the EU's cohesion policy and the common market. As we have seen, EU countries are increasingly integrated into a common economy. Accessibility for both goods and passengers are, as such, necessary. In this respect, it is tempting to link urban sprawl to a historic overall economic growth in Europe. Settling near green spaces has become affordable, while economic growth has caused a desire for larger homes. Not least, economic growth may be a prerequisite for the population to purchase cars. Furthermore, centralization contributes to increased pressure on housing prices, which might push people to areas outside the regional centers.

Micro-economic factors also play a role. There are, for example, several instances of market failures that can promote urban sprawl. These problems will not necessarily apply to Europe as a whole. Yet it might make sense for both politicians and administration to be aware of such problems, especially since it is possible to implement measures that diminish these challenges. It is also necessary to point out that competition between cities can be an important driving force behind urban sprawl. The literature review in this report shows several examples in Europe where this has been a challenge.

4.1.2 Community

Socioeconomic factors affect land development. Population growth is no longer the main explanation. Centralization in major cities and regional centers may be of greater importance. One of the most important driving forces behind urban sprawl could also be that people generally want to settle in areas characterized by

larger housing, access to green space and good environment for children. Thus it may be difficult to reduce urban sprawl. Cultural and individual factors may therefore be a crucial driving force.

4.1.3 Transportation

Transportation-related factors are necessary assumptions behind urban sprawl. The train, metro, bus and car contribute to greater freedom and opportunities for individuals, businesses and industry. Technological improvements and falling transport costs have made it possible for businesses and industries to locate outside city centers and infrastructure nodes. Moreover, it is now possible to travel longer distances within the same travel time. One can therefore, live farther from the city center or workplace without reducing travel time. In this regard, improvements related to flexibility and development in ICT is also a driving force.

4.1.4 Policy and regulatory framework

Policy and regulatory framework have played a major role when it comes to driving forces behind urban sprawl. Policy and regulatory forces are also important when it comes to manage such a development. The potential for managing land development depends on a number of factors and it can be difficult to make general observations on this subject. Yet there are differences in Europe in terms of potential to control land development. One hypothesis is precisely that countries with strong control over land-use policy, and less fragmented organization, have the best potential for managing and planning land developments. Put another way, horizontal and vertical integration have the best conditions for dealing with land-use policy. Policy and regulatory frameworks are not just limited to the organization. Cities or municipalities may also add up to a policy that promotes urban sprawl on the premise that it is in their interest to provide for such areas.

As we have shown in this document there are a number of factors that can act as a driving force behind urban sprawl, but it is difficult to determine which factors are most important. Driving forces behind urban sprawl vary between cities, regions and countries. Moreover, driving forces are closely inter-linked, and the cause - effect relationship is unclear. The conditions and opportunities for managing land development can thus be expected to vary. Some places will be able to reduce or limit urban sprawl, while others will continue to experience urban sprawl. The land development will be related to economic, political and social factors.

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