Transport Policy 20 (2012) 1–12

Contents lists available at SciVerse ScienceDirect

Transport Policy

journal homepage: www.elsevier.com/locate/tranpol

The Stockholm congestion charges—5 years on. Effects, acceptability and lessons learnt

Maria Börjesson [a,*], Jonas Eliasson [a], Muriel B. Hugosson [a], Karin Brundell-Freij [b]

[a] Centre for Transport Studies, Royal Institute of Technology, SE-100 44 Stockholm, Sweden
[b] Centre for Transport Studies, WSP Analysis & Strategy, Sweden

ARTICLE INFO

Available online 9 December 2011

Keywords:
Congestion charging
Public acceptability
Political acceptability
Elasticity
Long-term effects

ABSTRACT

Congestion charges were introduced in Stockholm in 2006, first as a trial followed by a referendum, then permanently from 2007. This paper discusses what conclusions can be drawn from the first five years of operation, until mid-2011. We show that the traffic reduction caused by the charges has increased slightly over time, once external factors are controlled for. Alternative fuel vehicles were exempt from the charges through 2008, and we show that this substantially increased the sales of such vehicles. We discuss public and political acceptability, synthesising recent research and Swedish experience. We conclude that objective and subjective effects on the traffic system, as well as general environmental and political attitudes, formed the basis of the strong public support, while institutional reforms and resolution of power issues were necessary to gain political support. Finally, we briefly discuss implications for the transport planning process in general.

1. Introduction

Congestion pricing has been long advocated by transport economists and traffic planners as an efficient means to reduce road congestion. Despite growing problems with urban congestion and urban air quality, and despite a consensus that investments in roads or public transit will not be sufficient to tackle these problems, cities have been reluctant to introduce congestion pricing.

In recent years, however, it seems that this is changing. London (2003), Stockholm (2006), Durham (2002), Milano (2008), Rome (2001) and Valletta (2007) have all introduced different forms of charging or permit systems to combat congestion and/or environmental problems. The Netherlands, Copenhagen, Budapest, Gothenburg, Djakarta and San Francisco are all considering congestion charges or planning to introduce them. The soon ubiquitous "value pricing" roads in the US are also examples of how congestion problems are now being tackled through pricing measures. New York, Manchester and Edinburgh have all tried to introduce congestion charges, and even if these attempts have been unsuccessful, it is a sign that congestion charges are being seriously considered to a greater extent than a decade ago.

The congestion charges in Stockholm have attracted enormous attention worldwide. Obviously, the opportunity to gauge the effects of congestion charges on traffic, congestion levels and travel behaviour has attracted great interest. Perhaps even more interesting is how the congestion charges survived a heated and complicated political and legal process, including a referendum initially forced through by opponents to the charges. The Stockholm charges went from "the most expensive way ever devised to commit political suicide" (to quote the then-secret feelings expressed by the Head of the Congestion Charging Office[1]) to something that the initially hostile media eventually declared to be a "success story" (e.g. Dagens Nyheter, June 22, 2006).

The Stockholm charges were introduced in January 2006, at first as a six month trial. During the trial, an extensive monitoring and evaluation programme was carried out, and many types of analyses based on these data sets have been published previously (references are given in Section 2). The two most important findings were that the charges did indeed cause substantial traffic reductions, leading to reductions in congestion and travel time variability, and that the public opinion changed from hostile to a small majority in favour of the charges. The aim of this paper is to explore how these effects have developed over time, and hence whether the conclusions based on the observations from the trial period stand the test of time. Hence, we focus on whether the

* Corresponding author. Tel.: +46 87906000.
E-mail addresses: maria.borjesson@abe.kth.se (M. Börjesson), jonas.eliasson@abe.kth.se (J. Eliasson), muriel.hugosson@abe.kth.se (M.B. Hugosson), karin.brundell-freij@wspgroup.se (K. Brundell-Freij).

[1] Quote Gunnar Söderholm, social-democratic head of the Congestion Charging Office during the trial, when (after the trial) describing the local Social Democrats' feelings when the national Social-Democratic government more or less forced the congestion charges onto the local Stockholm party district.

0967-070X/$ - see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.tranpol.2011.11.001

traffic reduction has persisted, whether congestion levels have stayed on a lower level, and how public and political acceptability has developed over time. The traffic effects are central, since they are the main driver of other benefits, such as improvements of local air quality, travel time reliability and greenhouse gas emissions. The increased public and political acceptance has been crucial for the survival of the charges since the trial. To some extent we will also discuss how the introduction of road user charges as a revenue source has affected the national infrastructure planning process. In the evaluation programme of the Stockholm trial, a large number of other effects were studied, including effects on businesses and retail, and location of households and firms. In most cases effects these were found to be small, and they have therefore not been studied further. Section 2 gives a brief description of the charging system, its history and references to previous studies.

There has been some apprehension that the effects of the charges will attenuate over time, either because drivers "get used to the charges" and hence do not react to them anymore, or because the freed-up road space will be filled up by new groups of drivers, returning the amount of congestion to the same levels as before the charges. This is the topic of Section 3, where we explore the long-term effect of the charges on traffic volumes.

Section 4 discusses the significance of the clean car exemption and the importance of different incentives for the sales of clean cars.

Section 5 is devoted to public and political acceptability. We draw from a number of sources to explain and discuss the current opinion on congestion charges, and the political context of the charges. We also discuss how the possibility to introduce road user charges has affected the national infrastructure planning process.

2. An overview of the Stockholm congestion charging system

The Stockholm congestion charging system consists of a toll cordon around the inner city, thereby reducing traffic through the bottlenecks located at the arterials leading into the inner city. The cost[2] of passing the cordon on weekdays is € 2 during peak hours (7:30–8:30, 16:00–17:30), € 1.5 during the shoulders of the peaks (30 min before and after peak period) and € 1 during the rest of the period 6.30–18.30. The charge is levied in both directions, implying that a return trip during peak hours costs € 4. The maximum total charge per day is € 6.

The system was introduced on a trial basis during the period January 3–July 31 2006. The trial period was followed by referendums in the City of Stockholm and in about half of the neighbouring municipalities, originally pushed through by opponents to the congestion charges. The referendum in the City of Stockholm itself resulted in a majority for keeping the charges, but based on the total number of votes in the County of Stockholm the majority of the voters were against the charges. However, adding all the votes in the County produces a result that is negatively biased compared to the overall public opinion in the County of Stockholm, because not all municipalities arranged a referendum. The public opinion in the municipalities that arranged a referendum was in general more against charges than the public opinion in the entire County. In the end, the new Liberal-Conservative government decided to reintroduce the congestion charges, earmarking the revenues for road investments but as part of a more comprehensive, partially government-funded transport investment package including both road and transit investments. The congestion charges were reintroduced in August 2007.

[2] Throughout the paper we have converted SEK to Euro using a conversion rate of 10 SEK/€.

The charging trial and the results of the monitoring programme have been described in detail elsewhere. An overview of the effects can be found in (Eliasson et al., 2009) and (Eliasson, 2008), where the latter also discusses the main lessons from the trial in terms of design, effects, acceptability and political process. (Eliasson, 2009a) provides a cost-benefit analysis of the congestion charges, based on effects measured during the trial. A detailed account of the political process can be found in (Gullberg and Isaksson, 2009), and experiences from the design and evaluation processes are described in (Eliasson, 2009b). (Karlström and Franklin, 2009) and (Franklin et al., 2010) analyse behavioural responses and equity effects. (Daunfeldt et al., 2009) investigate whether the retail sector was affected by the introduction of the charges, with a focus on the apprehension that retail in the inner city may be hurt, but finding no such effects. (Kottenhoff and Brundell Freij, 2009) discuss the role of the public transport system for the effects and acceptability of the charges, and in particular the introduction of a number of new bus lines in anticipiation of the introduction of the charges. (Isaksson and Richardson, 2009) analyse the strategy to create legitimacy for the charges, while (Gudmundsson et al., 2009) examine how decision support systems were used. (Winslott-Hiselius et al., 2009) provide an early analysis of the public attitudes, and also analyse the media coverage. (Brundell-Freij et al., 2009) and (Eliasson and Jonsson, 2011) provide analyses of the developments of the public attitudes up to late 2007, focusing on what factors explain differences and changes in public acceptability.

3. Long-term adaptation effects

The charges had a substantial effect on traffic volumes, and drivers have adopted many different adaptation strategies. In this section we explore the extent to which the behavioural adaptation has changed over time.

3.1. Traffic volumes across cordon

Fig. 1 shows the average number of passages across the cordon per weekday (6 am to 7 pm) for each month from January 2005 through September 2010. Corresponding numbers are presented in Table 1.

For each year, Fig. 1 exhibits a systematic seasonal variation, with volumes increasing throughout spring, a minimum in July and August (summer holidays) and stable volumes during the rest of the year.

3.1.1. The trial: Immediate reaction, slightly diminishing over time

Fig. 1 shows that the charges had a substantial effect on car driver behaviour from the first day of introduction in January 2006. This effect, as reflected by relative difference to the reference level (2005), was −28% in January. During the following months, volumes across the cordon increased successively, from just over 3,00,000 per day in January, to almost 4,00,000 per day in May. Some observers in the media and the general public interpreted this increase (large enough to be noticed by the naked eye) as a sign that the charges were successively losing their effectiveness. To the informed analyst, however, it was evident that the increase was mainly due to seasonal variation, similar to the reference figure for 2005. Nevertheless, the figures indicate that road users overreacted initially (with an estimated effect of −28% in January and −23% in February), but successively found more stable adaptation strategies (20–22% in March-June).

The adaptation strategies were different for different trip purposes. 24% of commuting trips by car across the cordon disappeared; nearly all of these switched to transit – only 1% switched route to avoid the cordon. 22% of discretionary trips by car across the cordon disappeared. Here, the main adaptation strategies seem to