Journal of Transport and Land Use 2 (3/4) [Winter 2010] pp. 87–107
Available at http://jtlu.org

JTLU

Preferences for commuting in sparsely populated areas

The case of Sweden

Erika Sandow
Umeå University, Sweden[a]

Kerstin Westin
Umeå University, Sweden[b]

Abstract: In a time of decreased inclination to migrate and an increased place attachment, increasing commuting can improve the functionality of local labor markets. In regional development policy in Sweden, facilitating increased commuting over larger geographical areas is therefore viewed as essential for enhancing the supply of competent labor in all parts of the country and decreasing spatial segmentation. Building on an analysis of data from a survey of Swedish residents' commuting options and preferences, this paper focuses on commuting in a relatively sparsely populated and peripheral area in northern Sweden. Further, the question of whether increased commuting is socially sustainable from a commuter's perspective is discussed. The point of departure is that the individual and the individual's context affect commuting behavior through social norms, geographical structure and available infrastructure. With respect to travel patterns and mode choice, a gender perspective is included in the analyses. The results show that the geographic and socio-economic structure of the labor market place time restrictions on people's commuting behavior and as a consequence people's daily reach in sparsely populated areas is restricted. Geographical structure, available infrastructure, and socio-economic factors (such as education, employment, and family situation) are also found to restrict women's access to the local labor market to a greater extent than men's. Furthermore, the study shows that the inclination to commute declines rapidly when commuting times exceed 45 minutes, regardless of gender, transport mode, and socio-economic factors. Considering distances and the provision of public transport in sparsely populated areas, the car is valued as the most optimal mode of transport when commuting. If regional growth is to be promoted by facilitating commuting over longer distances, a higher level of car dependency must be accepted in sparsely populated areas.

Keywords: Commuting; Travel time; Gender; Social sustainability; Regional development

1 Introduction

In contemporary discussions on European regional development and economic growth, mobility of the labor force is regarded as highly important (Krieger and Fernandez 2006). The ability of the labor force to move—between industries and workplaces as well as geographically—facilitates an efficient matching of local demand and supply of labor at different qualification levels. Migrating is a way to balance labor supply and labor demand, and Alonso's original

[a] Erika.Sandow@geography.umu.se
[b] Kerstin.Westin@geography.umu.se

formulation of monocentric models predicts that most workers will migrate (i.e., change their place of residence) to reduce journeys to work (Romani *et al.* 2003).

We know from migration studies in the Nordic countries that the labor market plays a less significant role in migration today than it did 30 years ago. People in the Nordic countries are more likely to move for social and environmental reasons than for obvious labor market reasons (Fisher and Malmberg 2001; Lundholm *et al.* 2004). Overall, less than two percent of the population moves from one municipality to another from one year to another. However, migration propensity differs between age groups; young people (aged 16–24) move more than other age groups, predominantly for reasons related to their education and, after completing their education, to get their first jobs (Lundholm 2007). Staying in one place has a special value; place attachment is central, as are local insider advantages. Another reason to stay is that a potential increase in earnings in a new area may be too small to balance the costs of moving. For many, commuting to work can therefore be an alternative to moving in cases of unemployment or when establishing a career (Green *et al.* 1999).

In a time of decreased inclination to migrate, increased commuting can improve the functionality of local labor markets. Commuting has increased substantially over the past decades, in Sweden as well as in many other Western countries (Green *et al.* 1999; Renkow and Hower 2000; Sultana and Weber 2007). Many factors have contributed to this development, including a lower migration propensity as mentioned above, as well as increased participation by women in the labor force, higher education levels and greater specialization among workers, improved infrastructure and the availability of faster travel modes, etc. Hence, in Swedish regional development policy, actions such as infrastructure investments that facilitate commuting over larger geographical areas are emphasized as essential for enhancing the supply of competent labor in all parts of the country and decreasing spatial segmentation (Government Bill 2001/02:4). This political goal, which strives to facilitate development toward geographically larger local labor markets, is largely based on increased commuting between present local labor markets. However, increased commuting, in terms of both longer trips and more commuters, can also be viewed as contrary to the overall Swedish political objective of economically, ecologically, and socially sustainable development. From the individual's perspective, commuting can be costly and strenuous, and can disrupt daily social life and routines.

Policies that aim to promote a development towards geographically larger local labor markets are largely based on the assumption that people are willing and able to commute longer distances to work. It is important to study the factors that encourage and discourage commuting when assessing policies aimed at promoting regional growth because the extent of people's commuting decisions presumably are affected by a complicated interaction between personal motives and external conditions.

Individuals' perception of travel time to a potential workplace is of importance for their inclination to commute. It is also important that commuting fit into people's daily lives. Being able to organize daily activities that are more or less stationary requires scheduling and resources such as access to suitable transport. Access to fast and comfortable transport modes can enable people to commute long distances and yet have acceptable travel times. As public transport is often less developed in more sparsely populated areas compared to more densely populated areas, the same travel distance may be valued differently depending on geographical context. Knowledge about present daily commuting and the prerequisites for people's possibilities and

inclination to change—in the sense of traveling longer in time and distance–in more sparsely populated areas is, however, rather limited.

The aim of this article is to analyze people's willingness to commute, in terms of travel time and modal choice, in a relatively sparsely populated and peripheral area in northern Sweden. Following from the results, the question of whether increased commuting is socially sustainable from a commuter's perspective is discussed. The article is based on a survey in which residents of a sparsely populated region in northern Sweden ($N = 1\,159$) were asked about their preferences and options for commuting. The point of departure is that the individual and his/her context affect commuting behavior through social norms, geographical structure and available infrastructure. With respect to travel patterns and mode choice, a gender perspective is included in the analyses. The following aspects are addressed: present commuting patterns as well as the individual's perception of commuting, valuation and preferences of travel time, inclination to commute and valuation of transport modes. In addition to disparities between women and men, the correlations between commuting behavior and occupation, education level, and family situation are addressed. Finally, the potential for expanding local labor markets by means of increased commuting is discussed.

2 Theoretical framework

2.1 The mobile vs. the sedentary society

In Sweden, as in many other countries, daily mobility has increased sharply. Rising levels of affluence and higher levels of access to private automobiles and other fast means of transport have increased people's ability to participate in activities that require longer journeys. Together with space-transcending technologies (computers, the Internet, mobile phones), this increase in mobility offers people the possibility of being constantly on the move (Ellegård and Vilhelmson 223–238; Frändberg *et al.* 2004); they are no longer limited to participating only in activities located near their residences. At the same time, the social and spatial organization of current society is often based on the assumption that people have high mobility. Homes, jobs, and services are geographically separated, creating more and longer journeys and an increased dependency on fast means of transport. As a result, the need for mobility is built into modern society, and the freedom of mobility is becoming a necessity (Ellegård and Vilhelmson 223–238; Frändberg *et al.* 2004; Krantz 1999).

On the other hand, society is sedentary, in that people change their residences only infrequently. Statistics show that the majority of the population lives in the same place for long periods of time and that the propensity to migrate has actually decreased in recent years (Garvill *et al.* 2000). When Swedes do move, it is not primarily for labor market reasons. Living in the same place for a long period, people accumulate place-specific human capital that is not easily transferable to other places. This capital, which can be defined as "local insider advantages," is important for an individual's working life, income possibilities, and leisure activities. Social networks that are constructed through participating in leisure activities as well as contacts and knowledge that are created through working can make it easier to find a suitable job if one becomes unemployed (Fisher and Malmberg 2001; Lundholm *et al.* 2004). All these insider advantages would be lost if a person moved. Commuting, then, may be seen as a strategy for keeping one's local insider advantages. Granovetter (1995) pointed out that social networks

are important in getting a job, and no matter how great the net advantage of a new opportunity, it can not be taken advantage of unless it is known. Therefore, there is a greater likelihood of getting a job in the local labor market where one has established interpersonal contacts. By migrating, one also loses the power of social networks and insider advantages.

One approach to understanding commuting behavior is to relate mobility to daily activities and their different patterns. This activity-based approach considers mobility choices as a result of the need of the person to participate in spatially separated activities, subject to constraints. Almost all travel activities are, therefore, examples of derived demand, often in connection with other people and material resources (Fox 1995; Hanson and Hanson 1993; Vilhelmson 1999). For instance, in a family's daily life there are several activities that have to be done: going to work, getting the children to school, grocery shopping, etc. These daily activities often occur in different places and require change of place, planning, and (last but not least) a suitable means of transport.

In contrast to this conventional view of travel as only a by-product of activity, some researchers (see, for example Mokhtarian and Salomon 2001) suggest that travel itself constitutes an activity that is desired for its own sake (see the section The willingness to commute, below). Obviously, a person's choice of form of mobility can thus be expected to be preceded by a rather complex decision process.

2.2 Gender differences in mobility and commuting

One aspect of social sustainability is gender equality. From previous studies, we know that men and women have different travel patterns (see Hanson and Hanson 1993; Hjorthol 2000; Johnston-Anumwono 1992; Kwan 1999; Turner and Niemeier 1997, among others). Patterns of activity and mobility are dependent on individual characteristics such as age, income, education, and roles and tasks within the household. There is a general consensus that what is generally held as masculine and feminine is a dominant norm in society, which is reflected in how activities are distributed in both society and in the household. On the labor market, this is reflected in the fact that women are more likely than men to work within the public sector and to work part-time (Dolado *et al.* 2004; Hanson and Johnston 1985; Hanson and Pratt 1995; Hjorthol 1990). Because the public sector is a monopsony, wage variations are small, and the large number of female public sector workers gain little or nothing by commuting.

Differences between the travel and activity patterns of men and women can be explained in several ways. One group of explanations concerns socio-economic and demographic factors, such as income, education and job status. Studies have shown a positive correlation between longer journeys and, for instance, higher income and education level (Hanson and Pratt 1995; Hjorthol 1990; Wyly 1996). The gender differences in travel patterns do diminish when one controls for income (SIKA 2002; Singell and Lillydahl 1986) and occupational status (Gordon *et al.* 1989; Hanson and Johnston 1985), but they do not disappear. Östh (2007) showed that the number of labor market regions in Sweden is higher for lower-educated men than for higher-educated women, which indicates that the variation in commuting behavior between men and women is larger than the within-group variation for either sex.

Another group of explanatory factors are geographical; men tend to work further from their homes than women. This might be due to a gendered labor market, in which women are concentrated in female-dominated occupations such as in the public sector. Because these

occupations are more evenly distributed than male workplaces, women have greater possibilities of finding work closer to home (Hanson and Johnston 1985; Hanson and Pratt 1995; Krantz 1999).

Social roles also affect travel patterns. One hypothesis is that the social roles of men and women are defined differently, with consequences for their travel behavior. Women adapt their travel and activity patterns to their chores at home to a higher degree than men do. This can partly explain gender differences in activity patterns and women's generally more complex travel. Women's shorter distances to work can therefore be partly explained by social roles. Women largely have dual roles in the household, handling the main part of the household work as well as work outside the home. Because women adapt their daily activities to children and household-related tasks, their activity and mobility patterns are constrained more than men's (Hanson and Hanson 1993; Hjorthol 2000; Johnston-Anumwono 1992; Turner and Niemeier 1997). This means that although women and men assign roughly the same amount of their time to paid work, women assign more time to unpaid work—which is often valued lower than paid work. Thus, women's dual role can restrict their ability to accept jobs further from home (Eriksson and Garvill 2000; Turner and Niemeier 1997).

A fourth group of explanatory factors of the different activity and travel patterns is cultural, and cultural symbols are not gender neutral. Enewold (2000) argued that in many Western cultures mobility is associated with masculinity, while place attachment is seen as a more feminine trait.

2.3 The willingness to commute

The willingness to commute is determined both by the economic benefits (i.e., wage premium) it yields and by generalized commuting costs (Olsson 2001). The latter consists of the value of commuting time and the actual expense for traveling. The value of commuting time differs between individuals depending on their specific circumstances and characteristics, including gender. In addition, commuting must be possible in terms of accessibility and available transport resources.

Commuting is commonly assumed to be a stressful, time-wasting, and costly experience. It could be argued that commuting is often in opposition to economic, ecological, and social sustainability, and therefore people seek to minimize their travel time and cost. However, in addition to the conventional view that travel is a source of disutility to be minimized, Mokhtarian and Salomon (2001) argued that commuting can also offer some positive utility, consisting of activities that can be conducted while traveling. For example, the opportunity to read, listen to music, or sleep while traveling can add a positive utility to a trip. Lyons and Urry (2005) also showed that with information and communication technologies (ICTs), travel time is increasingly being used productively as activity time. Under some circumstances, commuting can also be a desired activity for its own sake (Mokhtarian and Salomon 2001; Mokhtarian *et al.* 2001). Enjoyment of the environment or the speed and the opportunity to drive an automobile that projects high social status are examples of commuting offering a positive utility.

Accepting longer travel times and commuting to work can also be the best option for a person who cannot or does not want to move to get a job. If commuting means that a person can stay in familiar surroundings and keep some of their place-specific insider advantages, it might well be a better alternative than moving. For dual-income households, it can also be

difficult for both spouses to find a job at a new location if one partner needs to move for work. Migrating might just mean that the other partner has to commute to work near the previous place of residence—or, even worse, search for employment in the new place of residence.

While commuting can offer different utilities in terms of economic benefits—such as employment (instead of unemployment), possibilities for career advancement, and social benefits associated with keeping local insider advantages—the positive aspects of a commute must be weighed against the negative aspects. Due to different kinds of constraints, such as those on material and economic resources, and the need to interact with other people at certain times and places, not everyone is able to accept long commuting times. Women are worse off than men in this respect, as they often shoulder more household responsibilities (Hjorthol 2000; Turner and Niemeier 1997). A study of commuters in Sweden (Boverket 2005) has shown that one of the effects of long commuting times on dual-earner households with children is that the parent who does not commute (the mother) puts her career on hold. In order to be near their children, women often choose jobs closer to home and work fewer hours, at least when the children are young. As a result, their incomes are reduced and their career possibilities limited. Thus, the utility of a commute is a complex phenomenon and it is important to understand commuting not as an isolated activity but within a larger context.

3 Definitions

Sweden's local labor markets (LLMs) are functional regions, each composed of a number of municipalities between which commuting intensity is high. Swedish municipalities are grouped into local labor markets based on current daily commuting across municipal borders[1]. Businesses recruit the majority of their labor force within their local labor markets, and residents live out their everyday lives. For several reasons, the geographical size of the local labor markets has increased over the years. Improvements to infrastructure and public transport have made it possible to travel longer distances without increasing travel time to the same extent. Changing conditions on the national labor market and a decreased migration propensity have also contributed to changing patterns of commuting and as a result the size of local labor markets.

The official definition of a commuting trip in Sweden requires that a municipal border be crossed during the trip. In the geographically large and sparsely populated areas of northern Sweden, a journey to work can be fairly long without crossing an administrative border, while traveling the same distance in the south often entails crossing at least one municipal border. For this reason, many actual trips to work in the North do not meet the official definition of commuting trips; therefore, we disregard the official definition in this paper and allow the term "commuting" to refer to all work trips.

[1] The determination of which municipality is the center in a local labor market is based on two criteria, defined by Statistics Sweden: the share of employed residents in the municipality commuting to other municipalities for work must exceed 20 percent; and the largest flow of commuting to another municipality must not exceed 7.5 percent. Other municipalities are grouped with the municipality to which the largest flow of commuting by their residents is directed.

4 The geographical setting

The area in focus in this study is a relatively sparsely populated area in northern Sweden. It consists of four municipalities in the local labor market of Umeå as well as the municipalities of Lycksele and Örnsköldsvik, which constitute their own LLMs. The selection of these three local labor markets is motivated by current political discussion on the possibility of combining them into a single LLM, with the intent of promoting economic growth by creating a more dynamic region with better job matching. As of today, the interaction in terms of commuting between the three LLMs is modest, with the main part of the population not commuting to a local labor market beyond their locality (Sandow 2007).

The study area, shown in Figure 1, has an area over 21,300 square kilometers and just over 210,000 inhabitants. With the exception of Umeå, the municipalities are formally described as "sparsely populated" and have population densities of 2–15 inhabitants/km2, which is mainly concentrated in a few towns. Two major Trans-European Network (TEN) roads cross the area, the north-south E4 connecting Umeå and Örnsköldsvik and the east-west E12 connecting Umeå and Lycksele. A third major road runs from Umeå north-west to Vindeln. The settlements are fairly well concentrated along these major roads, and about half of the employed population within the area lives within two kilometers of them. As of today, it is not possible to travel by train between the cities in the area; however, a railway line (max. speed 200 km/h) from south of Örnsköldsvik to Umeå is under construction and expected to be in operation by 2010. Bus services operate between and within the major settlements in the area, while car travel is the only alternative outside these routes.

The largest employment sectors in the study area (in terms of number of employees) are "health and social care," and "retail and transport/communications." Compared to Sweden as a whole, a larger share of the employed in the region work in education, health care and social care, and a smaller share work in manufacturing and financial services. A trend of decline in job opportunities was broken in 2004 and unemployment rates fell from 3.9 percent in 2004 to 3.5 percent in 2006. However, the municipalities within the study area differ significantly from each other. Umeå is the largest municipality with 110,000 inhabitants, and has increased its population by 45 percent since 1975. Umeå has a differentiated labor market with a number of large workplaces in the public sector as well as in the forestry, manufacturing, and high-tech industries. The presence of a regional hospital serving northern Sweden with specialist care and a university adds to a labor market containing highly skilled jobs. Due to the large and differentiated labor market, there is an inbound commuting surplus in Umeå, i.e., more people commute to Umeå for work than commute from Umeå. The other municipalities in the Umeå LLM are small, between 5 900 and 8 500 inhabitants. Commuting from these municipalities is directed to Umeå, and in the case of Nordmaling, also to Örnsköldsvik. Örnsköldsvik LLM, which consists of Örnsköldsvik municipality only, has 55 000 inhabitants. The Örnsköldsvik LLM has a strong industrial tradition, with paper mills and manufacturing. The commuting flows to and from the Örnsköldsvik LLM are of equal size. Lycksele LLM, which also only covers one municipality, has 12 700 inhabitants and a relatively high share of employment within forestry, mining, and refinement of forest products. Commuting inflow is slightly larger than outflow

from this LLM. As Figure 2 illustrates, commuting takes place mainly around the major settlements[2].

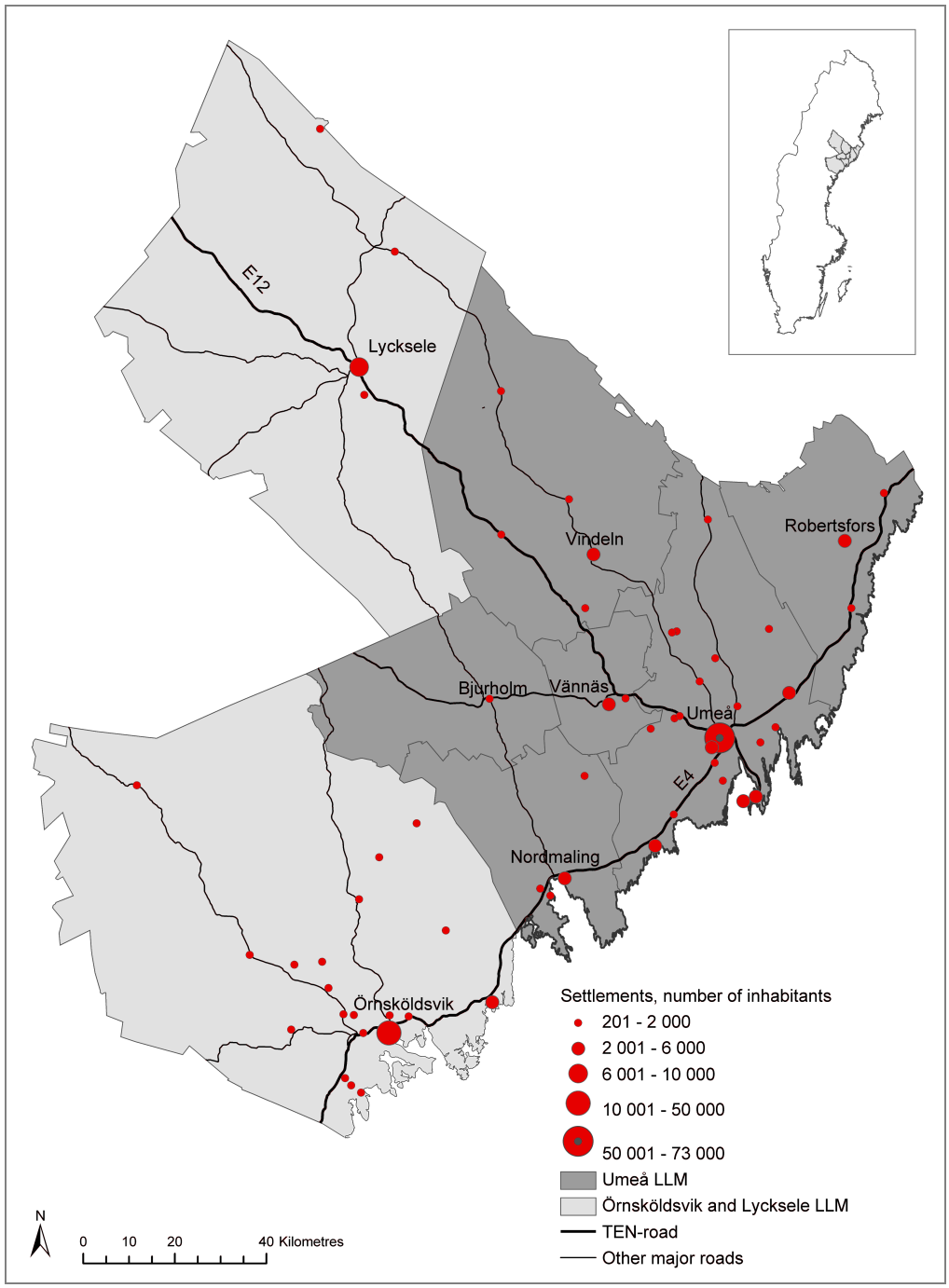

Figure 1: Study area.

[2] Commuting flows are aggregated using a grid resolution of 10 km x 10 km. Flows to/from each cell are represented by the center point. Flows lower than five commuters are not displayed.

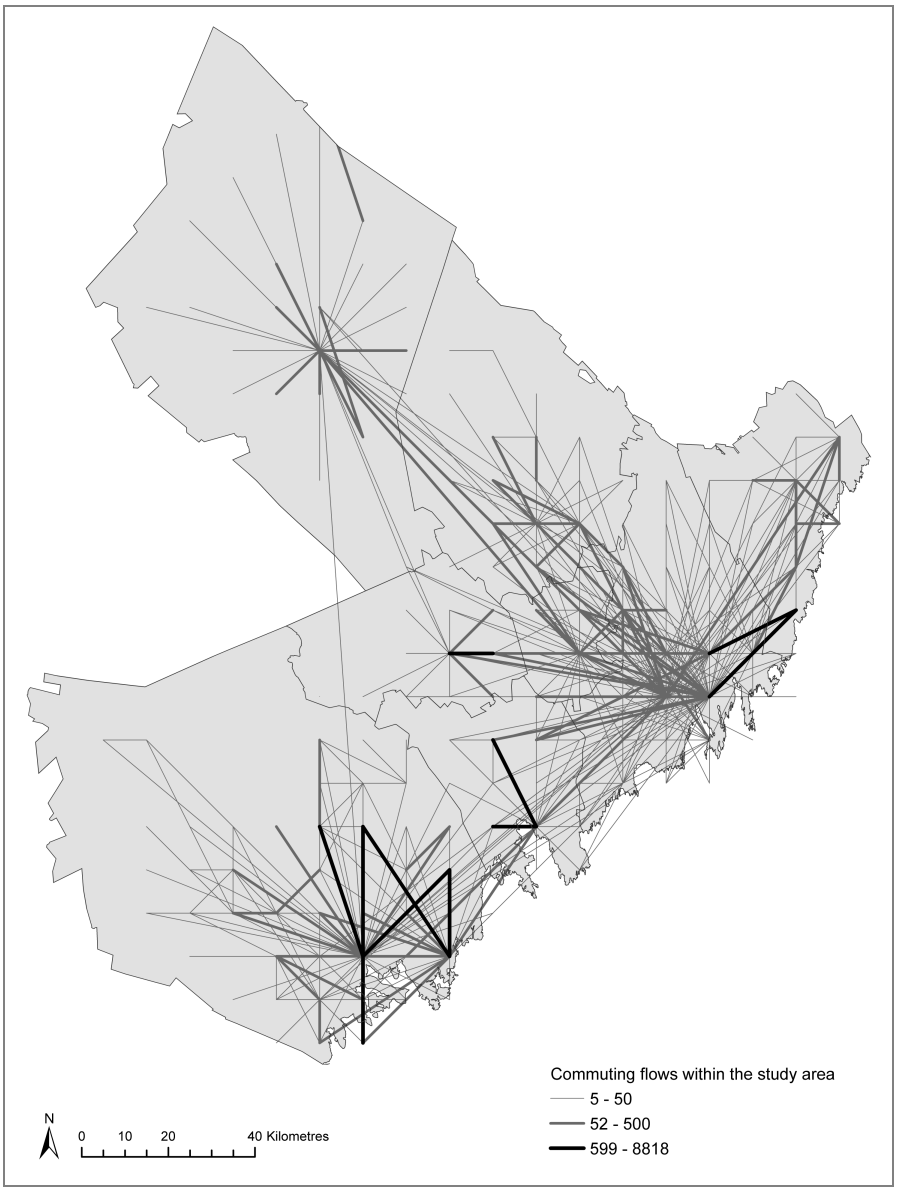

Figure 2: Commuting patterns for all people commuting within the study area.

5 Methodology

This paper is based on a survey of people's inclination and opportunities to commute. A total of 2,500 people aged 18–65 years in six municipalities were randomly selected.[3] A questionnaire was distributed by postal mail in October 2004, and three weeks later a reminder was sent.

[3] The municipalities selected were Umeå (excluding the central city, as municipal public transport cannot be compared to intercity or regional transport), Vännäs, Nordmaling and Vindeln in the Umeå LLM, and the Lycksele and Örnsköldsvik municipalities. The Bjurholm and Robertsfors municipalities in the Umeå LLM were excluded

The response rate was 59.4 percent and tests of the dropouts showed no significant differences between respondents and non-respondents, hence dropout is not assumed to affect the results. A majority (79%) of the respondents were employed, which is not surprising given the selection of respondents of working age. Part of the analysis concerned a comparison between present travel times with different travel modes and desired travel times. As unemployed persons and students do not have the experience of present travel to work, we have restricted further analyses in this paper to those in the sample that were gainfully employed and self-employed. This gives a sample of 1,159 respondents. The selected respondents were representative of the population in their respective municipalities.

The questionnaire contained five sections. The introductory part asked questions about a respondent's background: age, education level, occupation, family status, etc. The second part concerned the respondent's spouse and his or her work. The third section contained questions about hypothetical commuting situations and the propensity to accept commuting. The fourth section presented questions about usage of and attitudes regarding public transport. In the last section, respondents were asked to assign values to different transport modes and travel times.

To compare willingness to commute and travel times between different groups we have used ANOVA. All results are significant at the confidence level $p < 0.001$ unless otherwise stated.

Table 1: Background characteristics of the respondents.

Municipality	Women (%)	Married/Co-habiting (%)	Children at home (%)	> 3 yrs univ. education (%)
Umeå	49 (113)	88 (202)	58 (133)	24 (54)
Nordmaling	52 (77)	86 (127)	50 (72)	11 (16)
Vindeln	40 (63)	80 (124)	52 (81)	15 (24)
Vännäs	48 (83)	80 (138)	60 (103)	17 (29)
Örnsköldsvik	43 (98)	83 (191)	54 (122)	21 (47)
Lycksele	58 (130)	83 (186)	46 (103)	17 (39)
Total	49 (564)	84 (968)	53 (614)	18 (209)

6 Present commuting patterns

In total, nearly half of the respondents were women, and five of six were married or cohabiting. Slightly more than half of the respondents had children living in their households (see Table 1). Almost all had a driver's license, men (99%) to a higher degree than women (96%). It was as common to have two cars in the household as to have one (44% and 42%, respectively).

6.1 Geographical structure shapes commuting

One would assume that people living in more sparsely populated areas have to travel further than residents of more densely populated areas to reach work or other activities. However, the majority of people in this relatively sparsely populated area commute within their own localities. While the average commuting distance is 24 kilometers, half of all commutes do not exceed 12

in order to ensure enough observations from the other municipalities to be able to perform comparisons of different municipalities at a later stage.

kilometers. As Figure 3 shows, women's average travel distances are shorter than men's (19 km versus 29 km). Measured in travel time, half of all commutes are shorter than 20 minutes. Only 10 percent of the women and 15 percent of the men commute 50 kilometers or more, which is the average distance required to reach a job in another town or village. Hence, in order for the three local labor markets being studied to function together as one larger local labor market, a larger share of the workforce must be willing to accept jobs requiring longer commuting trips in kilometers and time.

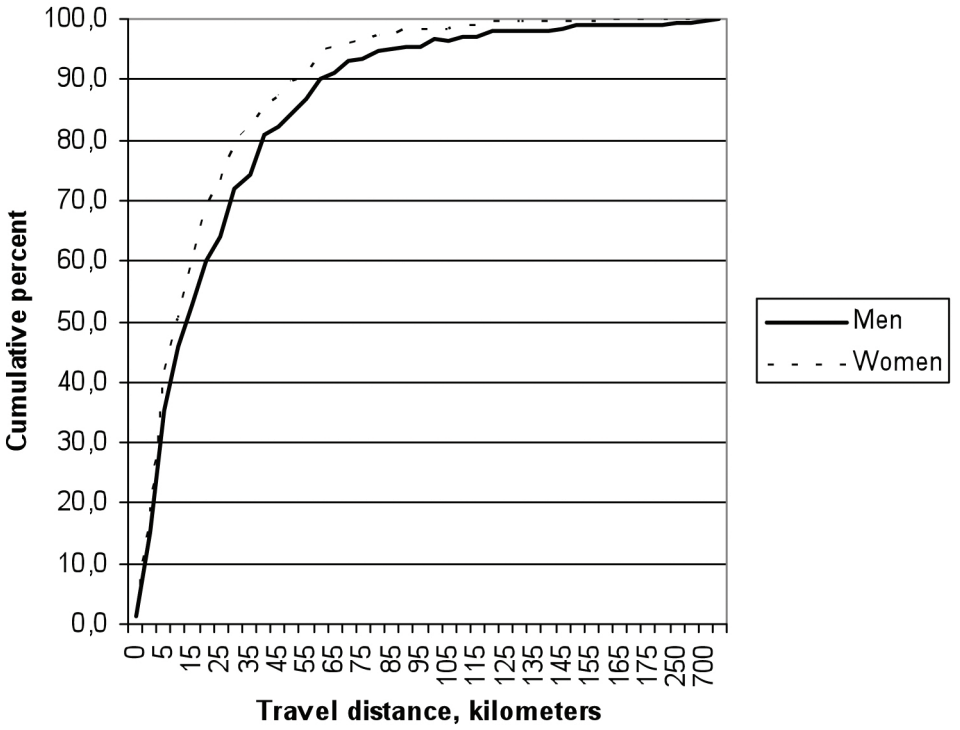

Figure 3: Travel distance to work for men and women (cumulative).

The results clearly reflect the fact that commuting behavior is largely shaped by geographical structure. The majority of people and workplaces are concentrated around a few major settlements, so it is possible for people to work relatively close to their homes. However, this sparse regional structure also imposes restrictions on further commuting. The large geographic extent of local labor markets and the long distances separating major agglomerations of people and workplaces result in interregional commuting distances that might not be perceived as feasible or tolerable as a daily journey.

6.2 Car dependency

Having access to fast and comfortable transport modes saves time, which increases the number of choices of where to work, live, shop, and spend leisure time. Access to a car often has a central influence on people's mobility and activity patterns. Compared to other modes of

transport, traveling by car saves time, which can make it easier to cope with a tight schedule of daily activities. In sparsely populated areas like northern Sweden, it is difficult to provide an effective supply of public transportation. For many, car ownership is a requirement for managing their daily activities. Overall, the car is the main transportation mode for both female and male commuters. A total of 76 percent of the men and 63 percent of the women went to work by car. This car dominance is higher than the national average of 54 percent. The other transport modes represent a lower share of the commutes, and women use these to a higher extent than men do. The low utilization of the public transport system for commuting can be explained partly by the relatively limited supply.

6.3 The gendered labor market

While the geographical structure and available infrastructure of the LLCs in this study clearly shape commuting behavior, gender-related differences in activity patterns are also important determinants. As mentioned in the theoretical framework, it has been shown that women adapt their activity patterns to children in the household and to other household-related activities to a larger extent than men do. As a consequence, long commuting times may impose greater time pressure on women's daily schedules. For instance, because activities such as dropping off and picking up children at day-care centers and preschools are fixed in time and space, it might be problematic if both parents have long commuting journeys. Furthermore, it is important for families with small children to ensure that at least one family member has the ability to return home quickly when a child is in need. The results of this study also show that households with children have shorter average commutes (in both minutes and kilometers) than households with no children. When gender is controlled for, it is also women who have the shortest commutes if children are present. Hence, the results indicate that the presence of children in a household imposes time constraints on commuting behavior and that the need to be close to home places greater restrictions the daily mobility of women than of men.

In addition to the correlation between gender and family situation, education level and occupation have an influence on commuting behavior. A higher education level is positively correlated to longer commutes; those employed in the public sector have shorter commutes than those employed in other sectors. The longest commuting distances in kilometers can be found among respondents employed in manufacturing and primary sectors such as agriculture, forestry, and mining. Nevertheless, women consistently have shorter commutes than men who are employed in the same sector or have the same education or level of income. Therefore, although the majority of commutes in this relatively sparse geographical context occur within and around the major settlements, the labor market is more geographically restricted for women than for men.

6.4 Valuation of and preferences for travel time

Commuting implies that a physical distance between place of residence and place of work has to be overcome daily. Distance can also be given a mental dimension, thus making the way a person values distance to a potential workplace important for the person's behavior.

Respondents were asked to state their present travel time, desired travel time, and longest acceptable travel time for commutes. In general, the longest acceptable commuting time is 40 to 45 minutes when traveling by car, bus, or train, and 20 minutes when walking or cycling. The

desired commuting time is generally 15 to 20 minutes. In line with other studies (Mokhtarian and Salomon 2001; Ory *et al.* 2004; Redmond and Mokhtarian 2001), we find a desire to live close to the workplace—but not too close.

Travel experiences affect the valuation of a transport mode (Hjorthol 2001), and one could therefore assume that present commute times, with the mode of transport presently used, would be found to be acceptable. However, when the desired commuting time is compared to the respondent's actual commuting time using their present transport mode, we find that the desired commuting time is lower in most cases. As Figure 4 illustrates, car commuters have average travel times of roughly 30 minutes, which is almost twice as long as they desire. Respondents traveling on foot or by bicycle indicated that they would prefer slightly longer travel times than they have at present (by approximately two minutes), which might be a reflection of the geographical structure of the area: fairly small cities in which trip distances are short. For those working in the town where they live, bicycling or walking are natural mode choices and travel times are naturally short—or even too short. For those who commute out of town, car and public transport are the possible transport modes. This might indicate that people have longer travel times than they desire; on the other hand, this discrepancy might imply that travel times are not the most important consideration when choosing where to live in relation to where one works. According to Redmond and Mokhtarian (2001), this can be seen as a trade-off for acquiring a desirable job. One explanation is that a shortage of reasonably priced housing has forced people out of some urban areas; another explanation is that environmental considerations, e.g., a nice place to raise children, are important when choosing where to live (Arena för tillväxt & Svenska kommunförbundet 2003). Thus, a person's choice has not been to commute longer, but to solve a housing issue. A third of the commuters (by the formal Swedish definition of crossing a municipal border) belong to this group of residential commuters. Respondents were asked to state the longest acceptable travel time, and the discrepancy with present travel time might also indicate that respondents were generally dissatisfied with present travel times but still accept them. If this is so, there is a risk of underestimating the potential for increased commuting in terms of travel time and distance.

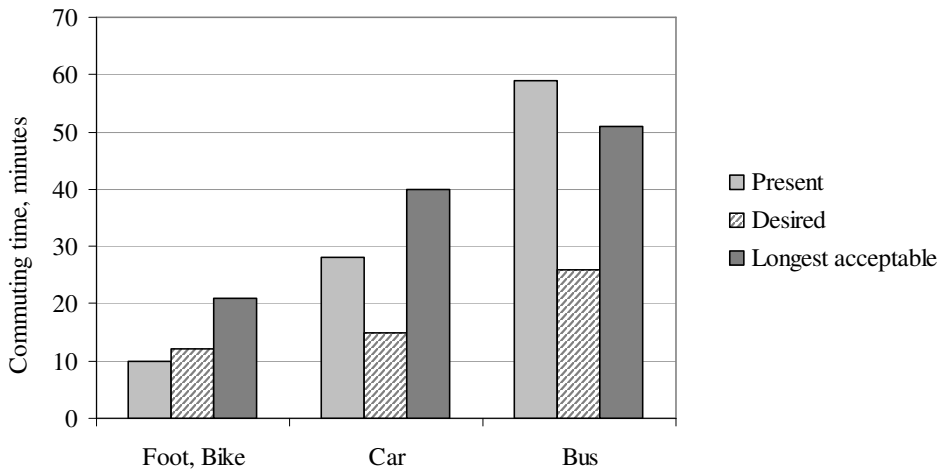

Figure 4: Present, desired, and longest acceptable commuting times with different modes of transport.

To some extent, the respondents' valuation of and preferences for travel time and distance vary depending on gender and on socio-economic factors such as employment and education. By and large, women's and men's estimation of desired and longest acceptable commuting times did not differ considerably. Women were willing to accept longer commuting times when walking or cycling to work, while men's acceptance of longer commute by car was higher than women's ($p < 0.01$). As a higher education level is often associated with better-paid work (which can compensate for commuting costs) one could assume that respondents with a higher education level are more willing to accept longer commuting times than are those with a lower education level. In fact, studies of commuting behavior in Sweden have shown that men with a high level of education are the most mobile on the labor market. Members of this so-called "commuter elite" have the longest commutes and are gaining the most economically from the geographical expansion of local labor markets (Dahl *et al.* 2003; Olsson 2001; SIKA 2002). However, the results in this study show that men with a lower education level actually have longer commutes than men with a higher education level. Moreover, the estimation of the longest acceptable commuting time did not differ significantly depending on the respondents' level of education; neither men nor women with a higher level of education were willing to accept longer commuting times than respondents with a lower level of education.

7 The potential for increased commuting

A very small fraction of the employed travel to work by public transport, and an even smaller fraction travel by public transport for other purposes. Respondents were asked how they perceived a trip to work by car and by bus, and what attributes they assigned to the two transport modes. As Figure 5 shows, a trip by car has more positive attributes than a trip by bus. A trip by car is perceived to be flexible, fast, comfortable, nice, and calm to a significantly higher degree than is a trip by bus. A trip by bus was perceived to be slow and not flexible, but less expensive than a trip by car and environmentally friendly. Women did not perceive a bus trip more positively than men did; however, the perception that a car trip is not environmentally friendly was greater among women. The different valuation of attributes certainly reflects some objective characteristics: buses are less flexible than cars because buses run on a timetable; buses are slower because they follow a particular route with given stops; etc. Nevertheless, the magnitude of the differences is interesting—even if a trip by car would not be much faster than the same trip by bus in terms of actual travel time, an individual's perception that that there is a great difference influences the likelihood of choosing a particular transport mode.

Not unexpectedly, those who commute by car found car commuting to be cheaper, more comfortable, safer, calmer, nicer, and more restful than those who travel led by bus. On the other hand, the bus riders found the bus to be cheaper, faster, more comfortable, more flexible and nicer than the car riders did. Previous experiences of transport mode are plausible explanations for these differences.

7.1 People's willingness to commute

The utility of commuting longer distances has to be weighed against the utility of accepting a specific job. Figure 6 shows the propensity for accepting a job in another town, if unemployed, and starting to commute. It is evident that respondents' inclination to commute declines when

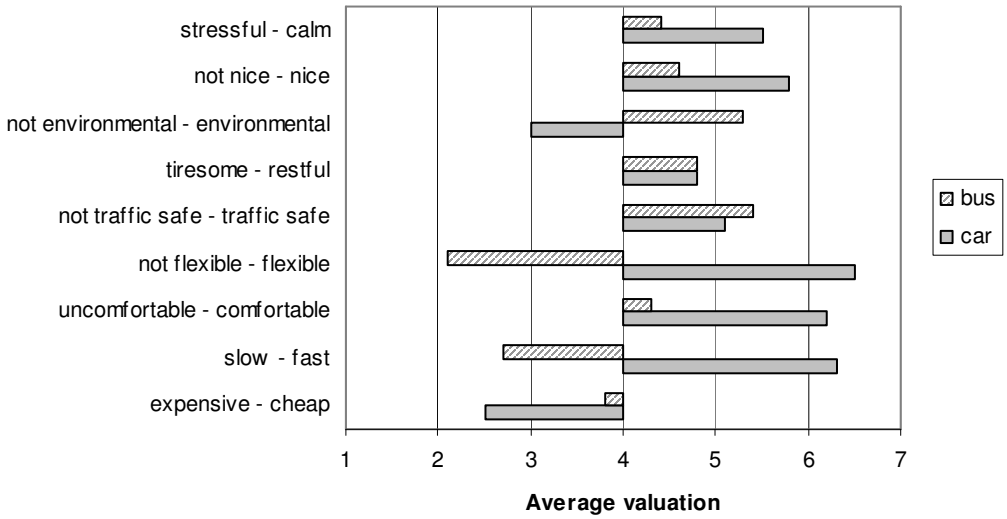

Figure 5: Valuation of attributes connected to a trip to work by car or by bus. The valuation was made on a scale of 1 to 7, where 1 = a negative valuation (e.g., stressful) and 7 = a positive valuation (e.g., calm). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

the commuting trip exceeds 45 minutes. The inclination to commute is higher if the mode of transport is a car compared to a bus or train. This may be because the car allows for a more flexible and comfortable commute. As expected, men were significantly more inclined than were women to start commuting if the mode of transport was a car. However, we found no significant differences after controlling for respondents' family situation, education level, and employment sector. A similar result was obtained when the question was related to the length of commuting times the respondents would be willing to accept if they were offered a better job in another settlement. The inclination to accept a job declines when commuting times exceed 45 minutes. However, only if the commuting time exceeds one hour by car were men significantly more inclined than women to accept a better job and start commuting.

Commuting experience is also found to have an important effect on the propensity to accept longer commuting times. Respondents with a present commuting time of more than 30 minutes had a higher propensity ($p < 0.001$) to accept a job requiring a commute of more than 45 minutes, either by car or by bus/train, compared to those who reported current commute times of 30 minutes or less. This holds true both if the respondent is unemployed and is offered a new job in another town, or is employed but is offered a better job. However, in either situation, the inclination to accept the job declined sharply if the commuting time would be longer than 45 minutes.

It is obvious that time is a limiting factor, regardless of previous commuting experience or mode of transport; when travel time exceeds 45 minutes, commute is deemed too long and daily commuting is no longer feasible or tolerable. Potential financial and career benefits yielded by long-distance commuting might not be worthwhile given increased travel expenses or longer travel times, which may impose constraints on other daily activities. Other solutions, such as

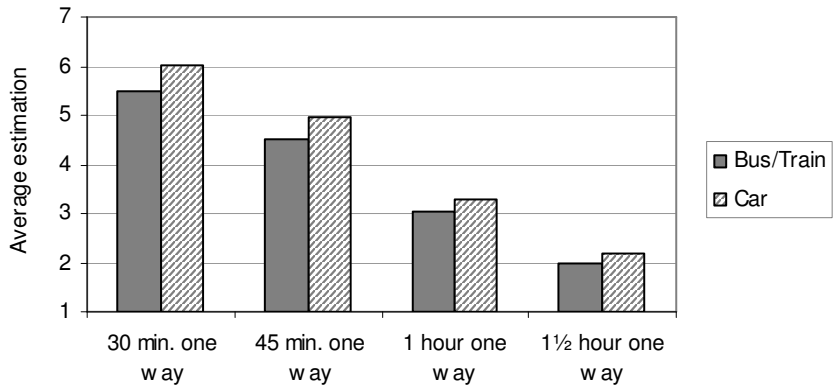

Figure 6: Maximum time unemployed job seekers would be willing to commute to a new job, divided by mode of transportation. The valuation was made on a scale of 1 to 7, where 1 = "not likely" and 7 = "very likely".

weekly commuting, migrating, or teleworking (some or all of the time) are most probably preferred (Karlsson and Olsson 2006).

7.2 Incentives for commuting via public transport

As discussed earlier, commuting constitutes a cost for a person, in terms of both money and time, and commuting in sparsely populated areas can be especially costly. In addition, as most commutes are undertaken by car, the environmental impacts on e.g. air quality, traffic safety, and the landscape increase. Increased commuting by car can also jeopardize traffic safety and increase public expenditures for road maintenance. Measures to stimulate commuting by public transport can, therefore, contribute to a more sustainable pattern of development for several reasons. One way to compensate for higher travel costs and increase motivation for accepting longer commutes might be to direct economic incentives to the commuter; examples of such incentives include tax deductions for travel expenses, employers allowing part of the travel time to be included in work time, and employers offering higher wages.

Incentives that make commuting via public transport more advantageous than car commuting (economically and time-wise) increased respondents' inclination to choose the bus. If tax deductions for travel expenses were allowed for the cost of commuting via public transport rather than by car, the main modal choice would be bus for 35 per cent of the respondents[4] (the respondents were not presented with travel times or travel costs, just modal options). The inclination to choose bus was even higher if employers were to allow the whole commuting time to be included in work time (47% chose bus), or compensate total travel expenses (42%). In sparsely populated areas, where it can be difficult for employers to recruit labor, these incentives can thus constitute a strategy for keeping and/or attracting trained labor. At the same time, such incentives might be worthless if the standard of public transport (in terms of flexibility, travel time, etc.) is not perceived to be competitive with travel by private car. Having been

[4] The question was "Suppose you are going to commute to Umeå or Örnsköldsvik, respectively, and the trip can be made by car, bus or by train. The government decides that only the cost for traveling by public transport is tax deductible. How probable is it that you would commute by bus/car/train?"

presented with the incentives, respondents may well have overlooked the attributes of transport modes.

Women valued buses as the main mode of transport when commuting, regardless of whether or not there were any incentives making commuting with public transport less costly. Taking women's present modal choice into account, they have more experience of traveling by bus; in view of that fact, this result is to be expected.

8 Discussion

In the border area between the "new economic geography" and the "new growth theory," a discussion has emerged concerning the importance of local and regional growth for (national) economic development (Fujita and Krugman 2004). De-agglomeration, or de-urbanization, is regarded as efficient and the existence of a number of small cities instead of a few very large ones is argued to save time in commuting (Anas 2004). Economic growth is a theme that appears frequently in the discussion on how to improve competitiveness; in Sweden, as in other countries, economic growth is viewed as essential to the maintenance of economic well-being. In addition, growth must be sustainable and encompass all regions. A traditional point of departure for regional development is that a region has to increase its population in order to have a basis for economic growth. Improved transport is a means to achieve larger labor market regions without people having to migrate to get jobs.

As increased interaction over geographically larger areas more or less implies increased travel, this political ambition might jeopardize the environmental policy goal of creating a more sustainable transport system. Further increasing the proportion of car traffic will lead to more emissions, noise, and landscape fragmentation, negatively affecting both the physical environment and human health.

Not only does this regional development policy work against aspects of environmental sustainability, it also has social implications that must be considered. Commuting is not an option for everyone, and women tend to be more limited in this respect than men. As stated, time sets a limit for when daily commuting is no longer feasible or tolerable. When children are present in the household, the daily scheduling of activities is rather inflexible. For households in which both parents work outside the home, it can therefore be difficult for both spouses to accept a job located further from home. As women usually shoulder a greater care-taking responsibility than do men, this means that women's daily reach on the labor market is restricted. Choosing a workplace close to home can be a strategy for women to combine their dual roles as mothers and wage earners. Women are also more likely than men to find employment close to home, largely because of their segregation in female-dominated occupations, in which the jobs are spatially distributed more evenly than in male-dominated ones. People's opportunities to accept commuting also depend on their access to fast and flexible modes of transport. Considering both women's and men's high access to cars, and the fact that women have a shorter commute than men regardless of employment sector, education level, and family situation, the result indicates that the gender role and daily time constraints women face impose stricter limitations on women's geographical labor mobility. Increased commuting may, therefore, strengthen the gender differences within the labor market. In addition, most people in northern Sweden reside in very local labor markets and do not have to travel far to work. Nor do they desire to travel

for very long; 20 minutes seems to be the optimal travel time and 45 minutes a threshold. Is it therefore truly feasible to strive to increase people's daily travel?

Who, then, will benefit from increased commuting? Commuting may be an alternative to migration; the ability to stay in one's home town and keep insider advantages is valued highly by many. From an industrial perspective, the ability to recruit competent labor is important, and commuting increases the the labor supply. From a national perspective, the economic effects of increased commuting and larger local labor markets are of high importance.

Furthermore, the strategy of expanded labor markets does not take into account regional differences such as geographical structure and available transport modes. In order for a long commuting distance to be more socially and economically sustainable, fast and flexible transport modes, such as a well functioning public transport system, have to be available. This is not, however, the case in all parts of Sweden.

The car is the predominant mode of transport in sparsely populated areas. High car dependency in our study area is partly a result of the resources society assigns to public transport. In sparsely populated areas, the population base and attendant transport demand are too small to support public transport at reasonable costs. Even when there is a certain supply of public transport it has to be able to offer people the ability to travel quickly with a certain standard in terms of number of departures, travel times and costs. To be able to travel by public transport is not only a question of the number of public transport vehicles; it is also very important that the services be fast, flexible (i.e., frequent departures), and comfortable. Public transport has to be a reasonable alternative to traveling by car.

What does it take to encourage people to accept commuting? It is important that the trip be fast, flexible, comfortable, and not too expensive. No matter how we choose to regard rural areas, they are sparsely populated. In our study area, the settlements are fairly well concentrated along highways, yet the number of inhabitants is too low to justify a public transport system that is sufficiently fast, flexible, comfortable, and inexpensive to meet the demands of potential users. It is not possible to demand that people, just because they live in rural areas, must choose transport modes that make their daily lives unduly complicated. However, people accept travel times of up to 45 minutes and more if they can travel by car, which is perceived more positively than public transport. If society is serious in its ambition to keep rural Sweden alive, it must accept a higher car dependency in these areas—even if doing so runs counter to the goal of environmental sustainability. For a person, the flexibility of car transport makes it more socially sustainable than public transport. Bus commuters already travel longer than what they consider acceptable, and car commuters longer than what they desire. Why demand that they extend their commutes still more? In addition, if society is serious about its political commitment to regional growth in all parts of Sweden and to the expansion of local labor markets as a means to that end, then it might be more economically and socially sustainable (both for society and for the individual) to encourage commuting by car. The costs of offering competitive and acceptable public transport are probably much higher than those of compensating a relatively small number of people for the costs they incur in traveling to work by car.

References

Anas, A. 2004. Vanishing cities: What does the new economic geography imply about the efficiency of urbanization. *Journal of Economic Geography*, 4:181–199.

Arena för tillväxt & Svenska kommunförbundet. 2003. På spåret – en studie av pendlingsmönster och boendekostnader [In Swedish] (On the track – a study of commuting patterns and housing costs. Rapport 2-02, Arena för tillväxt & Svenska kommunförbundet.

Boverket. 2005. Är regionförstoring hållbar? [In Swedish] (Is increased labor regions sustainable?). Technical report, Swedish National Board of Housing, Building and Planning.

Dahl, Å., H. Einarsson, and U. Strömquist. 2003. Effekter av framtida regionförstoring i Mälardalen. Länsstyrelsen i Stockholms län, Uppsala län, Södermanlands län, Västmanlands län och Örebro län [In Swedish] (Effects of future expansion of labor markets in the Mälardalen area. Technical report, Temaplan AB.

Dolado, J., F. Felgueroso, and J. Jimeno. 2004. Where do women work? analyzing patters in occupational segregation by gender. *Annales d'économie et de statistique*, pp. 71–72.

Ellegård, K. and B. Vilhelmson. 223–238. Home as a pocket of local order: Everyday activities and the friction of distance. *Geografiska Annaler B*, 86(4):223–238.

Enewold, J. 2000. Men and women on the move. Dramas on the road. *European Journal of Cultural Studies*, 3:403–420.

Eriksson, L. and J. Garvill. 2000. Transportsystemets tillgänglighet ur ett genusperspektiv. En litteraturstudie [In Swedish] (Accessibility of the transport system from a gender perspective. TRUM rapport 2000:5, Transportforskningsenheten, Umeå Universitet.

Fisher, P. and G. Malmberg. 2001. Settled people don't move: On life course and (im)mobility in Sweden. *International Journal of Population Geography*, 7:357–371.

Fox, M. 1995. Transport planning and the human activity approach. *Journal of Transport Geography*, 3(2):105–116.

Frändberg, L., E. Thulin, and B. Vilhelmson. 2004. *Rörlighetens omvandling. Om resor och virtuell kommunikation – mönster, drivkrafter gränser [In Swedish] (The transformation of mobility)*. Lund, Sweden: Studentlitteratur.

Fujita, M. and P. Krugman. 2004. The new economic geography: Past, present and the future. *Papers in Regional Science*, 82(139–164).

Garvill, J., G. Malmberg, and K. Westin. 2000. Värdet av att flytta och att stanna – om flyttningsbeslut, platsanknytning och livsvärden [In Swedish] (The value of migrating and of staying – migration decisions, place attachment and life values. Rapport 2: i Regionalpolitiska utredningen.

Gordon, P., A. Kumar, and H. Richardson. 1989. Gender differences in metropolitan travel behaviour. *Regional Studies*, 23(6):499–510.

Government Bill 2001/02:4. A policy for growth and vitality throughout sweden. Swedish Ministry of Industry, Employment and Communications.

Granovetter, M. 1995. *Getting a job: A study of contacts and careers*. Chicago: University of Chicago Press.

Green, A., T. Hogarth, and R. Shackleton. 1999. Longer distance commuting as a substitute for migration in Britain: A review of trends, issues and implications. *International Journal of Population Geography*, 5:49–67.

Hanson, S. and P. Hanson. 1993. The geography of everyday life. In T. Gärling and R. Golledge, eds., *Behaviour and Environment: Psychological and geographical approaches*, pp. 249–269. Amsterdam: Elsevier.

Hanson, S. and I. Johnston. 1985. Gender differences in work trip lengths: Implications and explanations. *Urban Geography*, 6(3):193–219.

Hanson, S. and G. Pratt. 1995. *Gender work and space*. International Studies of Women and Place. London: Routledge.

Hjorthol, R. 1990. Kvinners arbeidsreiser. Et viktig premises for offentlig planleggning. [In Norwegian] (Women's journeys to work, an important precondition for public planning). TØI rapport 72/1990, Transportekonomisk institut.

Hjorthol, R. 2000. Same city—different options. An analysis of the work trips of married couples in the metropolitan area of Oslo. *Journal of Transport Geography*, 8(3):213–220.

Hjorthol, R. 2001. Gendered aspects of time related to everyday journeys. *Acta Sociologica*, 44:37–49.

Johnston-Anumwono, I. 1992. The influence of household type on gender differences in work trip distance. *The Professional Geographer*, 44:161–169.

Karlsson, C. and M. Olsson. 2006. The identification of functional regions: Theory, methods, and applications. *The Annals of Regional Science*, 40(1):1–18.

Krantz, L. 1999. Rörlighetens mångfald och förändring. Befolkningens dagliga resande i Sverige 1978 och 1996 [In Swedish] (The diversity and transformation of mobility). Meddelande från Göteborgs Universitets Geografiska institutioner, Serier B Nr 95, Handelshögskolan vid Göteborgs Universitet.

Krieger, H. and E. Fernandez. 2006. Too much or too little long-distance mobility in Europe? EU policies to promote and restrict mobility. Technical report, European Foundation for the Improvement of Living and Working Conditions. URL http://www.eurofound.eu.int/docs/areas/populationandsociety/mobility4paper2006.pdf.

Kwan, M. 1999. Gender, the home-work link, and space-time patterns of nonemployment activities. *Economic Geography*, 75(4):370–394.

Lundholm, E. 2007. Are movers still the same? characteristics of interregional migrants in Sweden 1970–2001. *Tijdschrift voor Economische en Sociale Geografie*, 98(3):336–348.

Lundholm, E., J. Garvill, G. Malmberg, and K. Westin. 2004. Forced or free movers? the motives, voluntariness and selectivity of interregional migration in the Nordic countries. *Population, Space and Place*, 10(1):59–72.

Lyons, G. and J. Urry. 2005. Travel time use in the information age. *Transportation Research Part A*, 39(2-3):257–276.

Mokhtarian, P. and I. Salomon. 2001. How derived is the demand for travel? some conceptual and measurement considerations. *Transportation Research Part A*, 35(8):695–719.

Mokhtarian, P., I. Salomon, and L. Redmond. 2001. Understanding the demand for travel: It's not purely "derived". *Innovation*, 14(4).

Olsson, M. 2001. Studies of commuting and labor market integration. JIBS Dissertation Series 16, Jönköping International Business School, Jönköping University, Sweden.

Ory, D., P. Mokhtarian, L. Redmond, I. Salomon, G. Collantes, and S. Choo. 2004. When is commuting desirable to the individual? *Growth and Change*, 35(3):334–359.

Redmond, L. and P. Mokhtarian. 2001. The positive utility of the commute: Modelling ideal commute time and relative desired commute amount. *Transportation*, 28:179–205.

Renkow, M. and D. Hower. 2000. Commuting, migration, and rural-urban population dynamics. *Journal of Regional Science*, 40(2):261–287.

Romani, J., J. Surinach, and M. Artis. 2003. Are commuting and residential mobility decisions simultaneous? the case of Catalonia. *Regional Studies*, 37(8):813–826.

Sandow, E. 2007. Commuting behavior in sparsely populated areas: Evidence from northern Sweden. *Journal of Transport Geography*.

SIKA. 2002. Jämställda transporter? Så reser kvinnor och män [In Swedish] (Gender equality in transport? Travel patterns of men and women. Technical report, SIKA: Statens institut för kommunikationsanalys.

Singell, L. and J. Lillydahl. 1986. An empirical analysis of the commute to work patterns of males and females in two-earner households. *Urban Studies*, 2:119–129.

Sultana, S. and J. Weber. 2007. Journey-to-work patterns in the age of sprawl: Evidence from two midsize Southern metropolitan areas. *The Professional Geographer*, 59(2):193–208.

Turner, T. and D. Niemeier. 1997. Travel to work and household responsibility: New evidence. *Transportation*, 24(397–419).

Vilhelmson, B. 1999. Daily mobility and the use of time for different activities. *GeoJournal*, 49:177–185.

Wyly, E. 1996. Race, gender, and spatial segmentation in the Twin Cities. *The Professional Geographer*, 48(4):431–444.

Östh, J. 2007. Home, job and space. mapping and modelling the labor market. Geografiska regionstudier 72, University of Uppsala.