A Piece of the Puzzle

Essays on Accessibility, Transport Infrastructure and Distribution

Bondemark, Anders

2021

Document Version:
Publisher's PDF, also known as Version of record

A Piece of the Puzzle

Essays on Accessibility, Transport Infrastructure and Distribution

ANDERS BONDEMARK
FACULTY OF ENGINEERING | LUND UNIVERSITY 2021

A Piece of the Puzzle

Essays on Accessibility, Transport Infrastructure and Distribution

Anders Bondemark

LUND
UNIVERSITY

DOCTORAL DISSERTATION

by due permission of the Faculty of Engineering, Lund University, Sweden.
To be defended at the Joint Faculties of Humanities and Theology, Helgonavägen 3, in room C121, in Lund.16th of June at 10:00.

Faculty opponent
Dr. Niek Mouter, TU Delft, Netherlands

Organization LUND UNIVERSITY Faculty of Engineering Department of Technology and Society	**Document name** Doctoral Thesis
	Date of issue 11th of May 2021
Author Anders Bondemark	**Sponsoring organization** The Swedish Transport Administration, The Swedish National Road and Transport Research Institute, Lund University & K2 – The Swedish Knowledge Centre for Public Transport

Title and subtitle: A Piece of the Puzzle: Essays on Accessibility, Transport Infrastructure and Distribution

Abstract

The overall aim of this thesis is to contribute to the understanding of goal conflicts between various policies in the transport sector and their distributional impacts. This aim is broken down into two research themes: 1) What are the distributional outcomes of the transport system?, and 2) How do different actors incorporate distributional considerations into the allocation of infrastructure investments?. This thesis comprises of four papers. Papers I and II relate to the first theme and Papers III and IV to the second.

In Paper I we study whether income explains why some choose to travel with public transport using single tickets when their cheapest ticket is a monthly travel card. We investigate this using the Swedish national travel survey and find a positive relationship between travel card possession and income among those for whom the monthly card is the cheapest ticket. This effect is present among individuals with annual incomes up to SEK 230 000. Our main explanation for the seemingly irrational behaviour is real or perceived liquidity constraints.

In Paper II I study the effect of accessibility on other markets, in this case the market for food. Specifically, I study how accessibility explains variations in the price of food in supermarkets. I find a U-shaped relationship with higher prices in low and high accessibility locations and lower prices in medium accessibility locations. I attribute the higher prices in low accessibility locations to local monopolies and the lack of economies of scale. The higher prices in high accessibility locations I attribute to the location of a store being a quality for which people are willing to pay a premium in order to reduce travel costs in combination with congestion in stores.

In Paper III we investigate how the Swedish Transport Administration (STA) compiled the draft 2018-2029 plan. We do this by studying which qualities of individual investments that explain inclusion probability, complemented by interviews with planners. The qualities we find influence inclusion probability is if the investment have a positive net benefit investment ratio, which have a positive impact, and the presence of negative, non-quantified environmental effects, which have a negative impact on inclusion probability. None of the parameters relating to the variables meant to capture distributional considerations are significant and the only distributional consideration that surfaced during the interviews were that each of Sweden's 21 regions should each get at least one investment.

In Paper IV we conduct a choice experiment to solicit the public's preferences for aggregate benefits and distributional outcomes in the context of infrastructure investments. The distributional dimensions included are geography, gender, and income. We also conduct latent class analysis to capture heterogeneity. In general, individuals prefer infrastructure packages that entail large benefits and even distributions, however, if the benefits are unevenly distributed, they prefer those that favour non-metropolitan regions, women, and low-income earners. The groups revealed by the latent class analysis highlight different parts of the overall results.

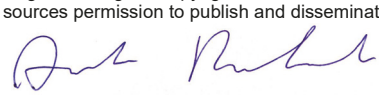
Finally, I argue that the interpretation of these results depends on whether accessibility hold instrumental or intrinstic value.

Key words: Transport, Distribution, Accessibility, Infrastructure investments, Food prices, Preferences

Classification system and/or index terms (if any)

Supplementary bibliographical information	**Language** English
ISSN 1653-1930 Bulletin – Lund University, Faculty of Engineering, Department of Technology and Society, 322	**ISBN** 978-91-7895-871-9 (print) 978-91-7895-872-6 (pdf)

Recipient's notes	**Number of pages** 82	Price
	Security classification	

Signature  Date 2021-05-04

A Piece of the Puzzle

Essays on Accessibility, Transport Infrastructure and Distribution

Anders Bondemark

LUND
UNIVERSITY

Coverphoto by Ulrika Isberg Bondemark

Faculty of Engineering
Department of Technology and Society

ISBN 978-91-7895-871-9 (print)
ISSN 978-91-7895-872-6 (pdf)

Printed in Sweden by Media-Tryck, Lund University
Lund 2021

Astronomy is much more fun when you're not an astronomer

Brian May

Acknowledgements

While the process of writing this dissertation has been a very solitary one, there are still many people to whom I owe a debt of gratitude. I would like to begin by thanking my grandfather, Anders, not only for allowing me stay with him during my visits to Skåne but also for his unwavering support and encouragement. I am very grateful for the bond we have developed over the past 12 years.

It goes without saying that my supervisors have played a large role. I would like to thank Henrik for introducing me to academia and for sharing his knowledge, Anders for arranging my doctorship and providing me with tips on how to deal with the academic world and, last but by no means least, Karin. Indeed, I could easily have dedicated this entire section to my debt to Karin, one of the many wonderful colleagues who introduced me to research at WSP, along with Eva and Emma among others, and who encouraged me to pursue a PhD. Throughout this process, it has been to Karin that I have been able to turn with almost any question. Despite a very busy schedule, she has taken the time to help me. She is without a doubt the most intelligent and pedagogical person I know, and it has been a privilege to be in the position to learn from her, both at WSP and while working on this thesis.

Were it not for the inspiration provided by the many wonderful people at WSP, I would not have considered pursuing a PhD. I have mentioned Karin, Eva, and Emma but there are many others to whom a vote of thanks is due, including – but certainly not limited to – Per, Erika, Christian, Peter, Lina, Katja, Sofia, Christer, Staffan, Svante, Patrik and Pia.

While I may have been alone in writing this dissertation, I have had plenty of colleagues at VTI to keep me company, not least Samuel, who has answered my econometric questions with great patience, and many others, including Roger, Karolina, Joakim, Kelsey and Axel. I should also mention those who have left VTI but who have helped me a great deal, notably Johan, Oskar, and Andreas. I would also like to thank my managers Jenny, Mattias, Mattias, Matts and Jan-Erik for their encouragement and support. I would also like to thank Andreas and David as they are great fun to talk to and have provided a useful vent.

A number of people who have also assisted by providing feedback on my texts, agreeing to interviews, answering questions and mediating contacts, notably Maria, Jean, Jonas, Joakim, Svante, Peter, Jonathan, Anders and Sven-Olov.

My affiliation to Lund University over these past years has meant a great deal of travelling to and from Skåne. In Lund, I have been fortunate enough to enjoy the hospitality of my friends Olof and Rebecca and staying with them has made my visits to Lund feel that much more meaningful.

While working on my thesis, I have shared an office with four colleagues whose company has been extremely enjoyable. During the first part of the thesis, I shared an office with Noor and Lisa, whose banter has been great fun to listen to and take part in. They have been great colleagues, both when they have been in the office and while away. During the second half of the thesis, I shared an office with Ulrika and Livia who have encouraged me to take the occasional break to focus on other things in life. I would also like to thank my parents for looking after Livia during the final stages of the thesis, enabling me to squeeze in a few hours of work here and there.

A special thank you goes out to Ulrika, who has been my number one supporter throughout this process.

List of papers

Paper I

Bondemark, A., Andersson, H., Wretstrand, A. & Brundell-Freij, K. (2020) Is it expensive to be poor? Public transport in Sweden. Transportation. https://doi.org/10.1007/s11116-020-10145-5

Paper II

Bondemark, A. (2020). The relationship between accessibility and price – The case of Swedish food stores. Journal of Transport Geography 82, 102615.

Paper III

Bondemark, A., Sundbergh, P., Tornberg, P. & Brundell-Freij, K. (2020). Do impact assessments influence transport plans? The case of Sweden. Transportation Research Part A: Policy and Practice 134, 52-64.

Paper IV

Bondemark, A., Andersson, H. & Brundell-Freij, K. (2020) Public preferences for distribution in the context of transport investments.

Resubmitted to Transportation Research Part A: Policy and Practice

Contribution statement

Paper I - Conceptualisation, Methodology, Formal Analysis, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization & Project Administration.

Paper III - Conceptualisation, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft & Writing – review & editing.

Paper IV - Conceptualisation, Methodology, Formal Analysis, Data Curation, Writing – Original Draft, Writing – Review & Editing & Project Administration.

Table of Contents

Introduction

Transport policy is riddled with goal conflicts. The presence of goal conflicts is by no means unique to transport policy but is an ever-present challenge in all aspects of public policy. In transport policy, we seek to maximise the transport system's benefits while minimising the adverse effects. Whether intentionally or unintentionally, our efforts to strike this balance will inevitably have distributional effects. It is these distributional effects that are the focus of this thesis.

To resolve goal conflicts, it is helpful to describe the conflicting goals and effects using a common language. Economics provides a theoretical framework within which different goals can be translated into such a common language. How individuals or groups of individuals choose between different goods, attributes and qualities is a fundamental aspect of economics. In the words of Swedish economist Assar Lindbeck: "Economics is to choose". This being the case, economics is the primary theoretical framework used in this thesis. That said, as the issues discussed here can be analysed from various perspectives, I will also borrow from elsewhere.

Aim

This aim of this thesis is to contribute to the understanding of goal conflicts in transport policy by describing and discussing questions related to the distribution of costs and benefits in the transport sector. To this end, I have identified two overarching research themes.

The first and second paper in the thesis address the first of these themes, while the third and fourth address the second.

What are the distributional outcomes of the transport system?

If we are to understand goal conflicts related to the distribution of costs and benefits, we must understand which distributional outcomes the transport system generates. Only when we understand the effects of policy do we possess the tools to shape it to deal with the goal conflicts adequately. Understanding distributional outcomes is a massive task, and the first overarching research theme of this thesis is to contribute to this understanding.

How do different actors incorporate distributional considerations into the allocation of infrastructure investments?

Understanding the distributional outcome of transport policy is only one part of understanding goal conflicts. Another aspect is understanding the prioritisations the various actors make based on their own understanding of the problem. Once we understand how distributional considerations affect their priorities, we can provide them with the knowledge to help them understand how their choices align with their intentions. In this thesis, I focus on how actors prioritise when allocating real or hypothetical infrastructure investments.

Disposition

The first chapter of the thesis provides background on public intervention in the transport system: what are the motivations and tools? The chapter ends with an introduction to the research questions posed in each of the four papers.

The second chapter introduces the central concepts explored in the thesis, firstly by giving an account of and discussing the transport system's primary output, accessibility, and secondly by presenting and discussing four dimensions of choice that correspond to the discussion of each of the papers.

The third chapter is a presentation and discussion of the data and methods used in the papers.

The fourth chapter contains summaries of each paper and discussions of and expansions on their results and contributions from various perspectives.

In the fifth chapter, I discuss the thesis' contribution given its aim and overarching research questions.

In the sixth and final chapter, I reflect on two issues that, although not thoroughly discussed in the thesis, have significant implications for its aim.

Background

Why do we maintain transport systems? Small transport systems can be maintained organically. A transport system of paths and minor roads in an ancient Mesopotamian or a ninth-century Viking village may well have developed without any real intention, while more complex transport systems are built and maintained for a reason. Historically, rather than transporting people, the reason has been to facilitate trade or imperial cohesion, as was the case with Greek trading outposts (Krämer 2016), Persian roads (Colburn 2013), Roman roads, bridges and ships (Söderberg 2015), Dutch ports (van Ittersum 2010) and early British railroads (Donaldsson 2018).

Historically, transport costs were high, especially in Sweden where distances between towns and villages could be vast (Andersson-Skog 2006). As such, most people did not travel far and the few who did were engaged in war, pilgrimage, migration, or trade. Technological advances during the nineteenth and twentieth centuries, specifically the advent of the railways and cars, increased the speed of travel (Andersson & Strömquist 1988) and the average length of journeys (Monroe & Maziarz 1985, Frändberg & Vilhelmsson 2011), as illustrated in Figure 1. This increased accessibility provided greater access to opportunities and led to considerable welfare gains (Leunig 2006).

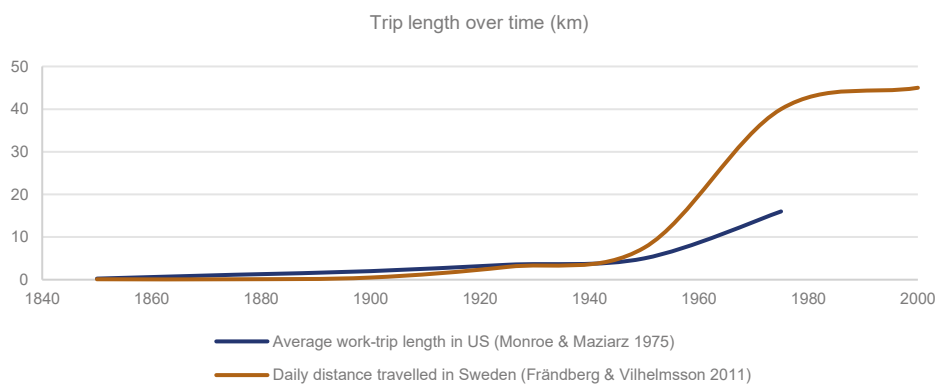


Figure 1 - Distance travelled over time. Adaptation of Monroe & Maziarz (1975) and Frändberg & Vilhelmsson (2011)

The railways also brought with them more even prices (Donaldsson 2018). Reduced transport costs decreased the importance of basing production close to natural resources, facilitating a concentration of production and increased specialisation (Glaeser & Kohlhase 2004). Factories could grow larger and industries could coalesce, sharing workforces and infrastructure and increasing output. Increasing demand for labour raised the wages paid in cities, fuelling urbanisation (Bengtsson 1990).

This increased specialisation and the introduction of public transport gave rise to commuting. Before 1900, even in cities most people lived close to where they worked (Heblish et al. 2018). With the advent of commuting, it became possible for workers to live further from the workplace and to specialise to a greater extent. In Stockholm, this is exemplified by the emergence and growth of suburbs such as Bromma, Hägersten, Täby, Enskede and later Vällingby and Farsta (Kallstenius 2010). In the 1950s, the emergence of the automobile as the dominant mode of transport led to not only an explosion in accessibility but also a shift in the transport system away from public transport and towards individual modes of transport and individual ownership of the means of transport.

The car enabled swift suburbanisation (Baum-Snow 2007). In North America, this had a significant social impact as those who could afford to do so moved to the suburbs, leaving those without the financial means to concentrate in the inner cities (Mieszkowski & Mills 1993). Today, larger cities tend to be more productive than smaller ones (Combes & Gobillon 2015). In modern cities, most people live far from their place of work, while their recreational activities may take place anywhere across the city or beyond its limits. This dispersion of activities entails considerable amounts of time spent commuting (38 minutes per day in Sweden, 50 minutes in North America) (Redding & Turner 2015), and a significant amount of household expenditure on transport (12 per cent in Sweden, 15 per cent in North America) (ibid.). One important reason for building and maintaining transport systems is to facilitate these trips and reap the positive benefits they entail.

It is not simply that technological innovations such as railways and cars and the transport policies we adopt to govern them have the potential to increase welfare; the technological innovations, investments, subsidies, and taxes related to transport also entail a redistribution of welfare as they impact the spatial distribution of activities and, ultimately, opportunities.

Public intervention in transport systems

In the following section, I will provide an overview of public intervention in transport systems, i.e. transport policy. This overview centres around four main themes that correspond to the papers included in this thesis: externalities (Paper II),

transport as a tool for regional and social cohesion (Paper I), acceptance of transport policy (Paper IV), and the allocation of transport infrastructure (Paper III). The aim of this section is to provide an overview and fundamental understanding of the issues addressed in these papers.

Externalities

The concept of externalities – i.e. the impact of the consumption of goods or service on third parties – is essential to economics and transport policy. One example is congestion, which results from large volumes of traffic and high costs of increasing capacity (Vickery 1969). Congestion means that drivers increase journey times for other drivers, lowering the overall efficiency of the system and decreasing accessibility. Congestion is however far from the only externality emanating from the transport system: local air and noise pollution, greenhouse gas emissions and accidents are examples of other negative externalities (Calthrop & Proost 1998, Parry et al. 2007). While such externalities are an important motivation for public intervention in transport (i.e. transport policy), they are not the only one. There are also positive externalities to consider.

According to economic theory, negative externalities result in excess consumption relative to the social optimum since the consumer faces a price lower than the social price. Transport policy has typically dealt with this problem in one of three ways. The first of these is by imposing rules or prohibitions; for example, speed limits can reduce negative externalities such as emissions and traffic accidents. That said, rules and prohibitions often lead to inefficiencies. The speed limit applies to everyone, even those who would be willing to pay a significant sum to break it (assuming the separation of regulation and enforcement), but we may prefer to impose the prohibition because we simply feel that traffic safety outweighs the benefits to individuals of arriving at their destination as quickly as they might like.

The second way in which we can control negative externalities is pricing. In the absence of pricing the cost of some goods, such as driving a car, is too low when taking into account the social costs. Without pricing, the consumer is not paying for the costs incurred on those not benefiting from the car, such as emissions and the risk of traffic accidents. To correct this discrepancy, we impose taxes on cars and fuel to bring demand closer to the social optimum (Baumol 1972). Ideally, we would like to tax the one emission or action that gives rise to the externality, i.e. the first-best policy, but this is very difficult to achieve in the real world. While we can tax fuel based on how much carbon dioxide it will emit, historically we have not had the technical or legal means to tax driving fast on dangerous roads any differently than driving slowly on safe roads. Instead, we have resigned ourselves to the difficulties and resorted to second-best policies, i.e. imposing taxes that do not perfectly reflect the externality. Swedish fuel taxes are one example of this (ignoring the fiscal aspect). As fuel taxes in Sweden are higher than the marginal cost of

burning the fuel, they also cover other external costs such as traffic accidents and noise pollution (Wang et al. 2019, Transport Analysis 2020). Although these taxes do not capture external costs perfectly, they do to some extent reflect these externalities since fuel is related to driving and driving is related to accidents.

One significant problem with pricing is that public acceptance of pricing as a policy instrument is generally low (Schade & Schlag 2003). The public tends to be far more accepting of the carrot than the stick (Schade 2003, Eriksson et al. 2008), which brings us to our third means of reducing externalities: offering incentives to make less polluting or harmful options more appealing. By doing so – for example, by investing in improving or subsidising public transport – more people choose public transport over going by car, thereby reducing congestion. The problem with this method is that building new infrastructure or subsidising public transport is generally an expensive business.

The message from the above discussion is that, in most cases, it is more efficient to ensure that the transport system is correctly priced than to build new infrastructure or increase subsidies. This is not to say that we should never build infrastructure but, without efficient pricing (given that prices are too low), we will build to accommodate an excessive demand for infrastructure. There are however good reasons to subsidise parts of the transport system, such as positive externalities.

The mother of all positive externalities in the transport sector is the Mohring effect (Mohring 1972). The Mohring effect implies that there are economies of scale in public transport. Without subsidies, too few people will use public transport. Subsidies in the form of lowers fares or better supply will increase passenger numbers and the provider will have to operate more buses to accommodate demand. This additional traffic will increase the frequency of services and benefit existing passengers. New passengers therefore provide positive externalities for existing passengers. There are however also negative externalities in terms of longer boarding and alighting (dwelling) times as well as crowding (Kraus 1991).

Positive externalities also arise in other markets, most notably through the positive effects of agglomeration on productivity. Agglomeration economies are a product of density and size, either through short distances or a developed transport system, reducing the cost of distance (Börjesson 2019). At a certain point, agglomeration economies through urban densification can no longer increase without a developed transport system. Improvements to transport systems are thus essential to realising the benefits of agglomeration. The benefits of agglomeration are, therefore, often an important motivation for developing the transport system. According to Graham (2007) and Melo et al. (2013), agglomeration economies differ from one sector to the next and are more significant in more knowledge-intensive sectors. Melo et al. (2013) show that the agglomeration economies accruing from road investments are more significant than those from rail investments. Holmgren and Merkel (2017) put a finer point on this by showing that agglomeration economies from rail investments

are higher for services but lower for other sectors. Chatman & Noland (2011), however, argue that most studies fail to consider the urban densification that public transport enables and that public transport improvements may create agglomeration economies in many ways.

Duranton & Puga (2004) divide the effects of agglomeration on productivity into sharing, matching, and learning. Duranton & Puga (2004) argue that one important reason for cities to exist in the first place is the indivisibility of some goods and services, for example, courts, hospitals, and amenities such as theatres. In large agglomerations, producers can share the inputs and thus reduce costs. Larger agglomerations also allow for more diverse inputs, individual specialisation and risk-sharing, to the benefit of producers.

While matching is one mechanism through which agglomeration economies are achieved, it is not a positive externality since consumers (in this case commuters) internalise the costs and benefits of commuting when choosing a workplace (Eliasson & Fosgerau 2019). Matching refers to the increase in productivity that results from people without a job finding one (Norman et al. 2017) or those with a job finding one that better suits their skill set, resulting in a higher wage (Combes & Gobillion 2015). The effect of improvements in the transport system on labour supply does not appear to be that large in already developed transport systems (Gutiérrez-i-Puigarnau & van Ommeren 2015, Börjesson, M., Isacsson, G., Andersson, M. & Anderstig, C. 2019).

Learning is all about the generation and diffusion of knowledge. Duranton & Puga (2004) argue that many of the interactions related to learning have a face-to-face nature and therefore need agglomerations to occur. It is also the mechanism of the three that we have the least understanding of (Puga 2010). Duranton & Puga (2001) develop a model in which young firms can use the diversity found in cities in terms of the workforce and financing opportunities to learn from one another and experiment, thereby generating knowledge. They find empirical support for their model in French data. Others oppose the idea that cities are more innovative than other places and argue that the increased innovation found in cities is due to market power centralisation (Shearmur 2012). On diffusion, two influential studies (de la Roca & Puga 2014, de Costa & Overman 2014) find that workers accumulate knowledge in cities, making them more productive. Furthermore, they can take this knowledge with them if they relocate to places outside the city. The findings of Börjesson, Isacsson, Andersson & Anderstig (2019) suggest that accessibility between workplaces has a larger effect on productivity than accessibility between workplaces and workers, suggesting that sharing and learning are important mechanisms when explaining productivity in agglomerations.

Another way that accessibility improvements can positively affect the labour market is by reducing the monopsony firms exercise over workers, i.e. that firms pay less than the worker is worth since the worker cannot or will not find another job. Models

of monopsony are based on high search costs on the labour market (Boal & Ransom 1997). Monopsony can occur if workers are specialised, and few workplaces match their skillset, the classic example being nurses (Staiger et al. 2010), or if there are few employers; for example, on an island with a single employer, the employer can pay the islanders low wages because there are no other job opportunities available. If the government constructs a bridge to the mainland, the islanders gain access to mainland workplaces, thereby reducing the island firm's market power and increasing the wages. Interestingly, plant size is larger in denser labour markets, despite the fact that theory predicts smaller plants in denser labour markets, which according to Manning (2010) indicates monopsony.

There are also other positive externalities that can arise in markets outside the transport sector when accessibility is improved, one being a reduced monopoly on markets for goods. Several studies have examined the effects of spatial competition on pricing (ex. Cotterill 1986, Barron et al. 2004). These studies show a negative correlation between spatial competition and price. Weak spatial competition can arise if poor accessibility, either through an underdeveloped transport system or a rural location, results in local monopolies.

Transport as a tool for regional development and social cohesion

While all of the above reasoning regarding transport policy is from an economic perspective, there are of course other reasons for adopting various transport policy measures. That said, the theories underpinning these are often, if not always, the economic principles described above. Two recent Swedish studies (Stjernborg & Mattisson 2016, Johansson et al. 2017) review municipal and regional planning documents to shed light on the motivations of municipal and regional transport policymakers in Sweden.

Perhaps unsurprisingly, Stjernborg & Mattisson (2016) and Johansson et al. (2017) come to fairly similar conclusions. Some of the goals at regional level are very financially oriented as this is the level at which responsibility for maintaining public transport lies. However, there are also broader goals, two of which are to improve accessibility and lower environmental impact, both locally and globally. While these goals clearly have links to the economic motives discussed previously, this is not necessarily the case with other goals.

Stjernborg & Mattisson (2016) report that regional transport plans state that regional transport policy is intended to make everyday life easier and the region more attractive and polycentric and to counteract segregation. They find that these themes are also present on a municipal level. All of these themes are interesting in various ways, one being the role of infrastructure in regional development.

Aside from the long-term economic impact, the effect of infrastructure on regional development as described earlier is twofold. First, like any other public investment,

there is the direct effect of investment. Whenever public (or private) funds are invested in local infrastructure, there will generally be a short-term increase in employment, not only in the construction sector but also as a result of spillover into other sectors (Leigh & Neill 2011). In economics, such effects are referred to as the *multipliers*. In a working paper written for the Swedish Institute of Economic Research, Hjelm & Stockhammar (2016) studied the effect of public investments in Sweden and found that the GDP multiplier varied between 0.2 and 0.6, implying that each job created by public-sector investment results in between 0.2 and 0.6 private-sector jobs. This suggests that infrastructure investments can be used as a counter-cyclical economic tool to boost growth (and reduce unemployment) or merely a way of sustaining employment in a declining region. Baldwin Hess & Lombardi (2005) cite studies that argue that policymakers may find the direct effect on unemployment just as appealing as any improvements to accessibility that new infrastructure entails.

Another way infrastructure can be used in regional development on a more micro level is in conjunction with zoning. The attractiveness of housing, shops, offices, leisure facilities and industries depends on the ease with which their locations can be reached by people and goods (Glaeser & Kohlhase 2004). Because of this, the availability of transport can be a powerful tool in shaping land use. The underlying mechanism here is that the more accessibility to a location increases, the more attractive it will be to businesses and people, raising the rent that a property owner can charge, increasing property values and the willingness of developers to develop the land. Since developers are more motivated to develop areas affected by transport investments, planning authorities have more leverage when deciding on the characteristics of new development.

Planners are often keen to encourage developments that reduce the demand for travel, for example by increasing density and promoting mixed-use. Empirical results show that urban density correlates with car use at a macro level (Kenworthy & Laube 1999). However, urban characteristics such as mixed-use do not always have a major impact on car use, public transport and walking (Ewing & Cervero 2010).

Planners can also encourage development around public transport hubs, so-called transit-oriented development. Transit-oriented development makes it easier to provide these areas with public transport and harness the Mohring effect. Two notable examples of transit-oriented development are Stockholm (Cervero 1995) and Copenhagen (Knowles 2012). Papa & Bertolini (2015) studied the relationship between transit-oriented development and accessibility in six European cities and found a positive relationship between the two. Transport-oriented development also makes it easier to achieve a sufficiently dense urban environment around the hub to create the necessary demand to support services, which in turn lowers the demand for motorised means of transport (Naess 2012), a result also found in the United States (Nasri & Zhang 2014). Although these dense urban environments result in

higher housing prices and rents, these are offset by lower transport costs. The same is not true for less dense and walkable areas, where lower transport costs do not offset higher housing costs to the same extent (Rennet et al. 2016).

In their study of Shanghai, Cervero & Day (2008) find that the recent suburbanisation and motorisation has led to increased congestion and decreased accessibility, they also propose that transit-oriented development could offer a solution to these issues. However, transit-oriented development is not necessarily easy to achive. Cervero & Dai (2014) offer a survey of 119 bus rapid transit (BRT) systems and transit-oriented development, concluding that introducing BRT alone is insufficient to spur the desired land use changes without other active measures. These results are echoed in the findings of Te Brömmelstroet & Bertolini (2009) from the Netherlands.

Another goal reported by Stjernborg & Mattisson (2016) is that some regions and municipalities use, or at least attempt to use, transport policy to increase equality and reduce segregation. In a Swedish context, this is in line with a history of using public transport to provide some level of basic accessibility to everyone (Ljungberg 2013). However, this reasoning is by no means limited to Sweden (Bondemark et al. 2020).

The relationship between transport and social disadvantage[1] has been studied extensively. How the travel patterns, or perceived mobility, of those with various physical and cognitive constraints respond to changes in the physical environment and how they use the mobility resources available to them – public transport, for example – has been studied by Wennberg et al. (2010), Engels & Liu (2011), Ryan et al. (2015) and Hallgrimsdotter & Ståhl (2018) among others. There is also a literature on socioeconomic variations in access to various essential goods, most notably grocery stores and healthy foods (Smoyer-Tomic 2006, Paez et al. 2010, Widener et al. 2015, Kolodinsky 2017, Allcott et al. 2019), but also to retail outlets in general (Schuets et al. 2012).

A related strand of literature deals with the impact of transport on financial outcomes and labour market participation. One example of such a study is Norman et al. (2017) who, based on Swedish data, find that increased accessibility lowers unemployment for low skilled workers. Several American studies focus explicitly on the effect of car ownership (Baum 2009, Gautier & Zenou 2010) or car access (Gurley & Bruce 2005). These studies all find that car ownership or access reduces the likelihood of unemployment. In a recent meta-study of the impact on transport opportunities and employment, Bastiaanssen et al. (2020) corroborate the American studies and find a positive association between access to transport opprotuntites, particularly car access, and employment. Gautier & Zenou (2010) study how initial

[1] Exemplified by Jones & Lucas (2012) as the lack of resources such as skills, income, job, health & housing.

wealth differences between ethnic minorities and whites in the United States result in lower car access among minorities and thus reduce access to labour markets. There are also reviews of other aspects of the relationship between transport and social outcomes, such as Jones & Lucas (2012).

Acceptance of transport policy

The importance of transport access and its positive and negative effects has spurred a great deal of research into the determinants of how taxes and subsidies are implemented and where infrastructure is allocated. Reasons for implementing corrective taxes and subsidies have been discussed above. Other, more pragmatic, reasons for collecting taxes include meeting rising costs or a desire to maintain supply when demand is declining (Baldwin Hess & Lombardi 2005). Regardless of why a policy is implemented, public acceptance is necessary. Most of the literature on the acceptance of transport policy instruments has focused on the willingness to pay taxes. It is that literature I will present in this section.

One of the most important taxes imposed on the transport sector, fuel tax, was initially imposed as a way of generating revenue. Brown et al. (2009) describes the symbiosis between the ability to collect taxes from cars and the expansion of highways in America during the twentieth century. In Sweden, fuel taxes were introduced in the 1920s, energy tax in 1957 and carbon tax in 1991 (Shmelev & Speck 2018).

Carbon emissions are a significant externality arising from transport. Despite being upheld as the most efficient way of tackling climate externalities in the transport sector (and other sectors) (Stern 2008, Acemoglu et al. 2012), by 2019 few countries had implemented carbon taxes (World Bank Group 2019). While some countries, most notably in Europe, have introduced other means of pricing carbon, specifically emission trading schemes, these do not cover the transport sector. The name of the tax, whether it be fuel tax or carbon tax, is perhaps less critical than ensuring that it is at the right level. Nonetheless, it has proven difficult to estimate the social cost (Nordhaus 2018) and, to implement the taxes (Kallbekken & Sælen 2011, Pizler & Sexton 2019). The same is true of congestion charges which, despite being widely regarded as the best way to tackle urban congestion (de Palma & Lindsey 2011), have thus far been implemented in only a few cities.

A good deal of research has been conducted into why these efficient taxes are not implemented. Perhaps unsurprisingly, Voonk Noordegraaf et al. (2014) find that political and public support is essential when implementing congestion charges. Andersson, Brundell-Freij, Jonsson & Vourenmaa Berdica (2017) review the literature on tax acceptance in the transport sector, dividing acceptance into public, industry and media acceptance. Relatively speaking, industry acceptance is perhaps more important to rail, shipping and air traffic, where companies typically pay the

taxes/charges. Taxes on road traffic, on the other hand, are to a larger extent directly paid for by the public. Perhaps because of this, there is a significant body of literature regarding public acceptance of above all environmental taxes, but also congestion charges.

Kallbekken & Sælen (2011) study how three factors influence support for corrective fuel tax: self-interest, environmental concerns and distributional impacts. They find that environmental concern is the most important, followed by distributional impacts. Their finding that self-interest is the least important factor when deciding on whether to support environmental taxes is similar to findings by Eliasson & Jonsson (2011) and Börjesson et al. (2015) in the context of congestion charges. Pizler & Sexton (2019) emphasise that the fact that corrective taxes tend to be (although are not always) regressive may go some way to explaining why public support for them is low. In contrast, Eliasson et al. (2018), find that different types of Swedish car taxes are progressive over most of the income distribution but that the tax burden is very unevenly distributed in the urban-rural dimension and those with the lowest incomes suffer a relatively larger welfare loss. Related to the distributional impact of taxes, Eliasson (2016) contends that if the taxes are corrective, the distributional impacts are less relevant than if they are fiscal. He argues that, in the case of fiscal taxes, it is difficult to argue that those with low incomes should contribute proportionally more than those with higher incomes.

Börjesson et al. (2016) review the impact of experience on acceptance of the Gothenburg congestion charge, arguing that one important reason why acceptance rose after implementation – a phenomenon also observed in Stockholm – is that people simply do not like change and prefer the status quo. The status quo bias could also be interpreted as a reason why people opposed the charges in the first place. Börjesson et al. (2016) also find that other improvements in the transport system, specifically improved bus services, increased acceptance of the charges, albeit to a very limited extent. That revenue recycling increases tax acceptance is something that other studies also have pointed to (Hsu et al. 2008, Kallbekken et al. 2011, Andersson, Brundell-Freij, Jonsson & Vourenmaa Berdica 2017). However, it might also be the case that, at least in part, people like earmarked taxes because they benefit from the tax in question or believe that they are efficient (Sælen & Kallbekken 2011).

There is also a literature on what determines acceptance of taxes in general. Using American data, Glaser & Hildreth (1999) examine the connection between public perceptions of government performance when supplying public services and their willingness to pay taxes. They identify a link between a positive perception of public-sector performance and willingness to pay. Oh & Hong (2012) arrive at similar conclusions using a theoretical model, while Collins & Kim (2009) find the opposite in American data indicating that citizens may be willing to pay taxes to solve public problems. Hammar & Jagers (2006) study how attitudes towards carbon taxes are influenced by trust in politicians and find a significant positive

relationship. Within the high-trust group, they find no statistical difference between those with and those without access to a car. Similar results are found in studies of willingness to pay various types of taxes (Andersson 2017). In another article, Hammar et al. (2009) study several different taxes and arrive at similar conclusions to Hammar & Jagers (2006). Those who do not trust their fellow citizens are also more likely to think that others are evading taxes. Perceptions about how others pay their taxes have been shown to impact both individual tax compliance and acceptance (Luttmer & Singhal 2014).

Allocation of transport infrastructure

Numerous studies have also examined which factors determine whether an infrastructure project gets built. One part of this literature is centred around the role of cost-benefit analysis, beginning with the papers by McFadden (1975, 1976) in which he examines what role cost-benefit analysis played in the allocation of highways in California. Subsequent to McFadden's studies, other studies have been conducted in Sweden (Nilsson 1991, Eliasson & Lundberg 2012), Norway (Odeck 1996, Fridstrøm & Elvik 1997, Odeck 2010), the United Kingdom (Nellthorp & Mackie 2000) and the Netherlands (Annema et al. 2007, Annema et al. 2017), the results of which can best be summarised as mixed. Perhaps because of these mixed results, the question of how policymakers use cost-benefit analyses has developed into a separate field of research (Nyborg 1998, Mouter et al. 2013, Mouter 2017). The findings from this literature are reasonably consistent. Policymakers find cost-benefit analysis to be useful for listing the pros and cons of a project and as a screening tool, while acknowledging that it is an incomplete tool that does not capture all of the projects' effects.

Another dimension of public investment in general is the potential for pork-barrelling, i.e. the practice of elected officials rewarding those who voted for them or attempting to convince people to do so by appropriating public funds. There has been some debate as to whether, and under which circumstances, such behaviour may arise (Shepsle & Weingast 1981). Using US data, Stein & Bickers (1994) find evidence of this behaviour among electorally vulnerable members of Congress, but that only well-informed voters seem to reward it. In the context of infrastructure investments, Cadot et al. (2006) find indications of this behaviour in France and Eliasson et al. (2015) in Sweden and Norway.

A special case is presented by large-scale, complex infrastructure investments, or *megaprojects*. Flyvbjerg (2014) contends that the cost of such megaprojects are systematically underestimated while the benefits are systematically overestimated. This is exemplified in the recent Swedish debate on high-speed rail by the project management's attempt to disregard costs entirely in its benefits analysis (Ronnle 2017), focusing instead on establishing a positive narrative about the project (Ronnle 2019). The fact that certain projects manage to garner support by

establishing a successful narrative could be an important factor in explaining which projects obtain funding. Eliasson & Lundberg (2012) found that municipal cofinancing increases a project's chances of being selected for the Swedish national infrastructure plan, which could be interpreted as an example of this.

One last important transport policy objective in many countries is spatial cohesion, or balanced regional development (López et al. 2008, Condeço-Melhorado et al. 2011, Pike et al. 2017). This is also an explicit objective of the European Union (Clifton et al. 2016). López et al. (2008) note that it is somewhat unclear what cohesion entails. Interestingly, this reason for building and maintaining transport systems is similar to those in ancient Rome and Achaemenid Persia, albeit in a different form.

Research questions

Based on the literature discussed in the previous section, I have identified two themes and four specific research questions to be addressed by the papers included in this thesis. Papers I and II relate to the first theme, *What are the distributional outcomes of the transport system?*. Papers III and IV relate to the second, *How do different actors incorporate distributional considerations into the allocation of infrastructure investments?* In this section, I will briefly present the background to each question and the question itself.

What are the distributional outcomes of the transport system?

Research question 1

The first research question concerns how effectively public transport subsidies improve accessibility for those on low incomes, an explicit goal of many public transport systems. The question is based on a phenomenon described in qualitative studies (Preston & Raje 2007, Isaksson 2010, Lucas 2011, Blumenberg & Weinstein Agrawal 2014). People on low incomes report that they cannot afford to buy weekly, monthly or annual travelcards for public transport and instead either rely on single tickets, meaning they pay more per journey, or refrain from travelling. Few quantitative studies address this issue, and the only paper explicitly devoted to the issue (Verbich & El-Geneidy 2017) uses neighbourhood data. Exploring this question using individual data could provide further knowledge.

R1: Can income explain travelcard possession among those for whom it would have been the cheapest ticket?

Research question 2

The second research question concerns the impact of the transport system on markets outside the transport sector. As described previously, the transport system has substantial effects on the labour and housing markets, as well as the retail sector. Although the retail sector has attracted less attention than labour and housing, there are some studies of food and vehicle fuels and their relation to spatial competition. These studies have primarily studied the effect of spatial competition, i.e. the number and characteristics of nearby competitors and market structure (Cotterill 1986, Asplund & Friberg 2002, Barron et al. 2006, Deltas 2008, Gullstrand & Jörgensen 2012). Some studies also use a urban/rural dichotomy (Ambrose 1979, Gibson & Kim 2013, Anania & Nisticò 2014). It is difficult to find studies that attempt to explain variations in the price of goods through accessibility and the few that do (Jimenez & Perdiguero 2011) use very crude measurements of accessibility. The possibility of gaining a better understanding of the interplay between accessibility and goods prices is therefore worth exploring.

R2: How does accessibility explain spatial variations in the price of goods?

How do different actors incorporate distributional considerations into the allocation of infrastructure investments?

Research question 3

The third research question concerns how the benefits of the transport system are allocated. The allocation of transport investments has been studied by Eliasson & Lundberg (2012) and Eliasson et al. (2015) among others. These studies focused on *where* investments were made, which is positively correlated with who benefits from them. Since then, the method used for impact assessments has been developed to better describe the distributional effects. Given the mixed results of the implementation of CBAs, exploring how distributional considerations play a role in allocating infrastructure could provide further insights.

R3: What distributional considerations can explain which objects the Swedish Transport Administration proposes for investment within the framework of the Swedish national infrastructure plan?

Research question 4

The wishes of public authorities regarding where infrastructure investment should be allocated is one thing, how the government allocates it something else entirely. A third question is the wishes of citizens regarding where such investments should be allocated. As with many other policy areas, citizens are rarely directly involved in infrastructure policy; instead, their preferences are represented through the political system. Citizen preferences for infrastructure allocation have attracted far

less attention than, for example, their willingness to pay various taxes. A few Dutch studies have examined how people value journey time and travel safety in their role as citizens as opposed to their role as travellers/consumers (Mouter et al. 2017a) and their preferences for spatial distributions of these benefits (Mouter et al. 2017b). How citizen preferences for the distribution of transport benefits vary in other dimensions, such as income, and how they would deal with conflicts between different dimensions remains unresearched.

R4: What are the preferences of citizens for distributing the benefits of infrastructure investments in various dimensions?

Central concepts

In this section, I discuss accessibility and choice, two concepts central to this thesis: accessibility, as it is the main output of the transport system, and thus often the good being distributed; and choice, as all four papers study choice from various perspectives.

Accessibility

As noted previously, accessibility is the main output of the transport system. The two papers that focus on the distributional outcomes of the transport system deal with accessibility in different ways. Paper I looks at one important component of accessibility, the cost of travel, while Paper II explicitly studies accessibility. In Papers III and IV, while accessibility is not discussed explicitly, it is ultimately the good being distributed. In this section, I will describe the concept of accessibility and how it can be represented.

Many studies try to make sense of accessibility by defining and categorising it. In one influential paper by Geurs & van Wee (2004), accessibility is defined as *the extent to which land-use and transport enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)*. While this might be easy to agree upon, it is much harder to measure. Geurs & van Wee (2004) divide accessibility into four components: land-use, transport, temporal and individual. They also divide accessibility indicators[2] into four types: infrastructure-based, location-based, person-based, and utility-based. Their structure is the one I will use in this section. Even if there are other definitions and categorisations of accessibility.

Infrastructure-based indicators

Infrastructure-based indicators refer to indicators of the quality of the infrastructure. As examples of infrastructure-based indicators, Geurs & van Wee (2004) list

[2] Because of accessibility's inherently abstract nature we cannot measure it directly, instead we rely on indicators that attempt to describe the "true" accessibility.

indicators such as the level of congestion and the average speed in the road network. These types of indicators are typically used in transport planning and can also encompass public transport, such as the common goal of increasing the average speed of inner-city buses.

The benefits of infrastructure-based indicators are that they are easy to construct and easy to interpret. The main drawback is that they do not tell us that much about the level of accessibility. Average speed on the roads can be improved by redirecting traffic to travel longer distances on faster roads, to the detriment of the individuals' ability to reach their destination.

Location-based indicators

A location-based indicator describes how easy it is to reach a given location or how easy it is to reach other places from that location. The most basic type of location-based indicator might involve describing the balance between the residents and jobs in a zone, i.e. a self-sufficiency indicator (Weibull 1976). However, one might also use an indicator of the spatial density of opportunities in a zone. If we develop indicators that acknowledge that people interact over zone boundaries, we obtain more reasonable location-based indicators. There are typically three elements of location-based indicators: the destinations, the features of those, and the cost of getting there (Geurs & van Wee 2004).

The type of destination, or rather the purpose of the trip, determines how to measure the supply. There are two extreme cases: strictly additive and strictly maxitive destinations (Weibull 1980). If a destination is strictly additive, this implies that people want access to as many of these destinations as possible. The typical example of a very additive destination is employment opportunities. The other extreme is strictly maxitive destinations where the individual only desires one destination but wants that destination to be as good as possible; for example, a hospital.

The measurement of travel cost

How easy it is to get to a destination can be translated into the cost of reaching the destination. The cost element of location-based accessibility indicators has attracted much attention and can be measured in several ways. Which of these is most suitable depends on the type of destination. There are two parts to the measurement of cost: firstly, the currency used to measure cost and, secondly, the metric used to determine access.

The currency used to describe cost is often distance or time. Even if distance is easily measured and immediately applicable to travel, for most people it is not a limiting factor in the same way that time is. If a destination is too far away, the issue is not that you cannot reach it but that it takes too much time to do so. The simplest measure of distance is Euclidean distance, which is both easy to measure and to

explain. The problem with Euclidean distance is that, as it is rarely possible to travel in a straight line, it is not a very good representation of how long a journey is. One solution to this is to multiply the Euclidean distance by a factor that reflects how far away something is should you follow the roads. However, every city is different; in cities such as Paris or Houston, which are relatively uninterrupted by natural features, this might work quite well, but in cities such as Stockholm or Hong Kong, divided by natural features with few crossing points, such approximations are less accurate. The best way to incorporate distance is to somehow represent the real-world transport system so that distances reflect actual transport opportunities. The transport system is also the best way to incorporate time, as this enables the analyst to consider the varying speeds of different modes of transport. However, as Geurs & van Wee (2004) note, not everyone has access to a transport model, even though these are more widely available today than they were in 2004.

Generalised cost of travel

Time is not the only expense associated with transport. Some journeys have a direct monetary cost, for example, for fuel or a ticket. To make the cost of journeys associated with different combinations of expense in terms of time and money comparable, we must convert one into the other – usually time into money. This combined expense is called the generalised cost of travel.

To convert time into money, we must assign a value to time. The concept of the value of time builds on the theories of Becker (1965) and de Serpa (1971). These papers show that there is a trade-off between money and time that makes it possible to place a monetary value on time. The value of time is a central concept in present-day transport policy, especially in cost-benefit analyses, where it is defined as the opportunity cost of time minus the utility of travel time divided by the marginal utility of money (Börjesson & Eliasson 2014). While a given journey might take different individuals the same amount of time, there may be a significant disparity in the cost in terms of lost opportunities during the time spent travelling and the marginal utility of money, and thus the value, of time, both between individuals and for the same individual at various times. The disparity between individuals may be due to their domestic circumstances, employment and income (Börjesson & Eliasson 2014). That the value of time increases with income is a common finding (Fosgearu 2006, Axhausen et al. 2008, Abrantes & Wardman 2011), consistent with the idea of diminishing marginal utility of income. The disparity for an individual at different times may depend on factors such as variations in the opportunity cost of time (are you in a hurry?) or utility of travel time (mode, comfort, etc.) (Mackie et al. 2001, Abrantes & Wardman 2011), which can also differ between individuals.

While it is perfectly feasible to apply generalised costs to location-based indicators, they are rarely used. In their literature review of location-based accessibility indicators, the papers listed by Paez et al. (2012) almost exclusively use time or

distance as the cost component, with the generalised cost more often encountered as a critical component of utility-based indicators, something we will examine later.

The measurement of access to destinations

Another issue, and one that can be addressed in a number of ways, is how to measure access to destinations. Geurs & van Wee (2004) divide these into distance indicators (e.g. the number of opportunities within 5 km, or distance to the nearest hospital) and potential accessibility indicators (also known as gravity-based indicators). Paez et al. (2012) divide them into normative and positive indicators. Normative indicators, which are mostly distance-based, are those without a behavioural component. Positive indicators, those with a behavioural component, are mostly various types of potential accessibility indicators.

Potential accessibility indicators, which have been in use for quite some time (e.g. Hansen 1959), weight destinations based on the cost of reaching them. The destinations can then be multiplied with their respective weights to yield the accessibility of the origin. The functions used to allocate weights assign less weight to destinations that are more costly to reach. How much less is determined by the shape of the distance-decay function. Distance-decay functions are estimated from observed behaviour based on the intensity of interactions at different distances (costs) (ex. Halás et al. 2014). They can also have different functional forms (Martínez & Viegas 2013).

One issue with potential accessibility indicators is that they rarely consider competition over destinations. Competition is especially relevant when studying labour market accessibility. In an early study, Mattsson & Weibull (1981) conclude that an individual in a small labour market with less competition might have equally good access to jobs as an individual in a large labour market with stiff competition. Van Wee et al. (2001) include a measure of competition when studying access to Amsterdam's labour market and find that competition has a significant impact on accessibility. In another study, Cheng & Bertolini (2013) include competition for both jobs and mode of transport in a model to identify development potential in Amsterdam.

Person based indicators

The emergence of person-based accessibility indicators is generally attributed to Hägerstrand (1970) and his space-time geography (Geurs & van Wee 2004). Person-based accessibility measures consider the individual characteristics of the traveller, such as physical, financial, or temporal limitations. Given those restrictions, person-based accessibility indicators can be defined in many ways.

One way to construct a person-based accessibility indicator is to impose individual-specific restrictions on location-based indicators; for example, access to a car or

other financial or physical limitations. Other types of person-based measures are more directly based on space-time principles, such as the space-time prisms used by Miller (1991) and Farber et al. (2013). One feature of space-time prisms is that they capture the individual's opportunities during a trip and therefore accommodate multipurpose trips. One such example is Widener et al. (2015) who, using a person-based measure, show that accessibility to supermarkets is much higher if the measure acknowledges that the individual can visit the supermarket on their way home from work, as opposed to assuming that the journey begins at home. Another example is the paper by Farber et al. (2013), which uses prisms to construct social interaction potentials, i.e. the possibility of interacting with other people if their paths cross. A third example is provided by Neutens et al. (2010), who study differences between various types of location-based and person-based indicators and find that even similar accessibility measures yield different conclusions regarding the distribution of accessibility.

A different perspective on person-based measures of accessibility is provided by perceived accessibility measures. Perceived accessibility has been applied when studying the concept of micro-accessibility (Wennberg et al. 2010), i.e. how difficult it is to use the transport system. The concept have been applied to study how accessible the transport system is to the elderly (Nordbakke & Schwanen 2015, Ryan et al. 2015) or those that cannot afford basic mobility tools (Smith et al. 2012). Perceived accessibility is based on peoples' perception of their accessibility. This concept is especially relevant when studying, for example, the elderly, who might not always utilise the accessibility available to them, making it relevant to understand if it is actually low accessibility that prevents them from travelling or if they simply have low demand for travel.

The type of accessibility defined at the beginning of this section is macro-accessibility, while micro-accessibility refers to how easy it is to use (or access) macro-accessibility. The concept of micro-accessibility might be perceived as irrelevant by some, given that most people have access to mobility tools such as a car and public transport that provide macro-accessibility. However, some people, such as the elderly, may find seemingly small obstacles such as a high kerb a formidable obstacle (Wennberg et al. 2018). Micro-accessibility is of interest when accessing the transport system constitutes a significant proportion of the total cost of making a trip. As difficulty accessing the transport system is hard to measure objectively, perceived person-based accessibility indicators provide a useful tool when assessing micro-accessibility.

Utility-based indicators

The final type of accessibility indicators discussed by Geurs & van Wee (2004) are utility-based indicators. Miller (2018) offers a definition of accessibility that describes the features of utility-based accessibility indicators rather well. He argues

that accessibility: varies from point to point in space; is specific to the purpose of the trip; combines the ease/difficulty of reaching the destination with the desirability of/opportunities available once there; is a measure of the potential to interact; and is a summation over the space of opportunities, weighted by the ease of interaction.

Certain location-based and person-based indicators fulfil some of these requirements. Those that use generalised costs cover the total cost of movement, while indicators that have some behavioural component, such as distance-decay functions, weight destinations according to the ease of reaching them. What sets utility-based models apart is that they directly address, or at least attempt to address, both the cost of reaching a destination and the benefits of doing so.

Since transport (demand) models are based on a utility framework, travel patterns used in these models include both costs and benefits. The benefit side of this equation is, however, often described in terms of size – for example, square metres of shops in Zone A – and could be improved (e.g. Kristoffersson et al. 2018). Demand models are therefore directly applicable when constructing utility-based indicators. One important feature of these models is that they capture the heterogeneity of travellers and the probabilistic nature of their transport choices, making them better at capturing the actual cost of travel than the deterministic travel times in some location-based indicators. Furthermore, since at least some transport models perform well when predicting travel demand (Eliasson et al. 2013), they appear to describe the utility of travel and cost of reaching destinations rather well, at least on an aggregate level.

One type of utility-based indicator is the *logsum* measure of accessibility, which describes the desirability of all available options (Geurs & van Wee 2004). Since the logsum considers all available options, additional options increase accessibility even if they are not as good as the best option (Eliasson 2001). This feature is a result of the random term in the logsum that accommodates preference heterogeneity. What appears to be the worst option from an analytical viewpoint may therefore be the best option for a given journey, thus contributing to the choice set's desirability, i.e. accessibility. Additionally, thanks to its functional form, the logsum indicator captures accessibility from additional options in a way that captures their diminishing marginal utility.

The cost component of utility-based indicators relies heavily on the value of time. In the previous description of the value of time, I noted that it is dependent on income. However, since utilitarianism stipulates that everyone should be given equal consideration regardless of how well-off they are (Sinnott-Armstrong 2019), I would argue that the analyst should not assign different values to time based on income when constructing utility-based accessibility indicators. When evaluating policy measures from an economic perspective however, it may be relevant to differentiate with regards to income. Börjesson & Eliasson (2014) argue that when the traveller themselves is paying it is the actual value of their time – i.e. based on

income – that should be used. Anderstig et al. (2016) study how congestion charges affect labour market outcomes accounting for heterogeneity in the value of time. They find that a reduction of labour market imperfections is a significant benefit of congestions charges that cannot be taken into account properly unless the value of time is linked to income.

The two papers in this thesis that focus on accessibility, Papers I and II, do so in different ways. Paper I studies accessibility through the price paid for journeys on public transport and how this differs with income, i.e., the cost component of accessibility. A higher price translates into lower levels of accessibility and is especially important for individuals on lower incomes (Bocarejo & Oviedo 2012, El-Geneidy et al. 2016). In Paper II, I use a logsum measure of accessibility to study spatial prices variations.

Choices

All the papers in this thesis analyse choices made by individuals or groups of individuals. Papers I, II and IV all study individual choices: Papers I and II in the role of consumer and Paper IV in the role of citizen. Papers II and III study choices made by groups of individuals. In Paper II, these groups are companies, while in Paper III, the group is an organisation, the Swedish Transport Administration.

The choices made by individuals as consumers are ticket purchases (Paper I) and the search for food prices (Paper II). In their capacity as citizens, the choices are between different infrastructure packages with different distributional profiles (Paper IV). As groups of individuals in the form of companies, the choices are related to price-setting (Paper II). As groups of individuals in the form of an organisation, the choices relate to proposing objects for investment in the Swedish national infrastructure plan (Paper III).

Table 1 - Overview of the choosing or deciding entity in each paper

ENTITY		CHOICES	PAPER
Individuals	Consumers	Purchases and search	I, II
	Citizens	Hypothetical choices between investment packages	IV
Groups of individuals	Organisations	Investment proposals	III
	Companies	Pricing behaviour	II

This section will provide a brief overview of theories relating to these various types of choices. This overview is divided into four subsections corresponding to the previous paragraph, i.e. choices by consumers, citizens, organisations and companies. Consumers and companies are treated as economic entities, and these sections are primarily centred around economic theory regarding how these entities interact with the world around them. Organisations and citizens will be based on

decision theory in a broader sense, with the emphasis on the inner workings of these entities.

Consumers

Preferences and utility

The foundation of the economic theory of consumer choice is found in utilitarianism, as described by Bentham as the pursuit of pleasure and the avoidance of pain (Crimmins 2019). This hedonism can be psychological, in that it relates to earthly pleasures and pains, or ethical, i.e. moral pleasures and pains. While models of consumer choice primarily deal with the former, whether directly or indirectly they also touch on the latter; indeed, in empirical analyses it is arguably not even possible to distinguish between preferences based on the striving for earthly or moral pleasures respectively (Miniard & Cohen 1981).

The concept used to describe pleasure and pain in economics is utility; however, as utility is unobservable, it is a somewhat problematic concept. Modern consumer theory instead focuses on consumer preferences, using utility as a tool to understand preferences, rather than the other way around (Varian 2014). In this framework, consumer preferences determine consumer choice and utility only determines the order of various consumption bundles, i.e. whether or not A prefers X to Y. Utility is treated as ordinal.

Economic theory makes a few critical assumptions about consumer preferences (Varian 1992). It assumes that they are complete and transitive, i.e., consumers know what they like and order the consumption bundles consistently. It also assumes that more is more. Completeness entails that individual A either thinks that X is at least as good as Y, or that Y is at least as good as X. Rational choice is therefore axiomatic in consumer theory (and to all other theories of decision-making relying on rational choice). If we observe that A chooses Y over X when we thought we knew that A prefers X to Y, we do not conclude that the consumer is irrational. Instead, we conclude that we do not fully understand the choice; for example: Could the consumer not afford X? Was the consumer unaware of X? These two questions will be the focus of the rest of this section.

Liquidity constraints

The price of goods and services is an important factor when choosing what to consume; after all, it is the pleasure the consumers get from consuming and the cost of doing so that determines which goods and services they purchase. While cost has no intrinsic value, the resources devoted to consuming a product have an opportunity cost consisting of foregoing the consumption of other products. Prices are not however the only factor determining what the consumer can afford; budget is also an important consideration, and this is determined by the endowment of the

individual, i.e., how much money does she or he have at their disposal. This in turn is determined by income, savings and borrowing.

Borrowing involves paying interest in order to increase one's consumption today, which can be useful if an individual has limited liquidity. In theory, the individual could avoid liquidity constraints by borrowing using future income as security (Friedman 1956). In real life, however, this is not always possible as borrowing is expensive, both in terms of effort and paying interest (Pissarides 1978).

In Paper I, we use liquidity constraints to explain why people for whom travelcards would be the least expensive option rely on single tickets. Liquidity constraints are not unique to public transport but are also found in other spending areas, such as investments in energy-saving measures (Trotta 2018, Schleich 2019) and durables (Alessie et al. 1997).

Searching for alternatives

The other question – whether the consumer is aware of all of their options – is another issue of theoretical importance. In order for A to have a preference for X over Y, A must be aware of the existence of both X and Y and know what they cost. How consumers search for information about availability and prices can be described in different ways. What unites economic theories about search is the common assumption that consumers aim to maximise utility.

One of the features of a *complete market* – a theoretical market used in economic analysis – is that there are no search costs. In real markets, however, there are many transaction costs, search costs being one (Dahlman 1979). While Stigler (1961) describes search as being a continuous process, there are other theories that regard search as a binary state: consumers are either searching or not. March (1994) describes models where search is failure-induced, i.e. no search is conducted until there is some failure (e.g. to find an acceptable price or to find the correct product). These models are satisficing. What unites all types of search models is that searching is costly.

There are many types of search models in consumer theory. Two prominent families of models are the sequential search models (satisfactory models are also sequential search models), such as Carlsson & McAfee (1983), and the models that employ an informed/uninformed dichotomy, such as the model proposed by Varian (1980).

In sequential search models, the consumer searches for information (for example, by visiting a store or a website). Once the consumer accesses the price of a product, she or he estimates the gain to be made from continuing the search, i.e. will the benefits outweigh the cost. If the answer is yes, the search continues until such time as the answer is no.

In models employing an informed/uninformed dichotomy, the informed consumer searches for prices, perhaps by accessing a clearinghouse or conducting a sequential

search, while the uninformed consumers purchase at random. An important finding from these kinds of models is that the share of informed consumers is essential for determining the market price. If a large share of consumers is informed, there are fewer uninformed consumers to whom sellers can charge higher prices, resulting in a lower price to appease the large share of informed consumers. Since transport costs contribute to the cost of search, we expect search costs to be inversely related to accessibility. In Paper II, I examine how accessibility is related to food prices in Swedish grocery stores.

Citizens

In simple economic models, individuals tend to be regarded as consumers acting rationally motivated by self-interest (Nyborg 2000). While this may be widely applicable, in some cases it is an oversimplification. One such case is when studying choices made by individuals in the role of citizen.

Citizen's considerations

So, how do people's choices as citizens differ from those made as consumers? There are several ways to define when someone is making choices as a citizen. Regardless of how citizen preferences are identified, studies that have examined citizen preferences typically find that they have several components. In the case of the willingness to pay taxes, these include the perceived effectiveness of the tax in question, the perceived severity of the problem it aims to tackle, and whether the tax is perceived to be fair (Kallbekken & Sælen 2011, Eliasson & Jonsson 2011, Börjesson et al. 2015). There are also studies, such as Hammar et al. (2008), that find that self-interest is an important factor. However, as Andersson, Brundell-Freij, Jonsson & Vourenmaa Berdica (2017) note, attributes that would explain self-interest can be highly correlated with political preferences and perceptions about fairness.

One way to distinguish citizen preferences from private preferences is to regard citizen preferences as consumer preferences with altruism (Curtis & McConnell 2002), but there are also others. One is the distinction used by Nyborg (2000). She states that, as a consumer, the individual makes choices that maximise his or her utility, while as a citizen, the individual's choices are based on what she or he considers best for society. Another way to make the distinction is based on the vehicle of payment. Mouter & Chorus (2016) use this distinction and define citizen preferences as the preferences for allocating public funds.

One problem with pigeon-holing preferences using terms such as *self-interest* and *altruism* is highlighted by Miniard & Cohen (1981) in their discussion of the theory of planned behaviour (Azjen & Fishbein 1969). They argue that it is impossible, and

perhaps irrelevant, to distinguish an action motivated by a genuine concern for (for example) other people from an action motivated by social pressure[3].

Multiple citizen identities

Nonetheless, what people perceive as fair does seem to be an important determinant of their choices as citizens. What people deem fair may well vary both depending on the issue at hand and over time. This apparent inconsistency need not be a result of inconsistent preferences, it could also be a manifestation of several identities within a single individual (Sen 1985). March (1994) writes about identities in the context of the logic of appropriateness, which he contrasts to the logic of consequences, i.e. rational decision-making.

In the logic of appropriateness, people are assumed to make decisions using the following steps (March 1994):

1. What kind of situation is this?
2. What kind of person am I? (What is my identity?)
3. What does a person like me do in a situation like this?

One appealing concept used in the logic of appropriateness is that of identities that can accommodate apparent inconsistencies. March (1994) contends that people have various responsibilities and roles depending on the situation and that they mitigate these inconsistencies by adopting different identities in different situations. He does however state that different, conflicting identities may lead to cognitive stress and that people therefore choose identities that support each other, although this need not always be the case.[4]

There are several ways in which an individual can resolve inconsistencies due to conflicting identities. They may use ideologies (Brunsson 2007), allow the identities to struggle for dominance, or activate different identities for different decisions. March (1994) describes the mechanisms through which identities are evoked, three

[3] This line of thinking is similar to ideas of "warm glow", or impure altruism, put forward by economists to reconcile non-selfish behaviour with selfish preferences (Andreoni 1990, Brekke et al. 2003). The inability to distinguish between pure altruism or what someone really believes is fair from impure altruism or virtue signalling is inherent to the framework of rational choices. One could also make that case that it is irrelevant in practice as the results are the same. However, the idea of "warm glow" hinges on people having an idea of what is fair, or at least that there is a consensus among people of what is right or fair. Models of warm glow presuppose on there is something that is considered fair.

[4] From an economic perspective, it is difficult to see what the fundamental differences from the logic of consequences are. It seems as if the individual, or identity, must still have a set of preferences on which they base their decisions. March (1994) goes on to argue that people behave in accordance with their identities because of feelings such as shame, pride and embarrassment. Thus, there seems to be a similar kind of pain and pleasure mechanism at work on which models or rational choice are based (Crimmins 2019).

of which are particularly relevant here: *categorisation*, *recency*, and *context of others*.

Categorisation assigns different identities to different situations; for example, an individual may have one identity related to where they grew up that, while it might not be relevant when deciding what to wear, may be relevant when forming an opinion of an infrastructure project in the region where they spent their formative years. *Recency* relates to the fact that identities that have been evoked recently are likely to be evoked again; for example, if our individual grew up in the countryside but has lived in a large city for the past 40 years, while they may have access to a rural identity, they are more likely to evoke an urban identity when making choices. Finally, the *context of others* relates to the fact that the presence of other people and their expectations may affect which identity is evoked; for example, suppose that our individual is among friends who share their rural background, they are more likely to evoke their rural identity than when among a group of friends from an urban background.

In paper IV, we attempt to evoke a citizen identity among respondents. Of course, this citizen identity is not the same for all individuals. One way of looking at this variation is that each citizen identity is made up of several identities or influenced by other identities. The concept of identities, each with their own set of preferences, has many similarities with conventional concepts of preferences where an individual has one set of preferences. The main difference is that the concept of identities allows an individual to have multiple sets of preferences, as the individual is made up of many identities.

Organisations

As Brunsson & Sahlin-Andersson (2000) note, an organisation is often defined through examples rather than through a definition in a stricter sense. They list a series of characteristics that unite organisations. A definition based on their characteristics could be that an organisation is a specific group of actors with a common purpose. Companies, a group of friends getting together, a government agency or the UN – all of these are organisations. I will use this section to discuss choices, or rather decision-making, in organisations.

Decisions, choices and action

In organisational research, there is a distinction between decisions and choices, neither of which are synonymous with action. According to Brunsson (2007), a choice is merely one possible outcome of a decision, the others being *mobilisation*, *responsibility allocation* and *legitimisation*. The government's decision to build a railway line could have the purpose of mobilising municipalities to develop land adjacent to the new stations. Making an important decision infers taking

responsibility. It might therefore be in the interests of certain actors to dilute the importance of decisions by dividing one important decision into several smaller ones; for example, it might be expedient to gradually run down an unprofitable bus service rather than summarily shutting it down. Legitimisation can be used to signal other actors; if the government announces a decision to build high-speed rail in the future, it may signal other actors that the government is concerned about the environment, regardless of any real intent to do put the decision into action.

Rational decision-making processes and their challenges

A common way of thinking of decision-making is that it follows a logic of consequences (March 1994), i.e. a template that looks approximately like this:

1. What is the problem?
2. What are the options?
3. How do we value different attributes?
4. Which one is best?

The steps above describe the kind of behaviour on which microeconomic models of choice are based. In organisational research, one important element of decision-making processes is the justification of choices. Since rationality holds a strong position within our society, decisions that appear to be made on rational grounds tends to be viewed as legitimate (Ronnle 2019). In that context, rational choices can be described as the instrumental-rational approach. There are many examples of this kind of decision making in the transport sector (Mouter 2017, Ronnle 2019).

The model of decision-making outlined above is deceptively simple; in reality, different actors within an organisation (or actors that hold sway over that organisation) may have different views of the problem (Johannesson & Qvist 2020). It is also complicated to list all the relevant options. In many important decisions presented as rational, only one option was ever considered (Brunsson 2007). The available options when making a decision are essential to the final choice, leaving the choice of options subject to opportunistic behaviour. Opinions on which option is optimal may also differ within the organisation, with different individuals and departments promoting different agendas.

The ideal rational process would require the organisation to thoroughly examine the nature of the problem, the available options and its preferences each time it is faced with a decision. Such thorough examinations can prove immensely costly and time-consuming. To avoid these costs, organisations are created with a specific purpose.

To simplify decision-making, an organisation may also develop an ideology; in this context, an ideology is a set of ideas shared by all members of an organisation that constitutes a common basis for discussion and action (Brunsson 2007). Examples of such ideologies might be a company dedicated to making money or an NGO

dedicated to saving whales. These ideologies facilitate decisions, as everyone in the organisation is familiar with the ideas that constitute the ideology. When a new actor joins the organisation, they immediately get a bearing on what they should try to achieve within the organisation.

Problems, solutions, decision-makers and timing

There are also other models of how decisions come about and how they result in specific choices. Two influential and similar models are the *garbage can model* (Cohen et al. 1972) and the *multiple streams framework* (Kingdon 1984). Both of these models consist of three parts: the problem, the solution and the decision-maker. They also stress the importance of timing. As opposed to the four-step rational model outlined earlier, multiple problems coexist simultaneously, not all of which are solved. The solutions in these models are not created to solve the problems but exist independently of them and are not necessarily the best solutions to those specific problems. Rather, the owners of various solutions look for problems that fit their particular solution. Decisions are then made in the organisations' decision-making arenas. In the multiple streams framework, the decision-maker is courted by policy entrepreneurs promoting their solutions. If the decision-maker has a problem that he or she deems could be solved by the solution, it is chosen. The multiple streams framework fits quite well with the Swedish planning context in which municipalities (policy entrepreneurs) can suggest both problems and solutions in the strategic choice of measures (ÅVS). In the garbage can model, both the problems and solutions stream past the decision-maker and the decision-maker devotes energy to various problems. If a solution to a problem is available and the decision-maker has enough energy available, a solution may be implemented.

In Paper III, we study how the Swedish Transport Administration compiles its proposals for the national infrastructure plan, both in terms of which attributes the Administration prioritises when proposing measures for the plan (i.e. its preferences) and how planners at the administration go about generating proposals for investment.

Companies

The objectives of companies

As an organisation, a company presents a special case. One goal that is shared by many companies, although not all, is paying dividends to its shareholders. As shareholders fall into many groups (e.g. individuals, pension funds, foundations) the dividend can consist of many things. In simple economic models, however, the focus tends to be on monetary dividends. Focusing on these simpler models, firms try to maximise revenue and minimise costs, thereby maximising profit.

In a perfectly competitive market, the marginal revenue is equal to price charged, and all firms are price takers (Varian 2014). To increase profits in such a market, the firms can employ various strategies to escape the perfectly competitive market. In reality, there are no perfectly competitive markets, in part because of the strategies employed by the firms. By moving away from the perfectly competitive market to monopolistic or oligopolistic market structures, the firms can make larger profits.

Horizontal and vertical differentiation

Analysing a company's strategy separately from consumer behaviour presents a challenge, in as much as that behaviour dictates the strategies available to the company. It is also important to note that, while it might sound like deviousness on the part of companies to try to move from perfect competition to more monopolistic market structures, some of the strategies are legitimate ways of increasing profits, such as improving production efficiency, thereby lowering costs or differentiating quality.

One differentiation strategy is to use the transaction costs present in real markets to establish a local monopoly through horizontal differentiation. The first model of this type is the linear city by Hotelling (1929). The linear city model shows that transport costs give rise to geographic market segmentation and local monopolies. Similar results have been found in empirical studies of, for example, petrol (Barron et al. 2004) and food markets (Cotterill 1986). Search costs could however also have the opposite effect on price; if it is more difficult for firms to attract new consumers than for consumers to find sellers, high search costs could keep prices low (Samuelsson & Zhang 1992).

Another strategy is vertical differentiation. Vertical differentiation implies that the firm changes their product so that it no longer faces such stiff competition from other products. Creating a brand through marketing (Tremblay & Polasky 2002) or introducing loyalty programmes (Rese et al. 2013) are examples of ways to achieve this. Another way of differentiating is through quality (and price). An accessible example of this is aeroplane seats, where more comfortable business and first-class seats are more expensive than economy-class seats.

In Paper II, I examine location as a way of achieving horizontal and vertical differentiation. By locating in an accessible area, stores can offer more high-quality products (the average generalised cost of shopping is lower in high-accessibility locations) and therefore charge higher prices. In low-accessibility locations, competition and economies of scale are scarcer.

Data and methods

The papers in this dissertation use different types of data to answer different questions. The different types of data all have their own benefits and shortcomings. There is greater similarity in the methods used to analyse the data, with an emphasis on logit models. The primary data sources and methods used to analyse the data are presented in Table 2. In this section, I discuss the types and shortcomings of the data used in the papers.

Table 2 - Data types used in the papers

PAPER	PRIMARY DATA TYPES	METHOD
I	Travel survey	Binary logit
II	Price data and model outputs, interviews	Linear regression model
III	Choices made by administrators, interviews	Binary logit
IV	Online survey with experiments	Binary logit, latent class logit, random parameters logit

Different kinds of data

It is important to note that all types of data come with different benefits, shortcomings, and limitations and that they all have a scientific role to play. I have structured the discussion on data in three parts. The first part deals with direct observations of behaviour, as used in Papers II and III. The second part deals with data collected by asking people about their behaviour in different situations, i.e., interviews and surveys. Interviews are used in Papers II and III to complement the observed behaviour and different types of surveys used in Papers I and IV. The final part is devoted to using model outputs as inputs, a key data source in Paper II.

Direct observations of behaviour

The direct observations of behaviour in Papers II and III include the price-setting behaviour of supermarkets and grocery stores and choices made by administrators working at the Swedish Transport Administration.

Price data

In the case of price data, there could be substantial quality differences underlying the price differences. To address this, those studies that have looked at spatial price differences are either precise regarding which products are included or use very few products; for example, Anania & Nisticò (2014), who study specific packages and brands of coffee and pasta, or Jimenez & Perdiguero (2011), who study a very homogeneous product, petrol. This highlights the main drawback of observational data. As it deals with actual behaviour, we cannot control it in the same way as in an experimental setting. We therefore need to be aware of contextual characteristics and how these affect the observed behaviour, one such being product quality.

Paper II's price data is collected by members of the Swedish Pensioners' Association (SPA) in their usual supermarket based on a list of goods provided by the Association[5]. These supermarkets belong to various chains, are of various sizes and located in various towns and cities. All of these factors contribute to quality differences. The chains have different brands, different sizes and different assortments and the quality of their locations vary. The qualities of different locations are the subject of Paper II, but to study that question we want to allow for the other parameters. However, quality is not the only thing related to these factors. Size and chain also impact prices in other ways, such as though market power, loyalty programmes and economies of scale at store level, which all adds up to further background noise we need to filter out.

The issue of variations in product quality in price comparisons is by no means unique to the data used in this study; indeed, it is ever-present when constructing consumer price indices. Several academic studies have examined how taking quality into account adjusts the real price. Van Dalen & Bode (2007) in the Netherlands and Matas & Raymond (2009) in Spain study how car prices have developed over time as quality improves. They both find that, while the nominal price of a car may have increased, prices have declined when taking quality into account. These common findings are perhaps unsurprising given the international nature of the vehicle market. In the case of packaged food-products, Riesz (1979) shows that the correlation between quality and price tends to be low. In another study, Curry & Riesz (1988) show that the correlation between price and quality decreases the longer a product has been on the market. For foods, we would therefore expect quality to have a limited impact on the price of individual products.

Regardless of the academic evidence, quality differences among products in the SPA survey were deemed to be a significant problem that caused the price data to lose comparability. In one supermarket, premium coffee was sampled and in another, budget coffee. To deal with these collection issues, the SPA developed

[5] The survey is well known and established in Sweden. Each year, the results attract significant media attention.

explicit guidelines concerning which items were supposed to be sampled and which items should be substituted if the first item was unavailable. By sampling more similar products, the potential impact of quality differences was further reduced and thus the noisiness of the data. Many of these improvements to the data collected took place between 2010 and 2014, the years studied in Paper II. To ensure the results were not affected by the improvements to data collection, the sample was split and the analysis performed separately on data from 2010 and 2014. Paper II thus illustrates the problems and potential solutions to comparing prices of goods that are more heterogeneous than, for example, petrol.

Choices by administrators

In Paper III, we use data on which objects the Swedish Transport Administration proposed for investment in Swedish national infrastructure plan 2018–2029. The data contains information on which objects were chosen and which were not along with large amounts of information about each project. We then use hedonic methods to determine which attributes correlate with inclusion. Hedonic models are widely used to determine how people (or organisations) value attributes for which no market exists, the most common examples being house attributes (Sirmans et al. 2005) and other urban amenities (Tyrväinen 1997).

As with food prices, the greatest benefit of observing the choices of the Swedish Transport Administration is that it represents actual behaviour. The drawback is that there are many things that we cannot observe that make formulating hypotheses and interpreting results much more difficult, one of which being that we cannot be sure that we are observing the things that de facto determine investment choices. While we can observe many attributes that describe the potential investment, we cannot observe the circumstances surrounding them. One example of an unobservable attribute could be an agreement between the Swedish Transport Administration and a municipality in which the municipality undertakes to make reciprocal investments or make land available for building following the Administration's investment. Another unobservable might be that internal bargaining or politics is at work within the Swedish Transport Administration; perhaps one of its regional offices or project groups has been a long-standing proponent of an investment object and, for whatever reason, the Administration decides to propose the investment to please that region or project. It could be that these procedural selection criteria are critical when selecting which investments to recommend. These underlying processes create noise as we cannot observe them in the data.

Another problem with observations of behaviour is that we cannot be sure that the attributes we observe are the same as the attributes the Swedish Transport Administration considers when deciding which investments to recommend. It could be that the attributes we find significant are somehow related to the Administration's actual priorities, causing us to draw false conclusions about what the planners consider important. Planners might value attributes other than those available to us,

such as the transport system's general functionality, which we cannot observe. These unknown correlations differ from an experimental setting in which we can describe the attributes to the participants and, by so doing, gain some control over what they consider when making their choices. Furthermore, infrastructure investments are much more complex than, for example, a house, making it that much more challenging to understand which qualities are attractive. The fact that the attributes of the investment object are not the only factors explaining the Swedish Transport Administration's decisions is to a certain extent reflected in the low explanatory power of the models used to analyse the data.

Surveys and interviews

All of the papers in this thesis rely on surveys or interviews. The data used in Paper I come from the Swedish National Travel Survey, collected by Statistics Sweden, Paper IV uses custom survey data and Papers II and III use interviews to complement direct observations of behaviour.

In essence, a survey is a standardised interview. It allows the researcher to ask questions about things that are not possible to observe directly in behaviour. It does not however go into depth or allow the researcher to react to the respondents' behaviour in the same way as in a full-fledged interview. Surveys can be used to collect more background variables, such as the likes and dislikes of respondents. As with most data, surveys rely on a sample of the population and therefore entail a sampling error which risks imposing a bias. If the sample is large enough, however, the sampling error will be negligible. There are also other potentially more severe errors, such as the sampling error that can arise due to low response rate (Nulty 2008).

This section will begin with a description of interviews as complements to directly observed behaviour followed by a discussion of data quality, after which the Swedish National Travel Survey and choice experiment are presented and discussed.

Interviews as a complement to directly observed behaviour

Because of issues with both directly observed behaviour and survey data, many studies combine data types to increase robustness and better understand the research (Mark & Swait 2004). Interviews were conducted while working on Paper II in order to understand how supermarkets cooperate and compete, although to a much smaller extent than in Paper III. In Paper III, combining data can alleviate the problem of perhaps not observing the investment characteristic that the Swedish Transport Administration is responding to, by checking the consistency of the estimates. However, it could also provide us with further insights concerning the workings and

importance of internal procedures. To that end, we opted for supplementing our data with in-depth interviews with employees of the Swedish Transport Administration.

While direct observation of behaviour has the advantage of revealing which behaviour is being exhibited, it does not necessarily tell us why. In-depth interviews, or any qualitative data, have the advantage of potentially providing a deeper understanding of the decision-making process. Interviewing planners at the Swedish Transport Administration provided us with insights into the workings of the procedural selection mechanisms that would have been unobservable by simply looking at which objects were proposed for investment, something potentially crucial to understanding investment decisions.

That said, the interview is by no means a silver bullet. At best, interviews only reflect the experiences of the interviewee (Alvesson 2003). As Brunsson (2007) notes, in attempting to make sense of events, people tend to post-rationalise things that happen around them. This post-rationalisation can cause individuals to draw erroneous conclusions about what has happened and relay these to researchers. One way to reduce the risk of buying into these post-rationalisations is to interview people with different roles in a specific process. If they have the same understanding of the process, that speaks in favour of events having taken place in the way they are describing. There may also be organisational "truths" or cultural scripts (Alvesson 2003) in play that interviewees relay to the researchers. It is therefore vital to monitor the statements made in interviews and ask follow-up questions to detect inconsistencies and clarify whether something has or *might have* happened. To reduce the negative impacts of these issues on our study, we interviewed people with different roles in the project and chose a format that allowed us to interrogate the respondents' answers.

The data analysis also rests on the assumption that the Swedish Transport Administration proposes what it considers to be the objects that best meet the objectives of the national infrastructure plan. It is unclear what determines what they consider to be the most appropriate investments in this context, making the formulation of hypotheses more complicated. The Swedish Transport Administration could determine what it considers to be desirable investment objects based on its appropriation instructions from the Government, or it could rely on its own organisational perception of a desirable national infrastructure plan. The answer is probably somewhere in between. This uncertainty can, in part, be dealt with by formulating hypotheses that cover both eventualities, as we do in Paper III.

It is also possible that the Swedish Transport Administration is acting strategically in answering the question of what they consider to be the optimal national infrastructure plan. If the Administration and the Government have what Hultén (2012) characterises as a “pragmatic relationship”, the proposed investment objects might be regarded as a negotiating ploy by the Swedish Transport Administration to the Government regarding the infrastructure plan.

Survey data quality

While the collection of more background variables is useful, surveys are not without drawbacks. There are several ways in which a survey can be conducted: face-to-face, over the telephone, or self-administered surveys by post or online. All these methods are associated with costs, with face-to-face and telephone interviews being the most expensive options, followed by postal and online surveys (O'Toole et al. 1986, SCB 2007, Greenlay & Brown-Welty 2009). There are qualitative differences between the various methods in terms of how inclined people are to respond (SCB 2007, Dillman et al. 2009) and how they respond (Dillman et al. 2009, Heerwegh 2009). These differences imply that each method will present its own biases. That said, Antoun et al. (2017) have demonstrated that respondents provide equally good answers on a smartphone as when using a PC.

One growing long-term problem across survey methods is that people choose not to respond to the survey (Curtin et al. 2005, Anseel et al. 2010, Stedman et al. 2019). Low response rates can induce non-response biases. If the survey has a high response rate, the risk of biases is lower. Non-response biases can induce several biases of which the researcher must be aware, such as the possibility that respondents and non-respondents differ in terms of their socioeconomic status (Tolonen et al. 2006). There can also be differences among those who answer and those who do not regardless of socioeconomic status. Dillman et al. (2009) suggest that this problem can be ameliorated by offering alternative survey modes.

Once respondents answer the survey, new challenges arise. Respondents must complete the survey and answer truthfully and with due deliberation, otherwise there is the risk of response bias. Response bias is a broad term covering inconsistent answers, an over-tendency to agree, extreme answers, the concealment of socially undesirable attitudes and exaggerating negative answers (McGrath et al. 2010). Respondents may also fall into the categories of *insufficient effort responders* or *careless responders* (Huang et al. 2012). There are several ways to identify these individuals, such as by looking at response times and the consistency of answers (Huang et al. 2012, Meade & Craig 2012, Curran 2016) or by introducing specific screening questions designed to test if respondents read the questions properly (Berinsky et al. 2014).

The substantial costs associated with conducting surveys and the growing difficulty of collecting answers due to falling response rates (Curtin et al. 2005, Anseel et al. 2010, Stedman et al. 2019) have forced researchers to explore new methods of obtaining answers. The closest alternative to the traditional methods is the web panel, which is cheaper than face-to-face and telephone surveys (SCB 2007). Two selection concerns with web panels are that opt-in panels will attract a particular type of respondent and that the same person is a member of several different panels. While the former is a selection problem in its own right, taken together they could lead to the emergence of “professional” respondents who do not represent the

population in general (Matthijsse et al. 2015). One way to tackle this is not to use panels to which participants can recruit themselves but to use probability-based web-panels instead. Participants are recruited to these panels in the same way as participants to a representative survey. However, as Hays et al. (2015) argue, there might be small differences between opting into a probability-based survey and opting into a nonprobability survey. Regardless, Matthijsse et al. (2015) show that professional respondents do not pose a significant threat to data quality.

The quality of data also depends on how it is used. If data is misused the quality of data in that application is lower. In Paper IV, we use Likert scale questions to map the attitudes of our respondents. There is ongoing debate regarding under what circumstances ordinal values such as Likert scales can be treated as interval scales (Jamieson 2004, Chimi & Russell 2009, Wu & Leung 2017), i.e. when the difference between categories can be treated as equally large. If ordinal values can be treated as interval values, they can be included as independent variables, as if they were measured on a continuous scale. A Likert scale is typically used to ask respondents the extent to which they agree on a five-point or seven-point scale, where the middle is neutral. Jamieson (2004) argues that there is no numerical interpretation of, for example, *good or fair*: ”the average between fair and good is not fair and a half". On the other hand, Wu & Leung (2017) demonstrate that the answers will more closely resemble the underlying distribution if there are enough scale points and therefore conclude that if there are enough scale points, it is less incorrect to treat Likert scales as intervals, even if they maintain that the most convenient way is to use the raw scores. Although we use Likert scales in Paper IV, we do not treat them as intervals but rather construct dummy variables.

The Swedish National Travel Survey

The Swedish National Travel Survey used for Paper I was a phone survey conducted between 2011 and 2016. Apart from filling out a travel diary, the respondents were asked a large number of background questions. These types of travel surveys suffer from a falling response rate (Stopher & Greaves 2007) in the same way as other surveys. A specific problem with travel surveys is the underreporting of journeys that in some cases may account for up to 30 per cent of the total number of trips (Sammer et al. 2018), a particular problem for short trips. This underreporting could cause problems in Paper I, as it might cause us to underestimate the size of the issue we are studying. However, from the point of view of showing that some individuals choose more expensive tickets, the underreporting adds robustness to the estimates.

Growing issues with response rates in combination with the underreporting of journeys has prompted the exploration of other methods for collecting travel data. Transport Analysis (2018) recently conducted a pilot study comparing four modern data collection techniques and how they compare to traditional postal/telephone collection. The four methods were: online survey, mobile application, long-distance trips from mobile phone data and municipal-level data using mobile phone data. The

online survey was a standard online survey, the primary benefit of which is its relative cheapness. The mobile application tracked the user's movements and prompted them to enter data on the purpose of their journey, etc. at the end of each day. Neither of these methods solved the issue of low participation, although the latter did make it easier to ensure that all journeys were registered.

The other two methods do not rely on the active participation of travellers. Collecting origin-destination matrices for long-distance travel using mobile phone data is technically uncomplicated and anonymisation can resolve any privacy issues. Collecting traffic flow on a municipal level is technically more complicated and uses anonymised traffic data and different types of algorithms to determine if a mobile phone moves. While Transport Analysis (2018) considers this method to have great potential for gathering aggregate traffic data on the scale of a large Swedish city, the method is unreliable for capturing shorter journeys. One significant drawback of mobile-phone dependant approaches is that they do not provide any information about which mode of transport was used for the journey or the individual unless the data is de-anonymised, something that obviously poses significant privacy challenges.

In Paper I, we rely heavily on questions related to matters other than the journeys taken. We identify our study group using questions posed to the respondent not directly related to the survey day. Although some of this information would be possible to solicit using mobile phones, one of our key variables, income, and many background variables would not be. Even in traditional travel surveys, income is challenging to collect and the response rate for this question in the Swedish National Travel Survey is only 74 per cent.

Choice experiments

In Paper IV, we study the public's preferences for the distribution of benefits accruing from a national infrastructure plan. Ideally, we would prefer to rely on a referendum or some other form of real-world example that could function as an experiment to solicit the public's preferences. Unfortunately, from a research perspective, referendums are quite rare. Instead, we rely on choice experiments.

Choice experiments of the type used in Paper IV have been used to solicit the value of goods for which there is no market, such as environmental goods (van Houtven et al. 2014) and travel time (Axhausen et al. 2008, Wardman et al. 2016). This procedure is not uncontroversial due to the many challenges the method poses (Johnston et al. 2017), which can cast doubt over the results' validity. To address this problem, many studies combine revealed and stated preference data to ensure the validity of the results (Whitehead et al. 2008). There are however influential papers, notably Arrow et al. (1993) and more recently Johnston et al. (2017), that argue that choice experiments by themselves can contribute to many research fields if conducted correctly.

One difference between real-world observation and experiment is that the latter allows us to control which of the respondent's preferences we are eliciting. If we were to study a referendum, we would be less sure that respondents were actually voting on the issue at hand. One example of this is the Gothenburg congestion charge referendum, which some voters regarded as a broader referendum on the controversial West Link rail project rather than the congestion charge itself (Hansla et al. 2017). In an experiment, we can be very specific about the effects of their hypothetical choices and then value the effects based on their choices, something that real-world data does not allow. However, this hinges on respondents perceiving the effects as realistic and not reading other things into the experiments, as happened in the Gothenburg referendum.

One significant drawback of experiments is that, ultimately, they are hypothetical. By asking hypothetical questions, we risk getting hypothetical responses, and hypothetical bias. Hypothetical bias implies that respondents' answers do not represent market behaviour (Hensher 2010) and that the validity of the solicited values is therefore questionable. Beck et al. (2016) review several studies showing that hypothetical bias is a significant issue in stated preference studies. Bishop & Boyle (2019) use different terminology: *reliability* and *validity*. Reliability addresses variance and validity addresses potential biases.

There are techniques available to address the problem of hypothetical bias. Some of these techniques combine stated with revealed preference data, "convergent validity", (Ben-Akiva et al. 1994), while others attempt to ensure consistency with economic theory and previous studies, so-called "construct validity" (Johnston et al. 2017). There are also more proactive approaches to reducing hypothetical bias.

Some studies, such as Vossler & Watson (2013), demonstrate that if respondents believe that the hypothetical choices are consequential, the differences between a referendum and hypothetical choice disappear. In contrast to Vossler & Watson's (2013) findings, there are also other techniques such as cheap-talk reminders to respondents regarding the tendency to give biased responses to hypothetical scenarios. However, Johnston et al. (2017) do not recommend techniques that reduce consequentiality, such as cheap talk. Other techniques appeal to the respondents' honesty. Studies (Carlsson et al. 2013, de-Magistris & Pascucci 2014) show that if the respondents take an oath to answer honestly, this results in lower estimates and reduces the propensity to make extreme choices.

Another source of bias can be strategic responses in which respondents misrepresent their preferences to impact the results. Hensher et al. (2012) argue that this is more likely to be a problem in the context of public goods than private goods. Meginnis et al. (2018) estimate the size of the strategic bias in the context of public goods and find that about a quarter of respondents provide strategic answers and that this has a significant impact on aggregate preferences.

Measuring public preferences using choice experiments is also complicated for other reasons. Traditionally, choice experiments have been used to value nonmarket goods from a consumer perspective, including public goods. In Paper IV, we attempt to analyse the preferences of the respondents as citizens rather than consumers. What citizen and consumer preferences entail differs slightly depending on how you make the distinction. While it is not readily apparent how to make this distinction, perhaps the most common method follows on from Nyborg (2000) by evoking a citizen role to make the individual consider what is best for society. In Paper IV, we define citizen preferences in the same way as Mouter & Chorus (2016) – i.e., citizen preferences are used when allocating public funds – whilst simultaneously trying to evoke a citizen role in the Nyborgian sense.

Using model outputs as inputs

Paper II uses output data from a transport model as input in the models used to analyse price. Using model outputs as inputs has several advantages but also comes with several caveats. In Paper II, the purpose of the model data is to make the abstract concept of accessibility tangible. When operationalised, accessibility is a model of the ease with which people and goods can reach various destinations. Like the concept of accessibility, a transport model is a depiction of reality that inevitably contains simplifications.

The transport model aims to depict travel behaviour as accurately as possible and is therefore a model of a specific part of human behaviour. A model's validity relies on its ability to model human behaviour, which it does by creating rules to describe it. A fundamental rule in the transport model is that individuals try to minimise the cost of travel. Describing the cost of travel is therefore a key feature of the model. The model then relies on people to act according to the model; any deviation from the model is in some sense irrational from the point of view of the model. For this reason, those who do not believe in rational choice might find it difficult to trust the model's output. However, the model's validity depends on its ability to replicate human behaviour, from which perspective whether or not you agree with the concept of rational choice is less relevant. The model system used has been shown to reliably replicate behaviour (Eliasson et al. 2013, Andersson, Brundell-Freij & Eliasson 2017).

Andersson, Brundell-Freij & Eliasson (2017) also illustrate how the model's accuracy is heavily dependent on the correct input. Input uncertainties or errors will propagate throughout the model and reduce the reliability of the outputs. When these outputs are then used as inputs, the errors or uncertainties are propagated further. Zhao & Kockelman (2002) show that uncertainties in early stages of transport models propagate to later stages but that the equilibrium assignment of traffic flows counteract the effect somewhat. Albeit in a different modelling setting, de Jong et al. (2007) study the Dutch National Transport model and show that the errors due

to input uncertainty tend to be much larger than the errors due to model uncertainty. However, as Rezaeestakhruie (2017) notes, to create more reliable measurements of how uncertainty propagates in four-step models, we would need a larger number of observations. As the data used in Paper II is based on a model of the present, the input-related uncertainty is very low. Given the findings by de Jong et al. (2007), Eliasson et al. (2013) and Andersson, Brundell-Freij & Eliasson (2017) that model uncertainty is low, it seems fair to assume that the uncertainty arising from using model output is, if not negligible, then at least acceptable.

Another thing to be wary of when using model outputs as inputs in analyses is that the interpretation of parameter estimates could become more difficult than when input is observed directly, such as the floor area of a supermarket. The area of a supermarket is easier to grasp; most people have a sense of how big a square metre is and have the ability to understand how much larger 200 square metres is than 100 square metres. Accessibility, on the other hand, is a difficult enough concept to grasp as it is. Adding to the complexity of interpreting accessibility, the analyst must understand and explain to the reader the limitations of the model regarding how it depicts reality. In Paper II, I use example locations to describe what different values of logsum-accessibility correspond to.

Paper summaries and contribution

In this section, I present the key findings of each paper in this thesis, along with a short discussion on the contributions to the academic literature and policy.

Paper I – Is it expensive to be poor? Public transport in Sweden

In Paper I, we examine whether those on lower incomes generally purchase more expensive tickets for public transport than those on higher incomes. This phenomenon arises when low-income earners who frequently use public transport and for whom travelcards are the cheapest option purchase single tickets rather than travelcards. While this might seem counterintuitive, the phenomenon is reported in several qualitative (eg. Lucas 2011, Blumenberg &Weinstein Agrawal 2014) and some quantitative (Graham & Mulley 2012, Verbich & El-Geneidy 2017) studies.

In Sweden, as in many other countries, travelcards are relatively cheaper than buying single tickets, typically resulting in a lower cost per journey for anyone making seven or more trips on public transport each week, even if it does entail a higher initial outlay. Using the Swedish National Travel Survey, we can establish a correlation between income and travelcard possession among those who use public transport on five to seven days each week, i.e. those for whom it would have been the cheapest ticket. Since we use individual data, we can check for a host of factors that correlate to income and that could impact the propensity to purchase a travelcard, such as level of education and the opportunity to telework. This also allows us to study differences within the low-income group. It is difficult to express how large the effect of income is as this differs depending on other attributes, but it is possible to say something about the extent of the problem. Based on Stockholm data, it appears that tens of thousands of people purchase single tickets when the most affordable ticket would have been a monthly travelcard.

So, why would people choose what seems like a more expensive option? In Paper I, we rely on an approximation of previous travel behaviour to identify very frequent public transport users, meaning that one explanation might be that current transport demand simply does not reflect past travel demand. That said, we also checked the number of trips made on the day of the survey and found that the average number

of journeys undertaken by this group is sufficient to justify the purchase of a travelcard, which indicates that the results are not simply due to a change in demand.

Another explanation could be that low-income earners do not understand the ticketing system or are unaware of the available options. Given that the individuals in our study state that they typically use public transport five to seven days a week, it seems unlikely that they are uninformed. This does not rule out the possibility that they are unable to understand the ticketing system or that it for some reason does not occur to them to purchase a travelcard.

Nevertheless, we consider liquidity constraints to be the most compelling explanation for our findings; i.e., that those on a low income choose not to purchase a travelcard even though it is the cheapest ticket because they feel that the initial outlay is beyond their means, opting instead for a higher cost distributed over a longer period of time. This liquidity constraint need not be strictly interpreted as the individual not having the available cash to purchase the travelcard; they may simply prefer spreading their costs over the month to ensure that they have a financial buffer.

There are also other explanations that we are unable to distinguish from liquidity constraints. One is how the individual foresees their future demand. If they think that their demand will be insufficient to justify the purchase of a travelcard, it is reasonable not to purchase one. It could also be the case that the future is so uncertain that the costs for the individual associated with informing themselves about likely future demand, or planning for that matter, is higher than the additional cost of relying on single tickets. A final explanation that supports both the liquidity constraint and other hypotheses is put forward by Mani et al. (2013), who find that financial stress (i.e. having a low income) causes cognitive stress, resulting in poor financial decisions and further cognitive stress. It seems feasible that the explanation for the observed behaviour is a combination of these explanations, as well as others currently unknown to us.

So, how do the results of Paper I fit into fare policy? Fares can be structured in many ways and come with various discounts, such as student and off-peak fares. Flat fares and zonal systems are common. Zones can be seen as a cross between flat fares and distance-based fares. Different combinations of fares, transport modes and land-use systems give rise to different distributional effects. Several studies have examined the distributional effects of (non)differentiated ticket prices on distance travelled and the time of day journeys are taken. However, there is not much literature concerning the distributional effects of travelcards and the disconnect between price and production costs.

The most basic observation about flat fares is perhaps the one made by Cervero (1981), who demonstrated that since it is more expensive to produce public transport during peak hours (when more vehicles, staff, etc. are required) and people commute longer distances during peak hours, those who travel shorter distances off-peak

subsidise the peak-hour commuters. A more recent study by Brown (2018) show that this is still the case in Los Angeles. Brown also demonstrates that the trips undertaken by low-income earners are shorter and more likely to be off-peak, meaning that they pay a higher per-mile price. The only system under which low-income earners paid a lower per-mile price than those on higher incomes was a distance-based fare with off-peak discount. Taylor & Morris (2014) argue that this is related to public transport funding in the United States, where new taxes are imposed to raise money for public transport. The focus on funding has resulted in an emphasis on projects through which it is possible to gain support for the tax, predominately projects appealing to the middle class rather than bus lines used by the urban poor.

A recent study in a Swedish setting (Rubensson et al. 2020) comes to a slightly different conclusion. In their study of Stockholm, the researchers find that, as there is such a high percentage of high-income earners in the inner city, on average high-income earners actually take shorter trips than the low-income earners in the suburbs who benefit more from public transport. In another study of Stockholm, Börjesson, Eliasson & Rubensson (2019) show that the flat fare currently in use is progressive, mainly due to low public transport use among those with the highest incomes. The subsidy per trip for the rest of the population is about the same. Börjesson, Eliasson & Rubensson (2019) also evaluate the distribution profile of a system with only single tickets compared to the current one with both travelcards and single tickets and find that it has a very similar distributional profile. Additionally, they find that many low-income earners do not travel enough to benefit from the travelcards, implying that they are, in effect, excluded from the most subsidised ticket. Introducing a system based on single tickets would therefore not change the distributional profile at the aggregate level, equally subsidise each trip nor remedy the liquidity constraints we highlight in Paper I.

This simple comparison between the United States and Sweden implies an element of context dependence in terms of what a desirable fare system might look like. It seems likely that these differences are a consequence of variations in interaction between the transport system and the land use. The differences are also reflected in the distributional impacts of changes in these systems; in some cases, the most impactful change might be to expand the transport network, while in other cases it might be to reform the fare structure.

While the studies discussed above examine the direct distributional effects of fares and subsidies, they do not describe the full distributional effects. As public transport networks in the western world are funded from the public purse, it is essential to understand the distributional impacts of the mechanisms used to collect these funds. There are many creative funding methods, such as earmarked taxes, fees, and land value capture (Ronnle 2015), intended to link public transport funding to costs in other parts of the transport sector or the value of the real estate reaping the benefits. In Sweden, however, the principal source of funding for public transport is income

tax. Given that high-income earners pay higher taxes but, at least in Stockholm, receive a lower per-trip subsidy than those on lower incomes, this increases public transport's progressivity, as with most other welfare services (Waldenström 2012). In other countries, the United States for instance, where funding from consumption taxes is more common (Ubbels et al. 2001, Baldwin Hess & Lombardi 2005) these results might be different, since the distributional effects of consumption taxes are less clear (Correia 2010).

Paper II – The relationship between accessibility and price – The case of Swedish food stores

In Paper II, I study how prices, specifically food prices, vary with accessibility. I improve on previous studies of food prices by including more goods in the basket and using accessibility as my spatial variable. Previous studies have used other measures to capture the effect of competition, such as distance to nearest store or the number of stores within a certain radius. The accessibility indicator I use describes how easy it is to reach other places from the supermarket, roughly corresponding to how easy it is to reach it. Accessibility is highly correlated to urban density, which is highly correlated to population, which is correlated with the number of supermarkets within a certain radius, which is correlated with the distance to the closest supermarket. While these relationships result in a high correlation between accessibility and the measures used in previous studies, the accessibility indicator used avoid assumptions about each shop's competitors and instead roughly describes the average cost of accessing the supermarket as, for example, it may be more likely that the local village shop is in competition with the supermarket in the nearby town where villagers work rather than with the shop in the next village.

I find the relationship between accessibility and price to be U-shaped; prices are higher in high and low-accessibility locations and lowest in medium-accessibility locations. I also find that accessibility is a more convincing explanation of price than the measures used in the literature. In low-accessibility locations, however, the density of supermarkets is as good an explanation of prices as accessibility, something that is not the case in high-accessibility locations.

In the paper, I suggest that there could be local monopolies in more rural areas due to the high search costs that follows with low accessibility. If the market is not large enough to support several grocery stores, the local shop is free to use monopoly pricing and extract monopoly profits. That said, it could also be the case that higher prices in rural areas are the result of the lack of economics of scale. Since there are fixed costs associated with running a supermarket or village shop, such as minimum staff requirements, freezers etc., village shops face higher average costs with a

smaller volume of sales across which to spread these costs, which may lead to higher prices.

Notwithstanding the latter possibility, why would they not extract monopoly profits if there are no competitors? One reason is that individual supermarkets are not independent businesses but are either operated as franchises or part of a larger company. As such, either due to corporate policy or as part of a franchising agreement, the individual supermarket agrees not to set excessively inflated prices that may reflect poorly on the franchiser and other stores operating under the same brand. Interviews conducted for Paper II also suggest that there is considerable peer pressure among store owners not to do so.

Another explanation could be that shops in rural areas cannot maximise profits but must focus on staying afloat, so that they can continue to provide a service to the local community. To this end, the Swedish Government runs a number of programmes that provide financial support to rural stores who struggle (Utredningen service i glesbygd 2015). It therefore seems likely that, at least in the most rural areas, higher prices are the result of a very small customer base rather than rent extraction by local monopolies.

One example of Swedish regional support is the financial aid granted to ensure adequate service coverage in all parts of Sweden. In order for a shop to qualify for this aid, it must be located at least 10 kilometres from the nearest other shop and its turnover must fall within a certain range. Accessibility analyses conducted by government agencies to study the effects of village shop closures calculate the number of additional minutes inhabitants must spend travelling to access their now closest shop, but fail to consider the number of people that can reasonably access the shop in the first place. Shops that receive this financial aid are often located in commuter villages around employment centres with larger supermarkets[6]. While these village shops undoubtedly struggle, this is partly due to competition from these supermarkets, which can offer a wider range of goods at lower prices thanks to economies of scale. The existence, or demise, of these local shops is hardly likely to affects the wellbeing of those with access to a car who regularly pass them by; however, for many people, especially the elderly and those without access to a car, these local shops are a lifeline. It is therefore perhaps more relevant to study how many such individuals would be affected by the closure of a given shop.

The mechanisms behind higher prices in more accessible areas are very different from those in lower accessibility areas. The main explanation used in Paper II is that the cost of purchasing food is comprised of the cost of the food itself and the cost of accessing the supermarket. In part, the accessibility indicator reflects this and is negatively correlated with the cost of accessing the supermarket; high accessibility

[6] Phone call with Pär-Ove Bergquist at The Swedish Agency for Economic and Regional Growth 24.09.2020.

attracts more customers and allows the store to charge a higher price. Additionally, as customer numbers peak at certain hours and many high-accessibility supermarkets are located in city centres where space is limited, in-store congestion limits their ability to sell goods, leaving higher prices as the only way for stores to increase profits.

This paper also contributes to the literature on food deserts which, in common with the Swedish support system, is focused on access to shops rather than prices (Clarke et al. 2002, Zenk et al. 2005, Smoyer-Tomic et al. 2006, Wright et al. 2016). Although there have been some studies that have in various ways examined both access and price (Kunreuther 1973, MacDonald & Nelson 1991, Cummins & MacIntyre 2002), these share the major drawback of assuming that all shopping trips depart from the home.

Many previous studies on food accessibility and price focus on prices in urban, often deprived areas. However, there is very little in Paper II to suggest that prices are higher in deprived areas. If anything, the results suggest the opposite, at least on an aggregate level. While I can only speculate on the reasons for this, one explanation could be that many poor neighbourhoods, at least in the larger cities, are in suburban locations that are easily accessible, at least to those with cars. These locations are attractive to large supermarkets with low prices, which should offset the effect of high accessibility. One important limitation of the results is that they only show the prices that the shops can charge, at least in more accessible areas where shops are not closing due to financial problems, not the profits.

Nonetheless, Paper II describes how at least part of the cost of living varies with accessibility. From a redistributive perspective, it is relevant to understand if there are parts of the country where some goods are more or less expensive. The latest Swedish Household Budget Survey (SCB 2020) shows that food accounts for a larger percentage of overall household expenditure in rural municipalities than in cities. At the same time, housing accounts for a smaller percentage of expenditure in rural areas. This highlights the fact that the type of financial aid low-income households need varies depending on their geographical location; while those in urban areas might benefit more from housing benefits, rural households might benefit more from transport or food subsidies. It may be worth bearing these differences in mind if we want to pursue a policy of reducing regional variations in the standard of living.

The results of Paper II highlight the need to study how the price of other essential consumer goods varies with accessibility. Since diesel and petrol make up a large part of transport expenses, certainly in more rural areas, these would be natural goods to study. Unlike food, these have the added benefit from an analytical perspective of being very homogeneous.

Paper III – Do impact assessments influence transport plans? The case of Sweden

In Paper III, we study which objects the Swedish Transport Administration proposed for investment within the framework of the national infrastructure plan 2018–2029. We then identify the characteristics that unite the objects that are proposed. Furthermore, we argue that the identified characteristics have been instrumental in the decision to propose the investments. We also interviewed planners involved with the national infrastructure plan in order to better understand the process of deciding which objects to propose.

We tested many hypotheses generated using policy documents and instructions to the Swedish Transport Administration. We also studied how regional conditions, such as unemployment and regional growth, correlated to the likelihood of an object being proposed for inclusion in the national infrastructure plan. Our results indicate that the net benefit investment ratio (NBIR) positively correlates with the probability of inclusion. The presence of adverse environmental impact not included in the cost-benefit analysis (CBA), on the other hand, had a negative correlation with inclusion probability. The positive impact of the CBA on inclusion probability is in line with results obtained by studies of the 2010–2021 investment plan (Eliasson & Lundberg 2012, Eliasson et al. 2015). However, the effect of environmental impact outside the CBA is new. The finding that environmental impact affected selection is reflected in interviews where planners stated that environmental impact received special attention, much as metropolitan areas were given special attention in the 2010–2021 plan (Eliasson & Lundberg 2012).

A large part of the study is also devoted to understanding how the other parts of the appraisal, notably the distribution analysis (DA) and the goal fulfilment analysis (GFA), were used, or perhaps a more apposite phrase would be "were not used", since we cannot find any quantitative evidence that they have been used. Some planners do however state that the GFA was included in the overall assessment of investment objects, although no planners state that they used the DA. The main reason appears to be that neither of them can be used to prioritise between investments.

At least on the surface, the Swedish planning process is recognised as a highly rational, technocratic process (Hultén 2012). Brunsson (2007) argues that decision-making processes that appear rational appeal to decision-makers, as rationality lends legitimacy to decisions. However, this legitimacy does not rest on the decisions actually being rational, they merely need to be perceived as such.

While the process used to propose and select investment objects for the national infrastructure plan might appear rational, there are several ways for actors to

manipulate the selection process. This manipulation can take place both within the selection process itself and during preceding processes.

The selection process itself can be manipulated in several ways. The planners in charge of compiling the plan at the Swedish Transport Administration rely on input from the Administration's regional offices to inform them about regional needs and which measures are the most suitable in each region. The planners in charge do, however, have the final say and are responsible for ensuring that their proposals correspond to the instructions received from the Government. The reliance on regional offices presents regional planners with opportunities to manipulate the process.

One such opportunity is presented when describing the needs of the transport system in the region, at which point planners are in a position to exaggerate or tone down certain aspects. Another opportunity is presented when proposing which measures should be implemented to address those needs. Potential investment objects, or other measures, are administered by regional offices and are also at risk of manipulation.

A model that could be used to describe this situation is the multiple streams framework presented by Kingdon (1984). In the context of Paper III, the regional planners are policy entrepreneurs that, for whatever reason, want a specific piece of infrastructure. There are examples of investments that are repeatedly proposed at the regional level but never included in the national infrastructure plan. At some point, policymakers decide that something is a priority. The policy entrepreneurs then have the opportunity to adapt their description of needs to fit the policymakers' priorities and to adapt their description of the investment so that it is perceived as a better solution.

To some extent, this is not really a problem but merely governance at work; however, as regional offices own the description of needs and the solutions, they, or factions within them, are in a position to influence the process. If there are multiple factions within a region, formal or informal negotiations could result in a description of needs and a battery of solutions that are not the ones that would have been produced under the type of rational process that it is presented as. It is therefore by no means certain that the investments we observe in Paper III have been generated in the way we would expect.

Nonetheless, the Swedish process of identifying needs and generating measures does not originate with regional offices, but in a strategic choice of measures (SCM). SCM is a method for identifying needs and solutions in the transport system and was introduced to facilitate more involvement by local stakeholders and to improve collaboration on infrastructure planning (Tornberg & Odhage 2018). A SCM can be initiated by anyone who has identified something that can be improved in the transport system. Other stakeholders then become involved, most notably the Swedish Transport Administration. Essentially, this allows any stakeholder to define a need and influence the choice of solution. In this situation, the policy

entrepreneur does not have to search for problems to fit their solution, they can define them themselves. Policy entrepreneurs pushing for their preferred solution could be one reason why reports have shown that the Swedish Transport Administration does not fully use the four-step principle (Swedish National Audit Office 2018). As Brunsson (2007) notes, in many decisions presented as rational, only one option was ever considered.

While SCMs and the power wielded by regional offices can be expected to improve local representation in the national plan, I think it is fair to say that the shift towards representation does remove the decision-making process from the rational ideal on which it is based. The analysis in Paper III is therefore limited because it studies how impact assessments explain selection rather than which types of measures are selected throughout the entire process.

Since the process preceding the decision to propose an investment object for inclusion in the plan is very decentralised and since the quantitative analysis in Paper III could not identify any distributional considerations, the question arises of whether distribution is handled in an alternative manner not examined in the paper. Any distribution of public good – in this case, infrastructure – gains its legitimacy by being perceived as fair; however, a fair outcome is not the to achieve this. It can also be achieved if the underlying process is perceived as fair.

Perhaps one purpose of the decentralised process feeding into the national infrastructure plan and the collaborative (or negotiatory) nature of the plan's compilation, is to create a process in which everyone feels represented. Representation is a very different method for dealing with distributional matters. Perhaps the hybrid nature of the process is a way of combining the best of two systems. However, this may also lead to contradictions.

One possible criticism of rationalistic planning is that it puts planners in charge of a fundamentally political process. One criticism of a decentralised process is that it is difficult to gain an overview of its internal processes and outcomes. While proponents of either method might consider the respective criticism to be a feature rather than a bug, it seems fair to say that both criticisms have merit. It might also be the case that the process, in its current state at least, is not the best of two worlds but a process with room for improvement.

The recent decentralisation of planning has coincided with increased local and regional cofinancing of national transport infrastructure. Recently, the state has also begun cofinancing local and regional transport infrastructure through urban environment agreements in exchange for local measures to improve local, sustainable transport. Eliasson & Lundberg (2012) showed that in the 2010–2021 national infrastructure plan, the first to include the possibility of municipal cofinancing, investments that included funding by municipalities and regional authorities were more likely to be included in the plan. In the Swedish National Audit Office's (2011) review of cofinancing, concern was expressed that local and

regional authorities with healthy finances, political unity and experience of negotiation would attract more than optimal levels of investment at the expense of financially weak and politically divided local and regional authorities. The Swedish National Audit Office (2011) also expressed concern that this might lead to an undesirable distribution of investments.

To study distribution in the manner we do in Paper III thus risks missing important mechanisms for how distribution is handled. While it could be that these matters are dealt with through a process of negotiation and consensus-building, such a process is vulnerable to strategic behaviour and power dynamics between participating stakeholders. While some might not consider this problematic from their own point of view, others might find it troubling. The kind of analysis conducted in Paper III, which focuses on the outcome of the process, might therefore fulfil the function of allowing comparisons between expectations of the processes and its outcomes.

Paper IV – Public preferences for distribution in the context of transport investments

In Paper IV, we study the public's preferences for the distribution of benefits in the context of transport investments using choice experiments. In the experiments, the respondents made trade-offs between distributional profiles in three dimensions and a measure of the total benefits from each package. The three dimensions were: geography, gender and income. The results show that respondents prefer packages that entail large benefits and even distributions but, when distribution is uneven, they prefer it to favour non-metropolitan regions, women, and low-income earners.

While the preferences were intuitive at an aggregate level, there is significant variation among individuals. One robust explanatory factor for heterogeneity is variables describing self-interest in their respective dimension, such as being female or living in a metropolitan area. General speaking, this means that women prefer packages that benefit women and people living in metropolitan areas prefer packages that benefit metropolitan areas. While this could be selfishness reflected in their citizen preferences, it might also indicate that they represent or understand the world through these identities or in-group biases. We are unable to discern whether respondents answer as they do out of self-interest or if they display these preferences for some other reason.

An alternative explanation to self-interest is that respondents have very similar preferences but that the surrounding group varies. The context could cause individuals to prefer packages that benefit people like themselves by whom they are surrounded, i.e. they are influenced by the *context of others*. If this were the case, we would observe that men, respondents in metropolitan areas and high-income

earners would prefer packages that benefit these groups, which we do not. An alternative explanation is that respondents, on aggregate, actually have egalitarian preferences but that some groups perceive themselves as disadvantaged. Of course, it could also be the case that other factors correlate with men, metropolitan areas and high-income earners that cancel out self-interest.

Stronger preferences for packages that benefit women, low-income earners and people living in non-metropolitan areas could also be interpreted as an understanding of the predicaments facing these groups. This reasoning implies that it is information about rather than concern for these groups that explain the preferences displayed in the study. It could also be an example of *recency*. Since these groups are quite fundamental and potentially triggered by the experimental design, the corresponding identities are readily available.

In the paper, we also divide respondents based on how fair they believe Sweden is in the three dimensions. Those who think that Sweden is fair from a geographical and gender perspective also demand less redistribution. These results tell us that their citizen identity is influenced, intuitively, by perceived fairness.

There is also the question of whether if it is reasonable to expect people to have well-formed citizen preferences on all issues; after all, there are a potentially infinite number of issues on which to have an opinion. Given that people have limited cognitive capacity, it is hardly reasonable to expect them to hold informed opinions about all issues in advance. Still, even if they do not have an opinion before being asked, people can make a choice.

Hamilton et al. (2014) use the concept of *substitution heuristic* from Kahneman (2011) to explain how people make judgements when they have inadequate information. Substitution heuristic implies that when an individual is faced with a choice but does not have sufficient information available, they will substitute a choice for which they have sufficient information. Hamilton et al. (2014) use the example of congestion charges and the environment. While some individuals might not have a strong opinion about congestion charges, they might feel strongly about the environment. If these individuals code congestion charges as an environmental measure, they will also support congestion charges.

It is fair to assume that most of the respondents did not have a strong opinion about the distributional impacts of investment decisions before answering the survey in Paper IV. So, which preferences did they substitute? One likely substitution is that individuals will categorise this as an issue of the distribution of benefits; however, it is by no means certain that all respondents have well-formed preferences for distributing accessibility or other accrued benefits of the transport sector. It is therefore impossible to rule out that we have captured some general preferences for distribution, either for public goods or even more general preferences. If respondents interpret transport benefits as a public good, their preferences are influenced by which kind of goods they interpret transport benefits to be. Mouter et

al. (2017b) show that Dutch respondents display more egalitarian preferences when distributing traffic safety benefits than travel time savings. This result suggests that respondents have different preferences for "essential" public goods, in this case health, than for time savings, which appear to be an entirely different kind of benefit. Since we did not specify which were the main benefits being distributed, we do not know if respondents classified them as essential.

What speaks in favour of people having well-formed preferences about distribution in the context of transport planning is that everyone has a relationship with transport. Transport does not reside in some obscure area of policy, like impenetrable transfer systems or areas with intangible benefits, such as culture. However, investment decisions are only a small part of the transport sector, and transport policy is not considered an important political issue by the Swedish public (Novus 2020), suggesting that they do not have preformed opinions.

Some studies suggest that preference formation and choice happen simultaneously. Sharot et al. (2009) and Coppin et al. (2010) contend that preferences are stronger once a choice has been made. Sharot et al. (2009) suggest that commitment to an option in one situation shapes future choices. March (1994) stresses the importance of memory in shaping preferences, reasoning that the memory of a particular choice will be reflected in future preferences. It is however unclear how these studies can distinguish their proposed explanations from the possibility that, until faced with a choice, people have simply not been required to make up their minds. In the context of transport choices, Kroesen et al. (2017) have shown that behaviour is more likely to influence attitude than vice versa.

In Paper IV, we also observe negative preferences for aggregate benefits among a group of individuals. This result is clearly in violation of fundamental assumptions in economics. One reason for this could be that they reject the variable to such an extent that they negatively value it. To my knowledge, there are no studies on how the public perceives cost-benefit analyses (CBAs), although there are some studies of how civil servants, politicians and practitioners perceive them (Beukers et al. 2012, Mouter et al. 2013b, Annema et al. 2015, Ronnle 2019). While these studies all express concerns about the informational value and role of the CBA, the extent to which the public shares these concerns, or if the public is even aware of the concept of CBAs, remains unclear. Even if the public were aware of, and disliked CBAs, the reasonable result would be that the aggregate benefits were non-significant rather than negative. The counterintuitive results thus remain a mystery.

Contribution to the research themes

The overarching aim of this thesis is to contribute to the understanding of conflicts between distributional goals and other goals within the transport sector. The contributions of the individual studies have been discussed in the previous chapter. In this section, I will discuss how these tie into the overarching research themes. The two overarching research questions that I used to operationalise the aim were:

1. What are the distributional outcomes of the transport system?
2. How do different actors incorporate distributional considerations into the allocation of infrastructure investments?

The focus of Papers I and II is on contributing to understanding the conflicts by describing the distributional outcomes of transport policy. Paper III and IV focus on conflicts between distributional considerations and other transport policy goals, specifically by studying the preferences of administrators and citizens for allocating infrastructure investments. No individual paper nor the thesis as a whole make any claims to answer these questions definitively. In this section, I will outline their contribution to understanding and answering the two research questions.

What are the distributional outcomes of the transport system?

Papers I and II contribute to understanding the distributional effects in very different ways and on different levels. The first way in which they do so is through the specific question addressed in each paper. Paper I ask whether ticket purchasing behaviour, and by extension access to subsides, is correlated with income. The answer appears to be yes, to a certain extent. Paper II describes how accessibility can describe spatial variations in prices and by extension, living conditions.

Both papers also contribute to understanding the distributional effects of the transport system in a broader sense. Paper I, does so by to some extent alleviating the problem of information loss when transitioning from descriptions of the individual experience to aggregate depictions of reality. By quantitatively describing a situation previously described qualitatively, we can describe how common that experience is. The connection between the individual experience and

the aggregate level provides us with a different understanding of the issue than aggregate distribution measures such as Gini or Suits coefficients.

The way in which Paper II contributes more broadly is twofold. Firstly, it introduces an accessibility measure that encompasses both land use and the transport system to the study of food deserts and economic studies of price, which have previously relied on crude spatial variables. The introduction of an accessibility measure allows me to describe the combined effect of land use and the transport system. This feature of accessibility essentially allows us to effectively measure agglomeration, which has a multitude of applications, not just for the study of prices but also other issues of urban economics. Paper II is by no means the first paper to use this accessibility measure, but it illustrates one application.

The other way in which Paper II contributes is by illustrating one way in which the benefits of the transport system are channelled from the transport market to other intermediary markets – in this case, the food market. If we think of transport as a cost, as we do in economics, then all the gains that arise in the transport market are eventually exchanged for benefits in other markets. Ultimately, all benefits are reflected in land values. Since the value of land is dependent on the value of production (O´Sullivan 2018), a description of how accessibility is reflected in food prices can help us understand how benefits are transmitted from the transport market to the land market. It is important to understand how the transmission occurs from a distributional perspective as transmission affects the distributional consequences while transmission is taking place. This temporal dimension is often omitted when noting that transport benefits are transmitted to the land market.

How do different actors incorporate distributional considerations into the allocation of infrastructure investments?

Papers III and IV contribute to an understanding of the research question from different perspectives. Figure 2 describes the relationship between the public, politicians and administrators in Swedish transport policy schematically. The public elect politicians, politicians instruct administrators who in turn inform politicians, who then make policy. Papers III and IV deal with a specific element of transport policy, investment allocation. Paper III focuses on administrator behaviour and Paper IV on public preferences.

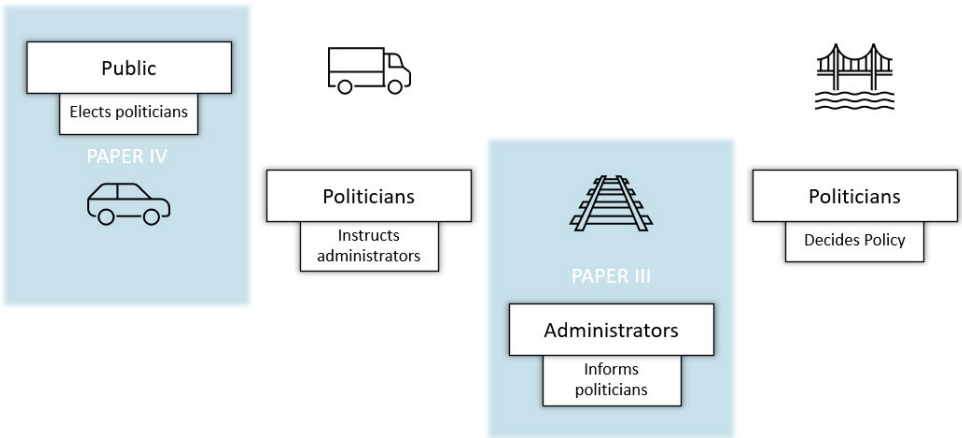


Figure 2 - Flow of transport policy

In describing the individual papers, I discussed the extent to which the public's preferences are actually preferences for transport policy and how administrators and other actors can manipulate the draft national infrastructure plan. The available opportunities to manipulate the framework plan suggest that future studies on what determines investment allocation should focus more on alternative generation than the CBA as a selection criterion.

Given the division of responsibility for transport policymaking, the question of whether the public has specific preferences for investment allocation is not very important. If the public does display specific preferences for investment allocation, then these preferences are relevant, but what if the public does not have specific preferences for investment allocation but instead displays general preferences? In that case, their preferences are equally relevant as it is these that are considered when deciding on transport policy. It is therefore irrelevant whether the preferences we solicit are specific or not.

The enormous amount of time that one would need to devote to remaining informed about every issue is one reason why there are ideologies. Citizens do not elect politicians based solely on their views on specific issues, they also weigh up how they believe politicians will act on issues of which they are unaware or uninformed. Since transport is not regarded as one of the most important political issues, at least in Sweden, it seems plausible that politicians are in a position to form policy relatively independently of public opinion. This also makes transport policy a useful tool in other policy areas that are potentially considered to be more important, such as the environment or regional development.

While the public appears to be more concerned about distributing benefits equally and progressively, it appears that administrators prioritise efficiency, i.e., the amount of benefits. However, this is partly due to the differences in methodology. The different methods do not allow us to make comparisons of gender and income-related preferences. It is however possible to compare geographical preferences. If we roughly compare the volume of new investments in the 2018–2029 framework plan allocated to metropolitan and non-metropolitan regions respectively, we find that 57 per cent of investments were made in non-metropolitan regions. It is not unreasonable to assume that, left to their own devices and given their egalitarian preferences, the public would have produced a similar a plan.

There are at least two possible explanations for the similarities between the public and the administrators in this regard. The first is that politicians are adept at interpreting and passing on the public's preferences to administrators. The second is that preferences for allocating transport investments are fairly similar among the public and administrators. Both explanations support the other. If preferences are widely shared among the public and administrators, it is not unfeasible that politicians share them too. If everyone shares similar preferences, they will be more easily communicated from one group to another. On an aggregate level, there appears to be some consensus on how to allocate transport investments, at least in broad strokes. These preferences appear to be well in line with the overarching goal of Swedish transport policy: Transport and infrastructure policy is about ensuring the provision of economically efficient[7], sustainable transport services for the general public and businesses throughout the country.

[7] The translation is taken from the Government's own website https://www.government.se/government-policy/transport-and-infrastructure/. However, the translation changes the meaning slightly. In Swedish it reads as *socio-economically efficient.*

Concluding reflections

In this section, I will take the opportunity to reflect on two fundamental issues regarding the conflict between distributional considerations and other transport sector goals that I have not touched upon so far. These issues have implications for how to shape policy that achieves as many goals as possible with as few conflicts as possible and what knowledge is needed to ensure that that policy is as effective as can be. These two issues are the *value of accessibility* – i.e., whether accessibility is instrumental or if it has intrinsic value – and the *distribution of accessibility* – i.e., if it is possible to find an overarching distributional principle that should guide transport policy.

The value of accessibility

The most basic question regarding any distribution is the nature of the item of distribution, which in this case is accessibility. There are two ways to conceptualise the value of accessibility: firstly, accessibility gains its value through the opportunities it provides; and secondly, accessibility, or rather mobility, has a direct value.

The first concept, that accessibility gains its value through the opportunities it provides, implies that accessibility is instrumental. The value of accessibility depends on how it affects outcomes in other areas, such as the labour market. This view leads to the conclusion that accessibility is a good that can be translated into other goods – to labour market outcomes, for example – which in turn can be converted into money, which can be converted into other goods. This view underpins the value of time and, by extension, CBA (Mackie et al. 2001).

In the second concept, the distinction between accessibility and mobility comes from the importance of reaching opportunities. As the value of mobility is independent of the opportunities it makes accessible, mobility is perhaps sometimes a more appropriate word. The view that it is mobility rather than accessibility that is important is not the same as to say that reaching one's destination is meaningless, only that the value lies in the individuals' freedom to reach the destination they desire. This view is present in, for example, the capability approach, where the

emphasis is on the individuals' freedom to move rather than whether the movement is actualised (De Vos et al. 2013).

If we view accessibility as instrumental, we do not have to distribute accessibility itself. Instead, we could choose to distribute other resources, such as money, that might be more directly related to the outcome we are trying to achieve and that can be translated into accessibility. This view also deals with some of the "problems" of voluntary inaccessibility discussed by van Wee & Geurs (2011). If people have other resources to translate into accessibility, the public does not need to intervene. Of course, the amount of resources could vary and be greater if the individual has a disability. Another result of this line of reasoning is that it is paramount to understand the effects of accessibility on different individuals in different situations, i.e. the instrumental value of accessibility.

If we instead think that mobility has intrinsic value, we can arrive at the conclusion that we should provide everyone with at least some basic level of mobility. This view is promoted by, among others, Nordbakke (2013) and Martens (2012), both of whom argue that mobility or accessibility is so important that its distribution should be separate from other goods. Their justifications for regarding mobility/accessibility as an essential good in its own right is its importance in providing the individual with the freedom to pursue the life they want. Underpinning this is also the view that people are very different and have very different needs. This line of thinking does, however, entail some analytical challenges.

One significant challenge is the impossibility of observing the difference between need and want. Given that resources are limited, we may wish to focus on giving people what they need to do what they want, rather than giving people what they want directly. Determining how much mobility someone needs contra how much they want is complicated and arguably more complicated in the case of accessibility than for other, more tangible goods, such as housing or food. Another challenge is to determine how this varies from one person to the next.

How we view accessibility thus determines if we should distribute it specifically or merely study the distributional impacts of accessibility. It also determines if we should focus on better understanding the effects of accessibility or determining what constitutes the basic level of mobility that each person needs. Regardless, it is vital to understand the differences in how individuals utilise accessibility and how differences among individuals impact the distribution of accessibility, as studied by, inter alia, Dixit & Sivakumar (2020).

The distribution of accessibility

Regardless of whether accessibility has instrumental or intrinsic value, we must allocate it, which has distributional implications. From an analytical perspective, it is at times necessary to specify which distributional principle is used in the analysis in order to establish if a change is for the better. Some studies present a host of principles and describe how these principles can be used, for example, Pereria et al. (2017) and van Wee & Roeser (2013). Others, such as Lucas et al. (2016), Ryan et al. (2015) and van der Veen et al. (2020), analyse distributional effects from a particular ethical perspective.

While it might be necessary to specify such a principle to conduct the analysis, it is questionable whether the principle used reflects the public's distributional preferences or the considerations behind any given policy. The literature on the willingness to pay taxes shows that the public's acceptance of taxation stems from a mixture of self-interest and values, which does not necessarily fit into any coherent distributional principle. Ultimately, policy is a reflection of the mixture of self-interest and values that make up public preferences, with the added complexity of being a result of past policies and negotiations between different groups, meaning that transport policy is hardly any more likely to fit the mould of any ethical principles. The disconnect between coherent ethical principles and public preferences does not make the public's preferences any less relevant. As Kymlicka (1995) emphasises, if any ethical principle is to be relevant, it has to *feel* right.

The discrepancy between, on the one hand, strict principles and, on the other, policy and preferences raises the question of whether there is any relevance to analysing the distribution of accessibility from these perspectives, other than showing what the consequences of that line of reasoning would be. Given the challenge of shoehorning policy or public preferences into any specific ethical principle, it is perhaps more relevant to thoroughly describe the distributional impacts so that they can be assessed by policymakers and citizens.

Distributional effects are not the only policy objective of transport and infrastructure. Furthermore, many policies are guided by several distributional principles, as exemplified in the overarching goal for the Swedish transport sector and the stated aim that */.../the design, function and use of the transport system should contribute to no deaths or serious injuries*. At the same time as we want to allocate resources where most people can benefit from them, we also want to allocate resources to all regions. The absolute goal to avoid serious injuries or deaths could very well conflict with allocating resources where they are most needed, given our valuation of safety-related traffic risks, as highlighted by Westin et al. (2019).

Regardless of whether the appropriateness of a decision that attempts to reconcile conflicting goals lies in its accordance with underlying preferences or the integrity of the decision-making process, we need to understand how decision-making

processes in the transport sector are designed and the various outcomes they produce. This includes how the different goals are weighed against one another and which goals and indicators are included in deliberations, something that I sincerely hope this thesis will contribute to.

References

Abrantes, P. & Wardman, M. (2011). Meta-analysis of UK values of travel time: An update. Transportation Research Part A: Policy and Practice 45, 1-17.

Acemoglu, D., Aghion, P., Bursztyn, L. & Hemous, D. (2012). The Environment and Directed Technical Change. American Economic Review 102 (1), 131-166.

Alessie, R., Devereux, M. & Weber, J. (1997). Intertemporal consumption, durables and liquidity constraints: A cohort analysis. European Economic Review 41 (1), 37-59.

Allcott, H., Diamond, R., Dubé, J-P., Handbury, J., Rahkovsky, I. & Schnell, M. (2019). Food deserts and the causes of nutritional inequality. The Quarterly Journal of Economics 134 (4) 1793-1844.

Alvesson, M. (2003). Beyond Neopositivists, Romantics, and Localists: A Reflexive Approach to Interviews in Organizational Research. Academy of Management Review 28 (1), 13-33.

Ambrose, D. (1979). Retail Grocery Pricing: Inner City, Suburban, and Rural Comparisons. Journal of Business 52, 95-102.

Anania, G. & Nisticò, R. (2014). Price dispersion and seller heterogeneity in retail food markets. Food Policy 44, 190-201.

Andersson, J. (2017). Trust in Government and Willingness to Pay Taxes in Transition Countries. Comparative Economic Studies 59, 1-22.

Andersson, Å. & Strömquist, U. (1988). K-samhällets framtid. Stockholm: Prisma.

Andersson, M., Brundell-Freij, K. & Eliasson, J. (2017). Validation of aggregate reference forecasts of passenger transport. Transportation Research Part A: Policy and Practice 96, 101-118.

Andersson, M., Brundell-Freij, Jonsson, L. & Vourenmaa Berdica, K. (2017). Attityder till infrastrukturfinansiering – Delrapport 5 i forskningsprojektet ”Höghastighetståg: markvärden och finansiering”. Working Paper 2017:5. Division of Real Estate Science: Lund University.

Andersson-Skog, L. (2006). Kommunikationer i ekonomisk-historisk belysning. In Hedenborg, S. & Morell, M. (ed.), Sverige – en social och ekonomisk historia. Lund: Studentlitteratur.

Anderstig, C., Berglund, S., Eliasson, J. & Andersson, M. (2016). Congestion Charges and Labour Market Imperfections. Journal of Transport Economics and Policy 50 (2), 113-131.

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm glow giving. The Economic Journal 100 (401), 464-477.

Annema, J.A., Koopmans, C. & van Wee, B. (2007). Evaluating Transport Infrastructure Investments: The Dutch Experience with a Standardized Approach. Transport Reviews 27 (2), 125-150.

Annema, J.A., Mouter, N. & Razaei, J. (2015). Cost-benefit Analysis (CBA), or Multi-criteria Decision-making (MCDM) or Both: Politicians' Perspective in Transport Policy Appraisal. Transportation Research Procedia 10, 788-797.

Annema, J.A., Frenken, K., Koopmans, C. & Kroesen, M. (2017). Relating cost-benefit analysis results with transport project decisions in the Netherlands. Letters in Spatial and Resource Sciences 10 (1), 109-127.

Anseel, F., Lievens, F., Schollaert, E. & Choragwicka, B. (2010). Response Rates in Organizational Science, 1995-2008: A Meta-analytic Review and Guidelines for Survey Researchers. Journal of Business Psychology 25, 335-349.

Antoun, C., Couper, M. & Conrad, F. (2017). Effects of Mobile versus PC Web on Survey Response Quality: A Crossover Experiment on a Probability Web Panel. Public Opinion Quarterly 81 (S1), 280-306.

Arrow, K., Solow, R., Portney, P., Leamer, E., Radner, R. & Schuman, H. (1993). Report on the NOAA panel of contingent valuation. Federal Register 58, 4601-14.

Asplund, M. & Friberg, R. (2002). Food Prices and Market Structure. Scandinavian Journal of Economics 104 (4), 547-566.

Axhausen, K., Hess, S., König, A., Abay, G., Bates, J. & Bierlaire, M. (2008). Income and distance elasticities of values of travel time savings: New Swiss results. Transport Policy 15 (3), 173-185.

Baldwin Hess, D. & Lombardi, P. (2005). Governmental Subsidies for Public Transit – History, Current Issues, and recent Evidence. Public Works Management & Policy 10 (2), 138-156.

Barron, J., Taylor, B. & Umbeck, J. (2004). Number of sellers, average prices and price dispersion. International Journal of Industrial Organization 22, 1041-1066.

Bastiaanssen, J., Johnsson, D. & Lucas, K. (2020). Does transport help people gain employment? A systematic review of the empirical evidence. Transport Reviews 40 (5), 607-628.

Baum-Snow, N. (2007). Did Highways Cause Suburbanization? The Quarterly Journal of Economics 122 (2), 775-805.

Baumol, W. (1972). On Taxation and the Control of Externalities. American Economic Review 62 (3), 307-322.

Beck, M., Fifer, S. & Rose, J. (2016). Can you ever be certain? Reducing hypothetical bias in stated choice experiments via respondent reported choice certainty. Transportation Research Part B: Methodological 89, 149-167.

Becker, G. (1965). A theory on the allocation of time. The Economic Journal 75 (299), 493-517.

Ben-Akiva, M., Bradley, M., Morikawa, T., Benjamin, J., Novak, T., Oppenwal, H. & Rao, V. (1994). Combining revealed and stated preference data. Marketing Letters 5, 335-349.

Bengtsson, T. (1990) Migration, wages, and urbanization in Sweden in the nineteenth century. In van der Woude, AD., Hayami, A. & de Vries, J. (ed). Urbanization in History – A process of Dynamic Interactions. Oxford: Clarendon Press.

Berinsky, A., Margolis, M. & Sances, M. (2014). Separating the Shirkers from the Workers? Making Sure Respondents Pay Attention on Self-Administered Surveys. American Journal of Political Science 58 (3), 739-753.

Beukers, E., Bertolini, L. & Te Brömmelstroet, M. (2012). Why Cost Benefit Analysis is perceived as a problematic tool for assessment of transport plans: A process perspective. Transportation Research Part A: Policy and Practice 46 (1), 68-78.

Bishop, R. & Boyle, K. (2019). Reliability and Validity in Non-Market Valuation. Environmental and Resource Economics 72, 559-582.

Blumenberg, E. &Weinstein Agrawal, A. (2014). Getting Around When You're Just Getting By: Transportation Survival Strategies of the Poor. Journal of Poverty 18 (4), 355-378.

Boal, W. & Ransom, M. (1997). Monopsony in the Labor market. Journal of Economic Literature 35 (1), 86-112.

Bocarejo, J-P. & Oviedo, D. R. (2012). Transport accessibility and inequities: a tool for identification of mobility needs and evaluation of transport investments. Journal of Transport Geography 24, 142-154.

Bondemark, A. (2020). The relationship between accessibility and price – The case of Swedish food stores. Journal of Transport Geography 82, 102615.

Bondemark, A., Andersson, H., Wretstrand, A. & Brundell-Freij, K. (2020). Is it expensive to be poor? Public transport in Sweden. Transportation. https://doi.org/10.1007/s11116-020-10145-5

Brekke, K A., Kverndokk, S. & Nyborg, K. (2003). An economic model of moral motivation. Journal of Public Economics 87, 1967-1983.

Brown, A., (2018). Fair fares? How flat and variable fares affect transit equity in Los Angeles. Case Studies on Transport Policy 6, 765-773.

Brown, J., Morris, E. & Taylor, B. (2009). Planning for Cars in Cities. Journal of the American Planning Association 75 (2), 161-177.

Brunsson, N. (2007). The Consequences of Decision-Making. Oxford University Press: Oxford.

Brunsson, N. & Sahlin-Andersson, K. (2000). Construction Organizations: The Example of Public Sector Reform. Organization Studies 21 (4), 721-746.

Börjesson, M. (2019). Kan investeringar i transportinfrastruktur öka produktivitet och sysselsättning?. SNS Förlag: Stockholm.

Börjesson, M. & Eliasson, J. (2014). Experiences from the Swedish Value of Time study. Transportation Research Part A: Policy and Practice 59, 144-158.

Börjesson, M., Eliasson, J. & Hamilton, C. (2016). Why experience changes attitudes to congestion pricing: The case of Gothenburg. Transportation Research Part A: Policy and Practice 85, 1-16.

Börjesson, M., Eliasson, J. & Rubensson, I. (2019). Distributional Effects of Public Transport Subsidies. Journal of Transport Geography 84, 102674.

Börjesson, M., Hamilton, C., Näsman, P. & Papaix, C. (2015). Factors driving public support for road congestion reduction policies: Congestion charging, free public transport and more roads in Stockholm Helsinki and Lyon. Transportation Research Part A: Policy & Practice 78, 452-462.

Börjesson, M., Isacsson, G., Andersson, M. & Anderstig, C. (2019). Agglomeration, productivity and the role of transport system improvements. Economics of Transportation 18, 27-39.

Cadot, O., Röller, L-H. & Stephan, A. (2006). Contributions to productivity or pork barrel? The two faces of infrastructure investment. Journal of Public Economics 90, 1133-1153.

Calthrop, E. & Proost, S. (1998). Road Transport Externalities. Environmental and Resource Economics 11 (3-4), 335-348.

Carlson, J.A. & McAfee R.P. (1983). Discrete equilibrium price dispersion. Journal of Political Economy 91, 480-493.

Carlsson, F., Kataria, M., Krupnick, A., Lampi, E., Löfgren, Å., Qin, P. & Sterner, T. (2013). The truch, the whole truch, and nothing but the truth – A multiple country test of an oath script. Journal of Economic Behavior & Organization 89, 105-121.

Cervero, R. (1981). Flat versus differentiated transit fares: what's a fair fare? Transportation 10, 211-232.

Cervero, R. (1995). Sustainable new towns – Stockholm's rail-served satellites. Cities 12 (1), 41-51.

Cervero, R. & Dai, D. (2014). BRT TOD: Leveraging transit oriented development with bus rapid transit investments. Transport Policy 36, 127-138.

Cervero, R. & Day, J. (2008). Suburbanization and transit-oriented development in China. Transport Policy 15, 315-323.

Chatman, D. & Noland, R. (2011). Do Public Transport Improvements Increase Agglomeration Economies? A review of Literature and an Agenda for Research. Transport Reviews 31 (6), 725-742.

Cheng, J. & Bertolini, L. (2013). Measuring urban job accessibility with distance decay, competition and diversity. Journal of Transport Geography 30, 100-109.

Chimi, C. & Russell, D. (2009). The Likert scale: A proposal for improvement using quasi-continuous variables. Paper presented at the ISECON November 2009, Washington, DC.

Clarke, G., Eyre, H. & Guy, C. (2002). Deriving Indicators of Access to Food Retail Provision in British Cities: Studies of Cardiff, Leeds and Bradford. Urban studies 39 (11), 2041-2060.

Clifton, J., Díaz-Fuentes, D. & Fernández-Gutiérrez, M. (2016). Public Infrastructure Services in the European Union: Challenges for Territorial Cohesion, Regional Studies 50 (2), 358-373.

Cohen, M., March, J. & Olsen, J. (1972). A Garbage Can Model of Organisational Choice. Administrative Science Quarterly 17 (1), 1-25.

Colburn, H. (2013). Connectivity and Communication in the Achaemenid Empire. Journal of the Economic and Social History of the Orient 56 (1), 29-52.

Collins, B. & Kim, H. (2009). Are satisfied citizens willing to pay more? Public sector consumerism as equitable social exchange. Public Money and Management 29 (2), 109-116.

Combes, P-P. & Gobillon L. (2015). The Empirics of Agglomeration Economies, in Duranton, G., Henderson, V. & Strange, W., (eds), Handbook of Urban and Regional Economics, vol. 5. (Amsterdam: North-Holland), 247-348.

Condeço-Melhorado, A., Martín, J. C. & Gutiérrez, J. (2011). Regional Spillover of Transport Investments: A Territorial Cohesion Analysis. European Journal of Transport and Infrastructure Research 11 (4), 389-404.

Coppin, G., Delplanque, S., Cayeux, I., Porcherot, C. & Sander, D. (2010). I'm No Longer Torn After Choice: How Explicit Choices Implicitly Shape Preferences of Odors. Psychological Science 21 (4), 489-493.

Cotterill, R. (1986). Market Power in the Retail Food Industry: Evidence from Vermont. The Review of Economics and Statistics 68 (3), 379-386.

Crimmins, J. E. (2019). Jeremy Bentham. The Stanford Encyclopedia of Philosophy (Summer 2019 Edition), Edward N. Zalta (ed.). Available: https://plato.stanford.edu/archives/sum2019/entries/bentham/ [23.03.2020]

Cummins, S. & Macintyre, S. (2002). A Systematic Study of an Urban Foodscape: The Price and Availability of Food in Greater Glasgow. Urban studies 39 (11), 2115-2130

Curran, P. (2016). Methods for detection of carelessly invalid responses in survey data. Journal of Experimental Social Psychology 66, 4-19.

Curry, D. & Riesz, P. (1988). Prices and Price/Quality Relationships: A Longitudinal Analysis. Journal of Marketing 52, 36-51.

Curtin, R., Presser, S. & Singer, E. (2005). Changes in telephone survey nonresponse over the past quarter century. Public Opinion Quarterly 69 (1), 87-98.

Curtis, J. & McConnell. K. (2002). The citizen versus consumer hypothesis: Evidence from a contingent valuation survey. Australian Journal of Agricultural and Resource Economics 46 (1), 69-83.

Dahlman, C. (1979). The Problem of Externality. Journal of Law and Economics 22 (1), 141–162.

de Jong, G., Daly, A., Pieters, M., Miller, S., Plasmeijer, R. & Hofman, F. (2007). Uncertainty in traffic forecasts: literature review and new results for The Netherlands. Transportation 34, 375-395.

De La Roca, J. & Puga, D. (2017). Learning by Working in Big Cities. The Review of Economic Studies 84 (1), 106-142.

de Palma, A. & Lindsey, R. (2011). Traffic congestion pricing methodologies and technologies. Transportation Research Part C: Emerging Technologies 19, 1377-1399.

de Serpa, A. (1971). A Theory of the Economics of Time. The Economic Journal 81 (324), 828-846.

De Vos, J., Schwanen, T., Van Acker, V. & Witlox, F. (2013). Travel and Subjective Well-Being: A Focus on Findings, Methods and Future Research Needs. Transport Reviews 33 (4), 421-442.

De-Magistris, T. & Pascucci, S. (2014). The effect of the solemn oath script in hypothetical choice experiment survey: A pilot study. Economic Letters 123 (2), 252-255.

Deltas, G. (2008). Retail gasoline price dynamics and local market power. The Journal of Industrial Economics. 61 (3), 613-628.

Dillman, D., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J. & Messer, B. (2009). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the Internet. Social Science Research 38, 1-18.

Dixit, M. & Sivakumar, A. (2020). Capturing the impact of individual characteristics on transport accessibility and equity analysis. Transportation Research Part D: Transport and Environment 87, 102473.

Donaldsson, D. (2018). Railroads of the Raj: Estimating the Impact of Transportation Infrastructure. American Economic Review 108 (4-5), 899-934.

Duranton, G. & Puga, D. (2001). Nursery Citites: Urban Diversity, Process Innocation, and the Life Cycle of Products. American Economic Review 91 (5), 1454-1477.

Duranton, G. & Puga, D. (2004). Micro-foundations of urban agglomeration economies, in Henderson,: J. V. & Thisse, J.-F. (eds) Handbook of Regional and Urban Economics, vol 4: 2063– 2117. Amsterdam, NY: Elsevier.

D'Costa, S. & Overman, H. (2014). The Urban wage growth premium: Sorting or learning?. Regional Science and Urban Economics 48, 168-179.

Eliasson, J. (2001). Att mäta tillgänglighet med logsummor. Transek: Sundbyberg.

Eliasson, J. (2016). Is congestion pricing fair? Consumer and citizen perspectives on equity effects. Transport Policy 52, 1-15.

Eliasson, J., Börjesson, M., van Amelsfort, D., Brundell-Freij, K. & Engelson, L. (2013). Accuracy of congestion pricing forecasts. Transportation Research Part A: Policy and Practice 52, 34-46.

Eliasson, J., Börjesson, M., Odeck, J. & Wolde, M. (2015). Does Cost-Benefit Efficiency Influence Transport Investment Decisions?. Journal of Transport Economics and Policy 49 (3), 377-396.

Eliasson, J. & Fosgerau, M. (2019). Cost-benefit analysis of transport improvements in the presence of spillovers, matching and an income tax. Economics of Transportation 18, 1-9.

Eliasson, J. & Jonsson, L. (2011). The unexpected "yes": Explanatory factors behind positive attitudes to congestion charges in Stockholm. Transport Policy 18 (4), 636-647.

Eliasson J. & Lundberg, M. (2012). Do Cost-Benefit Analyses Influence Transport Investment Decisions? Experiences from the Swedish Transport Investment Plan 2010-21. Transport Reviews 32 (1), 29-48.

Eliasson, J., Pyddoke, R. & Swärdh, J-E. (2018). Distributional effects of taxes on car fuel, use, ownership and purchases. Economics of Transportation 15, 1-15.

El-Geneidy, A., Levinson, D., Diab, E., Boisjoly, G., Verbich, D. & Loong, C. (2016). The cost of equity: Assessing transit accessibility and social disparity using total travel cost. Transportation Research Part A: Policy and Practice 91, 302-316.

Engels, B. & Liu, G-J. (2011). Social exclusion, location and transport disadvantage amongst non-driving seniors in a Melbourne municipality, Australia. Journal of Transport Geography 19 (4), 984-996.

Eriksson, L., Garvill, J. & Nordlund, A. (2008). Acceptability of single and combined transport policy measures: The importance of environmental and policy specific beliefs. Transportation Research Part A: Policy and Practice 42, 1117-1128.

Ewing, R. & Cervero, R. (2010). Travel and the Built Environment – A Meta-Analysis. Journal of the American Planning Association 76 (3), 265-294.

Farber, S., Neutens, T., Miller, H. & Li, X. (2013). The Social Interaction Potential of Metropolitan Regions: A Time-Geographic Measurement Approach Using Joint Accessibility. Annals of the Association of American Geographers 103 (3), 483-504.

Flyvbjerg, B. (2014). What You Should Know About Megaprojects and Why: An Overview. Project Management Journal 45 (2), 6-19.

Fosgearu, M. (2006). Investigating the distribution of the value of travel time savings. Transportation Research Part B: Methodological 40 (8), 688-707.

Fridstrøm, L. & Elvik, R. (1997). The barely revealed preference behind road investment priorities. Public Choice 92 (1-2), 145-168.

Friedman, M. (1957). A Theory of the Consumption Function. New Jersey: Princeton University Press

Frändberg, L. & Vilhelmsson, B. (2011). More or less travel: personal mobility trends in the Swedish population focusing on gender and cohort. Journal of Transport Geography 19, 1235-1244.

Geurs, K. & van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. Journal of Transport Geography 12, 127-140.

Glaeser, E. & Kohlhase, J. (2004). Cities, Regions and the Decline of Transport Costs. Papers in Regional Science 83, 197–228.

Glaser, M. & Hildreth, B. (1999). Service Delivery Satisfaction and Willingness to Pay Taxes: Citizen Recognition of Local Government Performance. Public Productivity & Management Review 23 (1), 48-67.

Gibson, J. & Kim, B. (2013). Do the urban poor face higher food prices? Evidence from Vietnam. Food Policy 41, 193-203.

Graham, D. (2007). Agglomeration, productivity and transport investment. Journal of Transport Economics and Policy 41, 317–343.

Graham, P. & Mulley, C. (2012). Public transport pre-pay tickets: Understanding passenger choice for different products. Transport Policy 19, 69-75.

Greenlaw, C. & Brown-Welty, S. (2009). A Comparison of Web-Based and Paper-Based Survey Methods – Testing Assumptions of Survey Mode and Response Cost. Evaluation Review 33 (5), 464-480.

Gullstrand, J. & Jörgensen, C. (2012). Local Price Competition: The Case of Swedish Food Retailers. Journal of Agricultural & Food Industrial Organization 10 (1), 1-25.

Gutiérrez-i-Puigarnau, E. & van Ommeren, J. (2015). Commuting and labour supply revisited. Urban Studies 52 (14), 2551-2563.

Halás, M., Klapka, P. & Kladivo, P. (2014). Distance-decay functions for daily travel-to-work flows. Journal of Transport Geography 35, 107-119.

Hallgrimsdottir, B. & Ståhl, A. (2018). The impact of measures taken in the outdoor environment on an ageing population: a panel study over a ten-year period. Ageing and Society 38, 217-239.

Hamilton, C., Eliasson, J., Brundell-Freij K., Raux, C., Souche, S. Kiiskilää, K. & Tervonen J. (2014). Determinants of congestion pricing acceptability. CTS Working Paper 2014:11.

Hammar, H. & Jagers, S. (2006). Can trust in politicians explain individuals' support for climate policy? The case of CO_2 tax. Climate Policy 5 (6), 613-625.

Hammar, H., Jagers, S., Nordblom, K. (2008). Attitudes towards Tax Levels: A Multi-Tax Comparison. Fiscal Studies 29 (4), 523-543.

Hammar, H., Jagers, S., Nordblom, K. (2009). Perceived tax evasion and the importance of trust. The Journal of Socio-Economics 38, 238-245.

Hansla, A., Hysing, E., Nilsson, A. & Martinsson, J. (2017). Explaining voting behavior in the Gothenburg congestion tax referendum. Transport Policy 53, 98-106.

Hays, R., Liu, H. & Kapteyn, A. (2015). Use of Internet panels to conduct surveys. Behavior Research Methods 47, 685–690.

Heblich, S., Redding, S. & Sturm, D. (2018). The Making of the Modern Metropolis: Evidence from London. CEP Discussion Papers dp1573, Centre for Economic Performance, LSE.

Heerwegh, D. (2009). Mode Differences Between Face-to-Face and Web Surveys: An Experimental Investigation of Data Quality and Social Desirability Effects. International Journal of Public Opinion Research 21 (1), 111-121.

Hensher, D. (2010). Hypothetical bias, choice experiments and willingness to pay. Transportation Research Part B: Methodological 44 (6), 735-752.

Hensher, D., Rose, J. & Beck, M. (2012). Are there specific design elements of choice experiments and types of people that influence choice response certainty? Journal of Choice Modelling 5 (1), 77-97.

Hjelm, G. & Stockhammar, P. (2016). Short Run Effects of Fiscal Policy on GDP and Employment: Swedish Evidence. Working Paper 147. National Institute of Economic Research: Stockholm.

Holmgren, J. & Merkel, A. (2017). Much ado about anything? A meta-analysis of the relationship between infrastructure and economic growth. Research in Transportation Economics 63, 13-26.

Hotelling, H. (1929). Stability in Competition. The Economic Journal 39 (153), 41-57.

Huang, J., Curran, P., Keeney, J., Poposki, E. & DeShon, R. (2012). Detecting and Deterring Insufficient Effort Responding to Surveys. Journal of Business Psychology 27, 99-114.

Hultén, J. (2012). Nya väg till vägar och järnvägar: Finansieringspragmatism och planeringsrationalism vid beslut om infrastrukturinvesteringar. Diss. Lund: Lunds Universitet.

Hägerstrand, T. (1970). What about people in regional science? People of the Regional Science Association 24, 7-21.

Isaksson, K. (2010). Lokalsamhället och vardagens transporter – berättelser från Vadstena, Åtvidaberg och Ljura i Norrköping. Rapport 2010:6. Norrköping: Centrum för kommunstrategiska studier.

Jamieson, S. (2004). Likert scales: How to (ab)use them. Medical Education, 38, 1212–1218.

Jimenez, J. L. & Perdiguero, J. (2011). Does Accessibility Affect Retail Prices and Competition? An Empirical Application. Network and Spatial Economics 11, 677-699.

Johannesson, L. & Qvist, M. (2020). Navigating the policy stream: Contested solutions and organizational strategies of policy entrepreneurship. International Review of Public Policy 2 (1), 5-23.

Johansson, E., Winslott Hiselius, L., Koglin, T. & Wretstrand, A. (2017). Evaluation of public transport: regional policies and planning practices in Sweden. Urban, Planning and Transport Research 5 (1), 59-77.

Johnston, R., Boyle, K., Adamowicz, W., Bennett, J., Brouwer, R., Cameron, T. A., Hanemann, M., Hanley, N., Ryan, M., Scarpa, R., Tourangeau, R. & Vossler, C. (2017). Contemporary Guidance for Stated Preference Studies. Journal of the Association of Environmental and Resource Economists 4 (2), 319-405.

Jones, P. & Lucas, K. (2012). The social consequences of transport decision-making: clarifying concepts, synthesising knowledge and assessing implications. Journal of Transport Geography 21, 4-16.

Kahneman, D. (2011) Thinking, Fast and Slow. New York: Farrar, Straus and Giroux.

Kallbekken, S., Kroll, S. & Cherry, T. (2011). Do you not like Pigou, or do you not understand him? Tax aversion and revenue recycling in the lab. Journal of Environmental Economics and Management 62, 63-64.

Kallbekken, S. & Sælen, H. (2011). Public acceptance for environmental taxes: Self-interest, environmental and distributional concerns. Energy Policy 39 (5), 2966-2973.

Kallstenius, P. (2010). Minne och Vision – Stockholms stadsutveckling i dåtid, nutid och framtid. Stockholm: Bokförlaget Max Ström.

Kenworthy, J. & Laube, F. (1999). Patterns of automobile dependence in cities, and international overview of key physical and economic dimensions with some implications for urban policy. Transportation Research Part A: Policy and Practice 33, 691-723.

Kingdon, J. W. (1984). Agendas, alternatives, and public policies. New York: Harper Collins.

Kolodinsky, J., Battista, G., Roche, E., Lee, B. & Johnson, R. (2017). Estimating the effect of mobility and food choice on obesity in a rural, northern environment. Journal of Transport Geography 61, 30-39.

Kraus, M. (1991). Discomfort Externalities and Marginal Transit Fares. Journal of Urban Economics 29, 249-259.

Kristoffersson, I., Daly, A. & Algers, S. (2018). Modelling the attraction of shopping destinations in large scale modelling. Transport Policy 68, 52-62.

Kroesen, M., Handy, S. & Chorus, C. (2017). Do attitudes cause behavior or vice versa? An alternative conceptualization of the attitude-behavior relationship in travel behavior modeling. Transportation Research Part A: Policy and Practice 101, 190-202.

Krämer, R. (2016) Trading Goods – Trading Gods. Greek Sanctuaries in the Mediterranean and their Role as emporia and 'Ports of Trade' (7th–6th Century BCE). Distant Worlds Journal 1, 75-98.

Kunreuther, H. (1973). Why the Poor May Pay More for Food: Theoretical and Empirical Evidence. Journal of Business 46, 368-383.

Kymlicka, W. (1995). Modern politisk filosofi – En introduktion. Nora: Nya Doxa.

Leigh, A. & Neill, C. (2011). Can national infrastructure spending reduce local unemployment? Evidence from an Australian roads program. Economic Letters 113, 150-153.

Leunig, T. (2006). Time is money: a re-assessment of the passenger social savings from Victorian British railways. Journal of economic history 66 (3), 635-673.

Ljungberg, A. (2013). Regional kollektivtrafik – några grundläggande välfärdsfrågor. Trafikanalys PM 2013:1.

López, E., Gutiérrez, J. & Gómez, G. (2008). Measuring Reginal Cohesion Effects of Large-scale Transport Infrastructure Investments: An Accessibility Approach. European Planning Studies 16 (2), 277-301.

Lucas, K. (2011). Making the connections between transport disadvantage and social exclusion of low income populations in the Tshwane Region of South Africa. Journal of Transport Geography 19, 1320-1334.

Lucas, K., van Wee, B. & Maat, K. (2016). A method to evaluate equitable accessibility: combining ethical theories and accessibility-based approaches. Transportation 43, 473-490.

Luttmer, E. & Singhal, M. (2014). Tax Morale. Journal of Economic Perspectives 28 (4), 149-168.

MacDonald, J. & Nelson, P. (1991). Do the Poor Still Pay More? Food Price Variations in Large Metropolitan Areas. Journal of Urban Economics 30, 344-359.

Mackie, P.J., Jara-Diaz, S. & Fowkes, A.S. (2001). The value of travel time savings in evaluation. Transportation Research Part E: Logistics and Transportation Review 37, 91-106.

Mani, A., Mullainathan, S., Shafir, E. & Zhao, J. (2013). Poverty Impedes Cognitive Function. Science 341 (6149), 976-980.

Manning, A. (2010). The plant size-place effect: agglomeration and monopsony in labour markets. Journal of Economic Geography 10, 717-744.

March, J. G. (1994). A Primer on Decision Making – How Decisions Happen. New York: The Free Press.

Mark, T. & Swait, J. (2004). Using stated preference and revealed preference modeling to evaluate prescribing decisions. Health Economics 13, 563-573.

Martens, K. (2012). Justice in transport as justice in accessibility: applying Walzer's 'Spheres of Justice' to the transport sector. Transportation 39, 1035-1053.

Martínez, M. & Viegas, J. M. (2013). A new approach to modelling distance-decay functions for accessibility assessment in transport studies. Journal of Transport Geography 26, 87-96.

Matas, A. & Raymond, J-L. (2009). Hedonic prices for cars: an application to the Spanish car market, 1981–2005. Applied Economics 41, 2887-2904.

Matthijsse, S., de Leeuw, E. & Hox, J. (2015). Internet Panels, Professional Respondents and Data Quality. Methodology 11, 81-88.

Mattsson, L-G. & Weibull, J. (1981). Competition and accessibility on a regional labour market. Regional Science and Urban Economics 11, 471-497.

McFadden, D. (1975). The Revealed Preferences of a Government Bureaucracy: Theory. The Bell Journal of Economics 6 (2), 401-416.

McFadden, D. (1976). The Revealed Preferences of a Government Bureaucracy: Empirical evidence. The Bell Journal of Economics 7 (1), 55-72.

McGrath, R., Michell, M., Kim, B. & Hough, L. (2010). Evidence for Response Bias as a Source of Error Variance in Applied Assessment. Psychological Bulletin 136 (3), 450-470.

Meade, A. & Craig, B. (2012). Identifying Careless Responses in Survey Data. Psychological Methods 17 (3), 437-455.

Meginnis, K., Burton, M., Chan, R. & Rigby, D. (2018). Strategic bias in discrete choice experiments. Journal of Environmental Economics and Management, 102163.

Melo, P., Graham, D. & Brage-Ardao, R. (2014). The productivity of transport infrastructure investments: A meta-analysis of empirical evidence. Regional Science and Urban Economics 43 (5), 695-706.

Mieszkowski, P. & Mills, E. (1993). The causes of Metropolitan Suburbanization. Journal of Economic Perspectives 7 (3), 135-147.

Miller, E. J. (2018). Accessibility: measurement and application in transportation planning. Transport Reviews 38 (5), 551-555.

Miller, H. (1991). Modelling accessibility using space-time prism concepts within geographical information systems. International Journal of Geographical Information System 5 (3), 287-301.

Miniard, P. & Cohen, J. (1981). An Examination of the Fishbein-Ajzen Behavioral Intentions Model's Concepts and Measure. Journal of Experimental Social Psychology 17, 309-339.

Mohring, H. (1972). Optimization and Scale Economics in Urban Bus Transportation. The American Economic Review 62 (4), 591-604.

Monroe, C. & Maziarz, T. (1985). American work-trip distances: a reversal of the historical trend. Geography 70 (4). 359-362.

Mouter, N. (2017). Dutch politicians' attitudes towards Cost-Benefit Analysis. Transport Policy 54, 1-10.

Mouter, N., Annema, J.A. & van Wee, B. (2013a). Attitudes towards the role of Cost-Benefit Analysis in the decision-making process for spatial- infrastructure projects: A Dutch case study. Transportation Research Part A: Policy and Practice 58, 1-14.

Mouter, N., Annema, J.A. & van Wee, B. (2013b). Ranking the substantive problems in the Dutch Cost–Benefit Analysis practice. Transportation Research Part A: Policy and Practice 49, 241-255.

Mouter, N., van Cranenburgh, S., & van Wee, B. (2017a). Do individuals have different preferences as consumers and citizen? The trade-off between travel time and safety. Transportation Research Part A: Policy and Practice 106, 333-349.

Mouter, N., van Cranenburgh, S., & van Wee, B. (2017b). An empirical assessment of Dutch citizens' preferences for spatial equality in the context of a national transport investment plan. Journal of Transport Geography, 60, 217-230.

Naess, P. (2012). Urban form and travel behavior: Experience from a Nordic context. The Journal of Transport and Land Use 5 (2), 21-45.

Nasri, A. & Zhang, L. (2014). The analysis of transit-oriented development (TOD) in Washington, D.C. and Baltimore metropolitan areas. Transport Policy 32, 172-179.

Nellthorp, J. & Mackie, P. (2000). The UK Roads Review – a hedonic model of decision making. Transport Policy, 7 (2), 127-138.

Neutens, T., Schwanen, T., Witlox, F. & De Maeyer, P. (2010). Equity of urban service delivery: A comparison of different accessibility measures. Environment and Planning A 42, 1613-1635.

Nilsson, J.-E. (1991). Investment Decisions in a Public Bureaucracy: A Case Study of Swedish Road Planning Practices. Journal of Transport Economics and Policy, 25(2), 163–175.

Nordbakke, S. (2013). Capabilities for mobility among urban older women: barriers, strategies and options. Journal of Transport Geography 26, 166-174.

Nordbakke, S. & Schwanen, T. (2015). Transport, unmet activity needs and wellbeing in later life: exploring the links. Transportation 42, 1129-1151.

Nordhaus, W. (2018). Projections and Uncertainties about Climate Change in an Era of Minimal Climate Policies. American Economic Journal: Economic Policy 10 (3), 333-360.

Norman, T., Börjesson, M. & Anderstig, C. (2017). Labour Market Accessibility and Unemployment. Journal of Transport Economics and Policy 51 (1), 47-73.

Novus (2020). Viktigaste politiska frågan. Novus Rapport. Available: https://novus.se/wp-content/uploads/2020/03/novusviktigastefrgafeb2020v1.pdf [04.11.2020]

Nulty, D. (2008). The adequacy of response rates to online and paper surveys: what can be done?. Assessment & Evaluation in Higher Education 33 (3), 301-314.

Nyborg, K. (1998). Some Norwegian politicians' use of cost-benefit analysis. Public Choice 95 (3-4), 381-401.

Nyborg, K. (2000). Homo Economicus and Homo Politicus: interpretation and aggregation of environmental values. Journal of Economic Behaviour and Organization 42, 305-322.

Odeck, J. (1996). Ranking of regional road investment in Norway – Does socioeconomic analysis matter? Transportation 23 (2), 123-140.

Odeck, J. (2010). What Determines Decision-Makers' Preferences for Road Investments? – Evidence from the Norwegian Road Sector. Transport Reviews 30 (4).

Oh, H. & Hong, J. (2012). Citizens' trust in government and their willingness-to-pay. Economic Letters 115 (3), 345-347.

O´Sullivan, A. (2018). Urban Economics, Ninth edition. Boston: McGraw-Hill Education.

O'Toole, B., Battistutta, D., Long, A. & Crouch, K. (1986). A Comparison of Costs and Data Quality of Three Health Survey Methods: Mail, Telephone and Personal Home Interview. American Journal of Epidemiology 124 (2), 317-328.

Paez, A., Mercado, R., Farber, S., Morency, C. & Roorda, M. (2010). Relative Accessibility Depreciation Indicators for Urban Settings: Definitions and Application to Food Deserts in Montreal. Urban Studies 47 (7), 1415-1438.

Paez, A. Scott, D. & Morency, C. (2012). Measuring Accessibility: positive and normative implementations of various accessibility indicators. Journal of Transport Geography 25, 141-153.

Papa, E. & Bertolini, L. (2015). Accessibility and Transit-Oriented Development in European metropolitan areas. Journal of Transport Geography 47, 70-83.

Parry, I., Wallis, M. & Harrington, W. (2007). Automobile Externalities and Policy. Journal of Economic Literature 45, 373-399.

Pereira, R., Schwanen, T. & Banister, D. (2017). Distributive justice and equity in transportation. Transport Reviews 37 (2), 170-191.

Pike, A., Rodriguez-Pose, A. & Tomaney, J. (2017). Local and Regional Development. 2nd ed. Milton: Routledge.

Pissarides, C. (1978). Liquidity considerations in the theory of consumption. The Quarterly Journal of Economics 92 (2), 279-296.

Pizer, W. & Sexton, S. (2018). The distributional Impacts of Energy Taxes. Review of Environmental Economics and Policy 13 (1), 104-123.

Preston, J. & Rajé F. (2007). Accessibility, mobility and transport-related social exclusion. Journal of Transport Geography 15, 151-160.

Puga, D. (2010). The magnitude and causes of agglomeration economies. Journal of Regional Science 50 (1), 203-219.

Redding, S & Turner M. (2015). Transportation Costs and the Spatial Organization of Economic Activity, in Duranton, G., Henderson, V. & Strange, W., (eds), Handbook of Urban and Regional Economics, vol. 5. (Amsterdam: North-Holland), 1339–1398.

Renne, J., Tolford, T., Hamidi, S. & Ewing, R. (2016). The Cost and Affordability Paradox of Transit Oriented Development: A Comparison of Housing and Transportation Costs Across Transit-Oriented Development, Hybrid and Transit-Adjacent Development Station Typologies. Housing Policy Debate 26 (4-5), 819-834.

Rese, M., Hundertmark, A., Schimmelpfenning, H. & Schons, L. M. (2013). Loyalty program types as drivers of customer retention: a comparison of stand-alone programs and multi-vendor loyalty programs through the lens of transaction cost

economics, The International Review of Retail, Distribution and Consumer Research 23 (3), 305-323.

Rezaeestakhruie, H. (2017). Analytical Error Propagation in Four-Step Transportation Demand Models. Diss. The University of Queensland, Australia. Brisbane: The University of Queensland.

Riesz, P. (1979). Price-Quality Correlations for Packaged Food Products. The Journal of Consumer Affairs 13 (2), 236-247.

Ronnle, E. (2015). Alternativ finansiering av kollektivtrafik: En kunskapsöversikt. K2 Outreach 2015:6.

Ronnle, E. (2017). Planners' analysis and opportunism – benefit analysis in the Swedish HSR-project: a preliminary analysis. European Planning Studies 25 (12), 2232-2249.

Ronnle, E. (2019). Justifying mega-projects: An analysis of the Swedish high-speed rail project. Diss. Lund: School of Economics and Management, Lund University.

Rubensson, I, Susilo, Y. & Cats, O. (2020). Is a flat fare fair? Equity impacts of fare scheme change. Transport Policy 91, 48-58.

Ryan, J., Wretstrand, A. & Schmidt, S. (2015). Exploring public transport as an element of older persons' mobility: A Capability Approach perspective. Journal of Transport Geography 48, 105-114.

Sælen, H. & Kallbekken, S. (2011). A choice experiment on fuel taxation and earmarking in Norway. Ecological Economics 70, 2181-2190.

Sammer, G., Gruber, C., Roeschel, G., Tomschy, R. & Herry, M. (2018). The dilemma of systematic underreporting of travel behavior when conducting travel diary surveys – A meta-analysis and methodological considerations to solve the problem. Transportation Research Procedia 32, 649-658.

Samuelsson, L. & Zhang, J. (1992). Search costs and prices. Economics Letters 38, 55-60.

SCB (2007). Att köpa statistiska undersökningar. Available: https://www.scb.se/contentassets/d62df838f1ac40648b3c29f79fa88c7c/att-kopa-statistiska-undersokningar.pdf [04.03.2021]

SCB (2020). Hushållens utgifter. Available: https://www.scb.se/hitta-statistik/statistik-efter-amne/hushallens-ekonomi/hushallen-utgifter/hushallens-utgifter-hut/ [24.09.2020]

Schade, J. (2003). European research results on transport pricing acceptability. In Schade, J. & Schlag, B. (ed.). Acceptability of transport pricing strategies. 109-123

Schade, J. & Schlag, B. (2003). Acceptability of urban transport pricing strategies. Transportation Research Part F: Traffic Psychology and Behaviour 6, 45-61.

Schleich, J. (2019). Energy efficient technology adoption in low-income households in the European Union – What is the evidence?. Energy Policy 125, 196-206.

Schuets, J., Kolko, J. & Meltzer, R. (2012). Are poor neighborhoods "retail desterts"?. Regional Science and Urban Economics 42, 269-285.

Sen, A. (1985). Goals, Commitment, and Identity. Journal of Law, Economics, & Organization 1 (2), 341-355.

Sharot, T., De Martino & Dolan, R. (2009). How Choice Reveals and Shapes Expected Hedonic Outcome. Journal of Neuroscience 29 (12), 3760-3765.

Shearmur, R. (2012). Are cities the font of innovation? A critical review of the literature on cities and innovation. Cities 29 (2), 9-18.

Shepsle, K. & Weingast, B. (1981). Political Preferences for the Pork Barrel: A Generalization. American Journal of Political Science 25 (1), 96-111.

Shmelev, S. & Speck, S. (2018). Green fiscal reform in Sweden: Econometric assessment of the carbon and energy taxation scheme. Renewable and Sustainable Energy Reviews 90, 969-981.

Sinnott-Armstrong, W. (2019). Consequentialism. The Stanford Encyclopedia of Philosophy (Summer 2019 Edition), Edward N. Zalta (ed.). Available: https://plato.stanford.edu/archives/sum2019/entries/consequentialism/ [23.06.2020]

Sirmans, S., Macpherson, D. & Zietz, E. (2005). The Composition of Hedonic Pricing Models. Journal of Real Estate Literature 13 (1), 1-44.

Smith, N., Hirsch, D. & Davis, A. (2012). Accessibility and capability: the minimum transport needs and costs of rural households. Journal of Transport Geography 21, 93-101.

Smoyer-Tomic, K., Spence, J. & Armhein, C. (2006). Food Deserts in the Prairies? Supermarket Accessibility and Neighborhood Need in Edmonton, Canada. The Professional Geographer 58 (3), 307-326.

Söderberg, J. (2015). Vår världs ekonomiska historia: Den förindustriella tiden. 2nd ed. Lund: Studentlitteratur.

Utredningen Service i glesbygd (2015). Service i glesbygd (SOU 2015:35). Stockholm: Näringsdepartementet.

Staiger, D., Spetz, J. & Phibbs, C. (2010). Is There Monopsony in the Labor Market? Evidence from a Natural Experiment. Journal of Labor Economics 28 (2), 211-236.

Stedman, R., Connelly, N., Haberlein, T., Decker, D. & Allred, S. (2019). The End of the (Research) World As We Know It? Understanding and Coping With Declining Response Rates to Mail Surveys, Society & Natural Resources, 32 (10), 1139-1154.

Stein, R. & Bickers, K. (1994). Congressional Elections and the Pork Barrel. The Journal of Politics 56 (2), 377-399.

Stern, N. (2008). The Economics of Climate Change. American Economic Review: Papers & Proceedings 98 (2), 1-37.

Stigler, G. (1961). The Economics of Information. Journal of Political Economy 69 (3), 213-225.

Stjernborg, V. & Mattisson, O. (2016). The Role of Public Transport in Society – A Case Study of General Policy Documents in Sweden. Sustainability (8), 1120.

Stopher, P. & Greaves S. (2007). Household travel surveys: Where are we going? Transportation Research Part A: Policy and Practice 41, 367-381.

Swedish National Audit Office (2011). Medfinansiering av statlig infrastruktur. Granskningsrapport RiR 2011:28.

Swedish National Audit Office (2018). Fyrstegsprincipen inom planeringen av transportinfrastruktur – tillämpas den på avsett sätt? Granskningsrapport RiR 2018:30.

Taylor, B. & Morris, E. (2015). Public transportation objectives and rider demographics: Are transit's priorities poor public policy? Transportation 42, 347-367.

Tolonen, H., Helakorpi, S., Talala, K., Helasoja, V., Martelin, T. & Prättälä, R. (2006). 25-year trends and socio-demographic differences in response rates: Finnish adult health behaviour survey. European Journal of Epidemiology 21, 409-415.

Tornberg, P. & Odhage, J. (2018). Making transport planning more collaborative? The case of Strategic Choice of Measures in Swedish transport planning. Transportation Research Part A: Policy and Practice 118, 416-429.

Transport Analysis (2018). Nya lösningar för framtidens resvaneundersökningar. Trafikanalys Rapport 2018:18.

Transport Analysis (2020). Transportsektorns samhällsekonomiska kostnader. Trafikanalys Rapport 2020:4.

Trembley, V. & Polasky, S. (2002). Advertising with Subjective Horizontal and Vertical Product Differentiation. Review of Industrial Organization 20, 253–265.

Trotta, G. (2018). Factors affecting energy-saving behaviours and energy efficiency investments in British households. Energy Policy 114, 529-539.

Tyrväinen, L. (1997). The amenity value of the urban forest: an application of the hedonic pricing method. Landscape and Urban Planning 37 (3-4), 211-222.

Ubbels, B., Nijkamp, P., Verhoef, E., Potter, S. & Enoch, M. (2001). Alternative Ways of Funding Public Transport: A case study assessment. European Journal of Transport and Infrastructure Research 1 (1), 73-89.

van Dalen, J. & Bode, B. (2004). Quality-corrected price indices: the case of the Dutch new car market, 1990-1999. Applied Economics 36, 1169-1197.

van der Veen, A., Annema, J., Martens, K., van Arem, B. & de Almeida Correia, G. (2020). Operationalizing an indicator of sufficient accessibility – a case study for the city of Rotterdam. Case Studies on Transport Policy 8 (4), 1360-1370.

van Houtven, G., Mansfield, C., Phaneuf, D., von Haefen, R., Milstead, B., Kenney, M. & Reckhow, K. (2014). Combining expert elicitation and stated preference methods to vale ecosystem services from improved lake water quality. Ecological Economics 99, 40-52.

van Ittersum, J. (2010). The long goodbye: Hugo Grotius' justification of Dutch expansion overseas, 1615–1645. History of European Ideas 36 (4), 386-411.

van Wee, B. & Geurs, K. (2011). Discussing Equity and Social Exclusion in Accessibility Evaluations. European Journal of Transport and Infrastructure Research 11 (4), 350-367.

van Wee, B., Hagoort, M. & Annema, J.A. (2001). Accessibility measures with competition. Journal of Transport Geography 9, 199-208.

van Wee, B. & Roeser, S. (2013). Ethical Theories and the Cost-Benefit Analysis-Based Ex Ante Evaluation of Transport Policies and Plans. Transport Reviews 33 (6), 743-760.

Varian, H. (1980). A Model of Sales. American Economic Review 70, 651-659.

Varian, H. (1992). Microeconomic analysis. 3rd ed. New York: W. W. Norton & Company.

Varian, H. (2014). Intermediate microeconomics with calculus. New York: W. W. Norton & Company.

Verbich, D. & El-Geneidy, A. (2017). Public transit fare structure and social vulnerability in Montreal, Canada. Transportation Research Part A: Policy and Practice 96, 43-53.

Vickery, W. (1969). Congestion Theory and Transport Investment. American Economic Review 59 (2), 251-260.

Vonk Noordegraaf, D., Annema, J.A. & van Wee, B. (2014). Policy implementation lessons from six road pricing schemes. Transportation Research Part A: Policy and Practice 59, 172-191.

Vossler, C. & Watson, S. (2013). Understanding the consequences of consequentiality: Testing the validity of stated preferences in the field. Journal of Economic Behavior & Organisation 86, 137-147.

Waldenström, D. (2012). Regeringen och ojämlikheten: En granskning av budgetens fördelningspolitiska redogörelser 1992-2011. Rapport till Finanspolitiska rådet 2012/6.

Wang, P., Deng, X., Zhou, H. & Yu, S. (2019). Estimates of the social cost of carbon: A review based on meta-analysis. Journal of Cleaner Production 209 (1), 1494-1507.

Wardman, M., Chinitakayala, P. & de Jong, G. (2016). Values of travel time in Europe: Review and meta-analysis. Transportation Research Part A: Policy and Practice 94, 93-111.

Weibull, J. (1976). An axiomatic approach to the measure of accessibility. Regional Science and Urban Economics 6 (4), 357-379.

Weibull, J. (1980). On the numerical measurement of accessibility. Environment and Planning A 12 (1), 53-67.

Wennberg, H., Hydén C. & Ståhl, A. (2010). Barrier-free outdoor environments: Older peoples' perceptions before and after implementation of legislative directives. Transport policy 17, 464-474.

Wennberg, H., Phillips, J. & Ståhl, A. (2018). How older people as pedestrians perceive the outdoor environment – methodological issues derived from studies in two European countries. Ageing & Society 38, 2435-2467.

Westin, J., Knutsson, J. & Westin, L. (2019). Modelling Changes in Regional Accessibility from Speed Limit Adjustments in the Road Network. CERUM Report Nr58/2019. Umeå: Umeå Universitet.

Whitehead, J., Pattanayak, S., van Houtven, G. & Gelso. B. (2008). Combining revealed and stated preference data to estimate the nonmarket value of ecological services: an assessment of the state of the science. Journal of Economic Surveys 22 (5), 872-908.

Widener, M., Farber, S., Neutens, T. & Horner, M. (2015). Spatiotemporal accessibility to supermarkets using public transit: an interaction potential approach in Cincinnati, Ohio. Journal of Transport Geography 42, 72-83.

World Bank Group (2019). State and Trends of Carbon Pricing 2019. Washington, DC: World Bank.

Wu, H. & Leung, S-O. (2017) Can Likert Scales be Treated as Interval Scales? - A Simulation Study, Journal of Social Service Research, 43 (4), 527-532.

Wright, J., Donley, A., Gualtieri, M. & Strickhouser, S. (2016). Food Deserts: What is the Problem? What is the Solution? Society (53), 171-181.

Zenk, S., Schulz, A., Israel, B., James, S., Bao, S. & Wilson, M. (2005). Neighborhood Racial Composition, Neighborhood Poverty, and the Spatial Accessibility of Supermarkets in Metropolitan Detroit. American Journal of Public Health 95 (4), 660-667.

Zhao, Y. & Kockelman, M. (2002). The propagation of uncertainty through travel demand models: An exploratory analysis. Annals of Regional Science 36, 145-163.

Printed by Media-Tryck, Lund 2021 NORDIC SWAN ECOLABEL 3041 0903

Lund University
Faculty of Engineering
Department of Technology and Society
Bulletin 322
ISBN 978-91-7895-871-9
ISSN 1653-1930
CODEN: LUTVDG/(TVTT-322)1-101