

Denne artikel er publiceret i det elektroniske tidsskrift
Udvalgte Artikler fra Trafikdage på Aalborg Universitet
(Selected Proceedings from the Annual Transport
Conference at Aalborg University)

ISSN 1903-1092

www.trafikdage.dk/artikelarkiv

Modtaget den 11.10.2012

Accepteret den 28.11.2013



Marginal Cost Controversies in Swedish Transport Infrastructure Policy

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Abstract

It is important that resources spent in transport infrastructure systems come to the best possible use. During the last four decades it has generally been argued that good resource utilization most likely comes about in cases where welfare economic principles are pursued. This holds both for the planning of transport infrastructure measures based on cost benefit analysis and for the use of the existing systems based on prices reflecting the short term social marginal costs of the transportation actually carried out. This article argues that, seen in a longer time perspective, there has however been a controversy regarding which financing principles that should be seen as most accurate. And this controversy has been persistent in Sweden since the 1930s.

An institutional perspective where the direct relation between the users and the organizations that manage the infrastructure system, and with an interest for dynamism, learning and organizational aspects, has been in conflict with the welfare economic perspective. According to the institutional perspective the users should pay the full cost and subsidies by the public sector are questioned. An outcome of the present turn in the transport infrastructure discussion, with more interest for alternative financing and demand for heavy new investments, might be a revival of full cost principles in financing rather than marginal cost models. Once again the financing and pricing principles and their relation to efficiency might become a centerpiece of the debate.

1 Introduction

This article aims for an analysis of the financing principles for roads and railroads as these have been discussed and implemented in Sweden from the 1940s to the 2010s. The primary source for the description of the historical development in Sweden is government committee reports and government bills to Parliament. It is argued that it seems reasonable to interpret the discussion in Sweden around pricing and financing policies (i.e. what prices or taxes the users should meet) related to transport infrastructure as a controversy between the two financing and pricing perspectives. On the one hand a (social) marginal cost perspective, and on the other hand a full cost perspective. The controversy seems to have been strongest during the 1970s-1980s. Reasons for an observed gradual shift from a full cost to a marginal cost financing policy are discussed. The possible impact the focus-shift had on the priority given to the organizational efficiency of the road and railroad agencies is reflected on.

The different perspectives for how to finance systems such as transport infrastructure were reflected in a series of articles by Coase in the 1940s and again in the 1970s (1946, 1947, and 1970). These articles were in turn written as a part of an ongoing exchange at the time between scholars like on the one hand Coase and on the other hand Pigou, Hotelling and others. These latter scholars argued for government intervention and the positive role of subsidies in achieving an efficient resource allocation in the economy. The articles by Coase, with their institutional focus, seem surprisingly up to date after nearly 70 years. The focus on organizational efficiency has been less focused in modern transportation economics e.g. as it is reflected in recent text books and articles in this theoretical field. In parallel welfare economics has gradually become stronger.

The article starts with a presentation of the two theoretical perspectives discussed. Section three presents the findings in Swedish transport infrastructure policies since the 1930s. In the fourth section reasons for the observed shift in policies are discussed. The last and fifth section presents some conclusions.

2 Government's role - visible or invisible hand?

In economics transport infrastructure systems (and thus assets used in these systems), with positive large scale effects due to decreasing cost structures, are generally seen as more or less self-evident candidates for being treated as natural monopolies. Part of this view is that it is unlikely that more than one provider of the systems (in each geographic unit) will prevail over time, that regulation or nationalization is the normal remedy to reduce the risks for monopolistic behavior and that short term (social) marginal cost pricing is to be seen as the first best policy alternative. In this way welfare economic based marginal cost reasoning has been a source for the introduction of marginal cost pricing in transport infrastructure inspired also from this industrial economics perspective. Mosca (2008) presents a historical background to the concept and use of natural monopoly theories which is instructive in this respect.

The pricing and financing principles for transport infrastructure systems have been treated both in welfare economics and in institutional economics. The two perspectives are discussed in the following sub-sections and some reflections and comparisons made in the following sub-section. The different views can also be interpreted as two expressions as to what role the government should have; an active or a more passive actor.

2.1 Welfare economics

According to the principles developed in welfare economics through the late 19th and 20th century by a number of scholars such as Marshall, Wicksell, Pigou, Hotelling and Lerner, consumers' marginal utility choosing different packages of goods and services, should be the basis for the analysis of resource allocation in the economy (Ruggles, 1949). These theories are generally based on assumptions of perfect

information, free entry, competition and rational actors. Equilibrium-oriented analysis and resource allocation on markets is more often in focus than change and dynamism are.

Part of the same view is that decreasing-cost industries, such as roads and railroads, could be expected to be run as nationalized or regulated monopolies in order to avoid inefficiencies such as overpricing. In these cases it is further argued, following this reasoning, that (only) marginal costs should be charged for the use of the products or services in order to achieve efficiency. Unfinanced parts of the costs, which are not covered for by marginal cost pricing based revenues should, according to the same line of reasoning, primarily be financed by the government, funded with general tax revenues.

Going through the more recent transportation economics literature such as McCarthy (2001), it is apparent that the analysis of transportation related themes based on micro-economics and welfare economics have been further developed along the line of the theories brought forward in the 1930s-1940s. A number of classical micro economic aspects on the producing firms in transportation, the demand functions, markets operating under perfect competition or less than perfect conditions are discussed by McCarthy.

Further the analytical dilemmas related to government regulation of transportation and infrastructure under different assumptions regarding the market structure and the cost-functions are analyzed. This also includes analysis of investment decisions and issues such as congestion charging and concepts like first best and second best pricing of assets like transport infrastructure. In one chapter in McCarthy's text book the theoretical foundations for and preconditions for a pricing and tax structure reflecting marginal costs for road charging, while also fulfilling a full cost financing requirement is outlined. Under certain conditions such charging, in congested areas and primarily for roads, can cover the full costs of transport infrastructure.

Winston (1991) discussing efficient pricing rules for transport infrastructure investments starts from a marginal cost based pricing system but adds the remark that the government in general should add components to the marginal cost that include social cost components, to give a correct price signal, also for new investment. New capacity should be provided until the marginal benefit equals marginal costs, so defined. For urban roads, with capacity shortage, such financing should also meet the financing requirement, according to Winston. Rural roads would though need additional charges to (p 120) "attain a balanced highway budget".

A common theme in this tradition since the 1930s, where McCarthy is a good example of theoretical accuracy, are the assumptions generally underpinning neo-classical theoretical work; perfect information, free entry and exit, perfect or constrained competition, utility maximizing consumers with stable (or stationary) and comparable utility functions among different actors. The producing organizations are primarily seen as cost functions, more than as tools for intentional action. These organizations are generally seen as following the maxims of profit maximization. Government intervention is justified whenever such intervention is seen, from a theoretical basis, to improve social welfare or an efficient resource allocation in the economy. The functioning of the government and the public sector at large with less than perfect information as seen from a principal-agent or political economy point of view is generally not in focus.

More dynamic decision problems, such as the choice between capital and labor or the market dynamics between competing transportation modes are also discussed by McCarthy's text book referenced earlier and of course also widely in general economic theory. However, the more overarching dynamics in markets and the economy at large concerning the discussion centering entrepreneurship and innovation and the actually observed functioning of the producing organizations are more or less left outside the discussion.

Another example of this neo-classic tradition is Parry and Bento (2001). They discuss the possible allocative efficiencies inherent in a, theoretically interesting, setting where revenues from congestion charging could be used by the government in order to reduce taxes on labor. This would more than offset the negative

supply effect connected to the introduction of congestion charges and, argues Parry and Bento, increases the efficiency of the user charge by more than 100 percent, while the congestion charge would still be equal to a Pigovian tax. This example also displays a limited interest for the government as a rather complicated actor and different public-choice related problems. It comes close to what Coase has named black-board economics.

Newbery (1990) discussing congestion charging also deals with the question of whether some kind of earmarking principles should be applied to the revenues from road charges in order to direct them to the “highway budget” (p 2). Newbery argues that there is no “logical reason” for this, echoing insights from classical public finance theorizing. Ear-marking might though be a vital aspect in any organizational system in order to raise or achieve efficiency, as will be discussed below. Wagner (1991) though at the same time discusses a number of possible dilemmas connected to user charges in a public sector setting from a classical public choice perspective. User charges in public sector setting might according to this view lead to sub-optimal solutions, e.g. due to the risk for revenues from such charges being transferred to other uses. A similar analysis is provided by De Borger & Proost (2012), where recent user charges systems and the success for those are related to situations where a close link (or ear-marking principle) between the revenues from such systems and financing of projects e.g. in related public transport systems is upheld.

2.2 Institutional economics

Coase in his articles on the Marginal Cost Controversy (1946, 1947) presented a different view on the preferable way of handling the pricing of services and goods in decreasing cost sectors. The original article was written in relief to the Hotelling-Lerner view, with its basis in marginal cost pricing and supporting government subsidies. Hotelling (1938) published a well-known article where this view was applied to transport infrastructure systems, arguing for government intervention and subsidies in order to reach a situation with optimal resource allocation.

Coase presented four arguments in favor of a pricing and financing system based on full cost and multipart pricing, with separate payments to cover fixed and variable costs. With such a system the user would face the full cost of the resources that are used for the production of the good or service, which would, according to Coase, confer a correct combined price signal leading to an efficient resource allocation.

Coase’s arguments against marginal cost pricing without full cost coverage are condensed into the following arguments:

- Marginal cost pricing would lead to mal-distribution of the production factors to different uses, since the full costs of these would not be obvious to the user
- Marginal cost pricing would lead to income distribution from non-users to users and from tax payers to users
- Marginal cost pricing if combined with tax subsidies would lead to “other harmful effects” as the economy is more heavily tax-burdened
- Marginal cost pricing would lead to a risk for over-consumption and lack of information on how to spend resources in the future, since price signals are distorted.

Coase’s discussion emphasizes the central role of the producing organization and its relation to users or customers. The organizational view can be traced back to Coase’s 1937-article The Nature of the Firm. This is a clear difference towards the neo-classical view, with its generally more simplistic organizational view.

Lindsey (2006), going through the later development of economists’ views on road pricing up to the 2000s, notes (p 315) that the institutional sentiment that Coase represents has not been the core element of economists’ handling of issues related to road pricing. The view represented by Pigou has, since the 1940s, according to Lindsey, largely been developed by a number of scholars such as Vickrey, Walters and

Mohring. Pricing of road-use based on short run social marginal cost has been the basis for these later scholars' writing, combined with congestion based charging. Small, Winston and Evans, among others, according to Lindsey, have shown that under some assumptions congestion and road damage charges can pay for the costs both for capacity and maintenance (p 312), which is also exemplified by McCarthy and Winston.

The institutional view, which was exemplified by road and railroad-related themes in Coase's 1940s articles have, according to Lindsey, not been widely developed with further applications in this sector of the economy. As an exception the writings of Roth can be mentioned. Roth (2006) has edited one of the more recent volumes, where a number of articles discuss the prospects and favors of more privatized road provision systems. A similar approach with focus on the possible benefits of experimentation, including e.g. private sector alternatives, has been presented by Winston (2010). Winston suggests privatization experiments to be introduced as a means for addressing many of the current problems of the US transportation system, such as lack of innovativeness, lack of resources and slow productivity growth. These two examples show that the institutional view is represented also by contemporary scholars, even if the welfare or neo-classical view is generally the stronger in discussions around transport infrastructure.

In another overview article covering the development of transportation economics through the latest 30 years (Button, 2010) presents a more or less similar view of the development of transportation economics. Even if a micro-economic and welfare oriented tradition in transport economics has been developed into the dominant Button seems to worry about the high abstraction level in micro economic-stylish transportation economics, and thus the fairly low relevance to actual politics and policy problems. There seems to be a frustration in this article that the highly developed theoretical models and analyses do not really make its way into the decisions. Button points to the need to include institutional theory and insights from political economy into the discussion in order to raise its relevance for policy.

While Coase favored a system where roads and railroads were financed without government subsidies the more recent institutional studies mentioned above seem mostly to focus on an improvement and methodological refinement of the application of marginal cost based financing models. By reducing cross-subsidies between different transport modes, and striving for setting prices more in line with social marginal costs (including congestion induced costs) a higher level of efficiency could be achieved than in many present systems.

This seems to be a view where a move from weaker to more powerful incentives is sought for, while not necessarily meeting Coase's requirements, aiming for full cost coverage, where both short term and long term cost should be covered. In some instances both views might, at the same time, lead to the fulfillment of a goal of full cost coverage. Even if short term social marginal cost pricing thus could be expected to raise sufficient resources to cover the full costs of roads in urban congested areas this would clearly not be the case in less populated areas. There would thus still be need for substantial tax-financing if these models are applied. This is of course something that is even truer when it comes to railroads, with its higher infrastructure costs.

2.3 Comparisons between the theoretical perspectives

A comparison between a neo-classical and an institutional perspective, where the neo-classical perspective is closely connected to the welfare-perspective in this article, is presented by Hasselgren (2013 a). The comparison is summarized in Figure 1 below. Here it becomes obvious that the two perspectives differ in the view both on the actors' perceptions and goals and when it comes to the view on organizations.

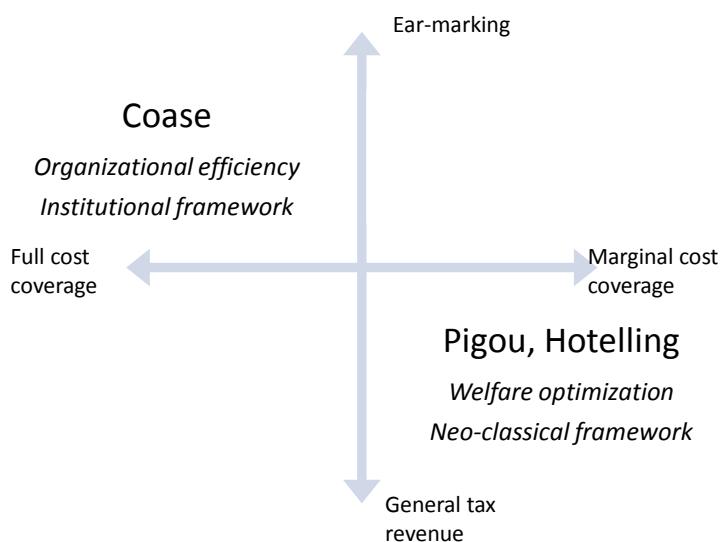
Figure 1
Comparison of a neo-classical and an institutional theoretical perspective

Feature	Neo-classical perspective	Institutional perspective
Actors' goals	Individual utility maximizers with given and stationary preferences	Individually maximizing individual goals and learning over time with different preferences as a starting point and result
Information	Perfect information Objective	Bounded and limited information Subjective
Role of prices	Transfers information on the resource use in the economy based on a utility view	Transfers information on production and transaction costs as a basis for decisions and learning
Transaction costs	Negligible	Important for understanding how economy and market functions Varying over time and between markets
Organizational view	Non-reflected view or seen as unimportant (and/or) Rational view	Organizations a tool for handling e.g. transaction costs Critical view on the rationality of organizations
Government intervention	Rational view Government intervention a tool for adjusting market imperfections	Bounded rationality Government action problematic either for a rent-seeking behavior, lack of representation, or since markets are seen as better tools for learning and evolution than government organization

Based on Klein (1998) and Huerta de Soto (2010)

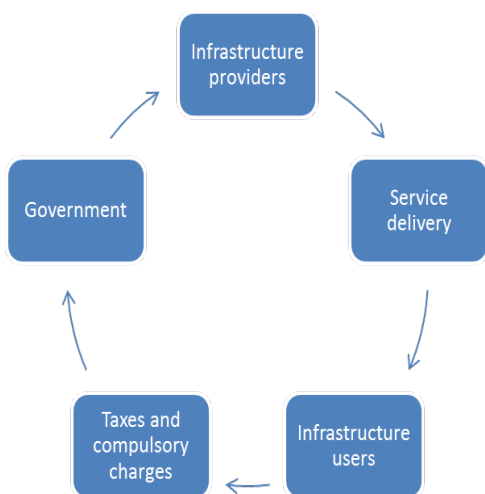
The different perspectives according to the two theoretical approaches when it comes to pricing policies and the view on cost coverage in systems like transport infrastructure are summarized in Figure 2. The x-axis shows different views on whether marginal cost vs. full cost coverage should be strived for. On the y-axis the dichotomy between ear-marking (all revenues are directly allocated to the supplier) and the handling of revenues as general tax revenues is displayed. Coase's model, placed in the upper left corner, combines full cost coverage with ear-marking. Coase did not explicitly mention ear-marking in his articles. It is, however, reasonable (but not necessary) to assume that some kind of direct allocation of revenues to the organization that produces the services is an integral part of the Coasean view. Anyhow government financing of deficits is not favored by Coase. The Pigovian/Hotelling welfare model is displayed in the lower right, combining marginal cost coverage with the treatment of revenues from taxes and fees as general tax income.

Figure 2
Coase and Pigou/Hotelling – different views on cost coverage and financing



According to welfare economics it is often logical to draw the conclusion that market failures are at hand and that government intervention is justified in order to correct market outcomes. By applying marginal cost financing and pricing principles the government is inserted between the users and the infrastructure providers with a role to channel additional financing to infrastructure or to redirect financing between transport modes. This organization and financing model makes the relation between the provider and the user less clear than in a model with ear-marking and direct connections between the users and the providing organization. The model is illustrated in Figure 3.

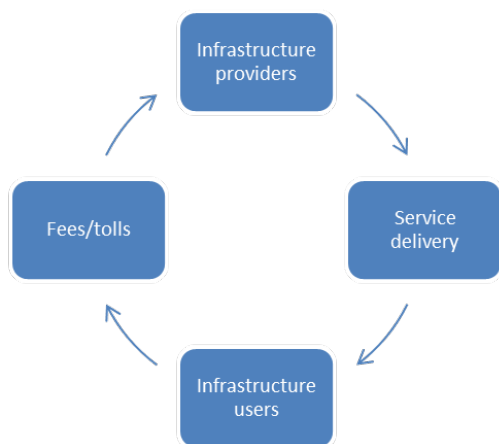
Figure 3
Indirect relation between user and provider of infrastructure



Coase's argumentation, which is also reflected by more recent writers as discussed above, was based on a model where organizations and institutions matter. According to this view market failures are identified less frequently compared to the neo-classical theory. Instead market solutions, where actors learn over time when facing full-cost based prices, are an important alternative to government intervention. Government action is seen as problematic with possible inefficiencies both when it comes to the internal operations of the public sector system and the negative effects on price signals tax-funded activities might bring. Private sector organizations directly financed by users are generally believed to be more dynamic and efficient, according to this institutional view. Organizational change and learning is thus generally more closely connected to the institutional view than to neo classic welfare theories.

The more direct relation between user and infrastructure provider according to this model is illustrated in Figure 4.

Figure 4
Direct relation between user and provider



In reality it should of course be noted that none of the two ideal models has probably been used in the most refined of situations. Elements of cross-subsidization is a normal feature of market-financed systems as they are in government financed systems. Subsidies normally go from more heavily used parts of the transport infrastructure systems to the less used parts. This is true both in private and public sector run systems.

Another this is of course that the two paradigms have developed over time. The welfare economic paradigm has been developed in a direction also including organizational and management perspectives as exemplified e.g. by McCarthy (2001) where a number of concrete management oriented problems are discussed based on a solid welfare economic inspired starting point. Situations with less than perfect information is one such aspect that has been included in the discussion. The use of different incentives in the form of fees and taxes to overcome inefficiencies in the systems, such as externalities or congestion, does also signal an interest in the organizational aspects also in neo-classical inspired analysis around transport infrastructure.

3 Controversies over marginal costs and the government's role in Sweden

This section is based on studies of the official documents from government committees, government bills and Parliamentary reports and decisions from the mid-1920s until the 2010s. A more detailed description of the development of the government's policies in the field is provided by Hasselgren (2013 b). This section is structured around three periods in Swedish transport infrastructure policy according to the balance between the institutional and the welfare economic perspective.

3.1 The Full Cost Coverage Period

Following the nationalization of roads and railroads in Sweden by the late 1930s and early 1940s the government initiated the post war planning in the transport-sector. The first post-world-war two *Transport Committee* started its work in 1944. It presented its final report in 1947 (SOU 1947:85).

The overriding principle for the management, planning and financing of transport infrastructure was defined to be to aim for efficiency, expressed as the highest possible output in relation to the resources used in the sector. In addition to this a principle of full cost coverage responsibility for every single transport mode was proposed.

Overall the Committee had a positive view on the value of free enterprise and competition as a basis for the development of a sound and efficient transport system. Dynamism, technological development and competition were seen as superior aspects of a free market, compared to a government controlled development or dirigisme. A number of proposals were put forward by the Committee in order to improve the functioning of the government agencies' in the field and to set a more stable financial institutional environment in the sector, fostering efficiency.

The 1944 Transport Committee's proposals were, according to Sannerstedt (p 5, 1979), never followed by any explicit proposals by the government. When reading the government's yearly budget bills from the years following the war-end, the government instead focused on the need for tackling the overriding economic policy dilemma with a strong growth in consumption and imports and the need for investments in most areas of the economy. To set up a separate road-management structure, part of the 1944 Transport Committee's program was never proposed.

The future of the general transport policy was in focus of the *1953 Transport Policy Committee*, reporting in 1961 (SOU 1961:23). It presented a coherent plan for a sustained market oriented transport policy with focus on deregulation, whereby major parts of the remaining war-time regulations should be dismantled. The basic strategy with the business-economic friendly framework and the cost responsibility principle was also to be preserved.

The basis for efficiency of the system was, according to the Committee, that the (true) costs of the different transport modes were reflected in the prices that the transport users met. This was a direct link to the cost responsibility principle of the 1940s and 1950s. This would make the choices in each situation efficient and also lead to a subsequent separation of transport flows to the different modes according to their relative strengths.

The Committee however also discussed marginal cost-based pricing principles, which were said to be the correct pricing principle for the existing network at any given time. The Committee had at the same time the view that for new-construction the users should be charged the full costs of the projects. In a situation with a strong projected investment growth such full-cost coverage would set a frame for the total investment volumes. There had been concerns over risks for over-investment, mainly voiced by the Ministry of Finance. These concerns could be met by this two-tier pricing policy.

The Transport Policy Committee's work was commented on in the government's proposal to Parliament in 1963 (1963:119). The government more or less endorsed the proposals of the Committee. This decision also summarizes the rather strong focus on the cost responsibility principle during this period.

3.2 The Mixed Policies Period

Through the 1960s there was a growing public discussion on the future development of the transport system. One of the effects was that there were political claims for the railroad to be protected from further reductions. Questions were also raised whether the projected strong growth of the number of motor vehicles actually should be welcomed. The correct estimation of the social costs (and revenues) of the road-system, and the possible application of the welfare economic principles both for the roads and railroads was therefore one of the concerns in the late 1960s and early 1970s, when discussing transport policy.

In order to answer to the public pressure for a revised transport policy with elements such as the critique against the perceived road-transport favoritism and the cautions that the railroad-system was disadvantaged by the prevailing policies, the government decided to set up a new Committee, the *1972 Transport Policy Committee*.

This time the government aimed for a redirection of the transport policy. The Committee expressed the main features of the new transport policy to be the wider social goals, compared to the more narrow internal system-oriented goals in earlier committees' work. Within a framework of government ownership of transport infrastructure and welfare economic principles the transport services should, however, be carried out with the overriding aim to achieve a more narrowly defined business economic efficiency.

In a report from the Committee in 1978 (SOU 1978:31), focusing on the cost responsibility principles and fee-structures, the view that the cost responsibility perspective should be abolished for both railroads and roads was advocated.

The Committee thus emphasized the welfare economics pricing perspective when it came to the management, financing and planning of transport infrastructure, though with some degree of inconsistency. At the same time it only slightly discussed the need for efficiency in the production of the services and the management of the government agencies in the area. Only one paragraph was included in the 1978-report (p 41) discussing the need for a focus on the internal efficiency of the agencies (and other organizations) in the transport sector. Little was said in this respect other than that "intense rationalization-and cost-reduction" should be the focus of the organizations and that "motivation" (for reaching efficiency) is important as the marginal cost principle for fee-systems would probably not give the best prerequisites for (internal) efficiency.

The government sent its proposal to Parliament in 1979 (1978/79:99). The 1963 goal for transport policy was to be changed in line with the proposal from the 1972 Transport Policy Committee. A new overriding goal for transport policy, reflecting the shift to a welfare economic stance, was proposed by the government.

Marginal cost based pricing was seen as the preferable principle for future decisions on the prices and taxes in the area, and primarily when it came to the use of the existing network. At the same time the difficulties in applying these principles were reflected on. The fiscal objectives of the government were also emphasized, showing that the full cost perspective was still valid as a complementary yard stick.

The 1979 parliamentary transport policy decision did, however as it turn out, not have enough stability and impact to change the actual policies pursued by the government and the agencies. The government therefore had initiated a renewed work for analyzing the transport policies already by the mid-1980s.

A number of reports were presented by the Ministry of Communication during the 1980s as a result of preparations for the coming transport policy decision. One of the reports prepared for the decision concerned the cost responsibility of the transport sector, and was published in 1987 (DsK 1987:4). In this report the connection between the financing principles and the organizational (or internal) efficiency of the separate transport modes was discussed. It was argued that a cost-responsibility principle would give stronger incentives for efficiency than if fixed costs were covered by general tax-income. The report finally proposed something close to a mix of the 1963 and 1979 transport policy decisions in these respects.

The government, in its *proposal to Parliament in 1988* (1987/88:50), concluded that the principles of the 1979-decision had not fully been implemented in the sector. The different market-conditions in the sub-sectors where the transport modes operate had, according to the government, over time been more influential than the overriding political principles as decided in the transport policy decisions.

As the Communication Minister discussed the cost-responsibility principle in the transport policy area the conclusions and proposals mirrored the proposals in the 1987 ministry report. A marginal cost principle was thus proposed as a principle for short term costs while a (full) cost responsibility principle was proposed to cover for all fixed costs, which should be borne on a decentralized level in the system.

Competition between the transport modes and the importance of the free choice of transport customers and users were further emphasized in the proposal. Here, the government took a step back from the more vaguely formulated principles from 1979, where the basic principle was that the financing gap, following the introduction of marginal cost based prices, should be covered by government financing rather than by sub-sector cost responsibility.

The period from 1963 to 1988 was a time of shifts and inconsistencies as regards principles and policies for financing of transport infrastructure. The period started and finished with more or less similar formal policies; a market friendly policy with focus on full cost coverage, with a foreword for welfare-economic cost benefit calculation to guide investment decisions, combined with marginal cost based pricing.

3.3 The Social Marginal Cost Period

The 1988 parliamentary decision seems to have had as limited impact on the real world practical policies as the 1979 decision. One main result of the 1988 decision was the split of the former vertically integrated railroad agency into a new separate infrastructure agency and a new transport service oriented railroad agency. Growing deficits in the railroad operations however, once again, was one of the main concerns of the government. Once again a government committee was launched. The focus was a (new) general reform of the transport policy. The Committee proposed a widened role for transport policy to explicitly include areas such as regional policy, sustainability, traffic safety etc. This marked a shift to a more politicized agenda for transport policy than earlier.

The report (SOU 1997:35) from the *1996 Transport Policy Committee* was also more openly political in its style than earlier reports in this policy area. Transport policy was described as a policy area where the main focus should be the achievement of political goals rather than to see transport policy and transport systems as functional systems.

The Committee reflected on the issue of internal and external efficiency of the transport system with a view that a cost responsibility principle would give a good framework for internal efficiency, more so than a

welfare economic framework with tax-funding of fixed costs. A number of reasons were, at the same time, presented as support for rejecting the cost-responsibility principle.

In a few sections in its report (p 138 ff) the Committee concluded that the former (1963 and 1988) policies were deficient as guiding principles. The (once again) new policy was proposed to be that short term social marginal costs should be the basis for prices and taxes. Financing of fixed costs should (normatively expressed) be covered for by general tax revenues. At the same time the government should be open for (some) additional funding from users in specific cases, formally in order to open for efficiency gains, but perhaps in practice more in order to meet the willingness to spend in addition to what cost benefit analyses show.

In its *proposal to Parliament in 1998* (1997/98:56) the government presented a view close to the 1996 Transport Policy Committee. However, as in earlier decisions reflected on in this article, the government was more pragmatic in its stance than the Committees. The government thus, in its basic “transport policy principles” (p 36 ff) outlined that, even though transport policy was one policy area among many other, and that transport issues mainly are to be treated in relation to the political goals and not primarily as a functional system, transport services at the same time have to be based on the principles of decentralized demand and user-choices. It was, according to the government’s proposal, through the active choices made by users and customers, that efficiency and development is achieved.

When it comes to the view on the cost responsibility in the transport sector the government was clear that the basic principle should be that prices and taxes should reflect the costs of the use of the transport infrastructure system, with a focus on internalization of external effects. The decision in 1998 has been confirmed by two later decisions on transport policy, e.g. in 2006 (2005/2006:160) and 2008 (2008/09:35). Short term social marginal costs as the basis for the charging of fees and taxes has been transformed the new cost responsibility principle of transport policy since the late 1990s and it is also part of the EU transport policy framework.

In the most current development there might at the same time be some signs of a return to principles of full cost coverage, e.g. in the EU-policies where both marginal cost and full cost principles are mentioned as important. The same might to some extent be true also for Swedish transport infrastructure policy, where both principles are from time to time mentioned in current political statements. Through high taxation on road transportation it could be argued that the financing principle is upheld, even if marginal costs are used as the yard-stick for prices and taxes. At the same time it could be argued that as long as ear marking is not allowed and all the time the infrastructure providing organizations are kept as government agencies, the political and social aspects of the transport infrastructure systems will presumably largely prevail, rather than the organizational aspects.

4 Theory and practice – has there been a controversy?

4.1 A controversy?

The review of the development of the policies in section three shows a general trend from the full cost responsibility principle to the marginal cost coverage principle. The basic principle, that each transport mode should cover the full costs through the collection either of revenues from voluntary services (as earlier for railroads) or through taxes or compulsory fees (as for roads), has over time more or less been abandoned. The current policy is based on the government’s collection of revenues from the transport modes and services where the elasticity to price changes are modest rather than in accordance to the actual costs of the different transport modes. Thus road transport is taxed more heavily than railroads and railroad-transport.

This article has shown that, at least on the official policy level, the discussion around pricing and financing policies related to transport infrastructure can be seen as a controversy between the two different perspectives as outlined by Coase in his 1946 and 1947 articles. The controversy seems to have been most obvious during the 1970s-1980s when the policies on financing principles shifted several times. Since then the marginal cost principle has been the dominant official policy principle. This development has been underpinned through an emphasis on this perspective also in EU-policies.

At the same time it is of course possible to discuss whether there has actually been a controversy or if diverging views on transport infrastructure financing, as other policy areas, should be seen as signs of transition between different perspectives and principles over time, without necessarily constituting a controversy. The core focus of the political discussion can also be interpreted as a discussion more over the total volume of investments than over the financing principles as such. The persistence in the discussion around the different views and the reoccurrence of the different principles in the debate over time is, however, a sign of this being a more or less eternal question in relation to systems like transport infrastructure. Therefore it seems reasonable to see the marginal cost controversy as one of the basic issues in transport infrastructure policy, and that this is true also in Sweden.

4.2 Reasons for the change in policies

The change in the government's financing policies can be seen as influenced by a number of reasons. Some of these reasons are outlined here primarily as suggestions or hypotheses to be further analyzed and exemplified in coming research.

The five most debated and discussed reasons in the official documents and in some additional sources quoted below were based on and inspired by:

- A successively more intervention-friendly public policy orientation
- A generally growing environmental concern in the society and in politics, favoring railroads and with a gradually less road-friendly view on roads than before
- A view based on economics arguing on the one hand that road traffic did not cover its full social costs, reflecting a cost responsibility view, and on the other hand a view that welfare economics and marginal cost pricing was the right way forward, opening for subsidies to railroads
- A critical stance towards the centralized expert oriented planning practices of the 1950s and 1960s
- An increased interest in preserving the fiscal net surplus from vehicle and fuel taxation

A general shift towards a more marked government intervention-stance in politics in Sweden might be seen as a common denominator explaining the general support for a move away from the cost-coverage policy to the marginal cost policy up to the 1990s. Government intervention was seen as a remedy to many different perceived shortcomings on the market, especially through the 1970s-1980s. The growing environmental concerns with the generally less road-friendly stance in the society at large worked together in favor of a stronger political support for subsidizing railways, perceived to be the environmental friendly alternative.

As Sannerstedt (1979) has shown there was a wide-spread criticism towards the reduction of the railroad system in the public debate in the 1960s, following the 1963 transport policy decision. The critical stand-points were reflected in an influential book ('Ska vi asfaltera Sverige'¹) written by a group of academicians of which some social democrats (Anell, Hedborg, Lönnroth, Ingelstam, 1971) discussing the effects of the expansion of the road system and arguing for a revised transport policy. One main point in the book was the perceived too road-transport friendly stance of the transport policy.

¹ "Should Sweden be asphalted?"

Another key element of the critique was that road transport in general did not pay for its full social cost, claiming in specific that (negative) externalities were not included in the calculations of the cost-base. Railroads on the other hand, it was argued, as a consequence of the prevailing financing principles, had to pay their full costs, which rendered them a too weak competitive role in relation to road transport.

Another critical standpoint towards the prevailing policy at the time was forwarded by Bohm, a well-known Swedish economist at the time, active e.g. in transportation economics. Bohm argued (Bohm, 1973) that e.g. the 1972 Road Tax Committee was heading for the right principles for the future; short term social marginal costs, as the basis for pricing. The ministry officials and the prevailing transport policy could though, according to Bohm, be expected to work for a too strong focus on the principle of full cost coverage. This view reflected perhaps the tendency for inconsistency in the pricing and taxation policies in relation to transport infrastructure where the official policy with openness to marginal cost pricing often had to leave room for more pragmatic cost responsibility policies in practice.

A general and comprehensive critique of the 1963 transport policy and its effects was published in 1974 by Bohm (et al). Here, the critical voices of the late 1960s and early 1970s, in specific against the road-planning practices, were one of the starting points of the discussion. Through a wider use of cost-benefit analysis and welfare economic principles a redirection of transport policy to focus more on welfare based efficiency should be achieved, it was argued. The inclusion of externalities in the cost base was the key in this process. Here many of the wider political interests could be brought into the decision process in a formalized way.

The welfare economic perspective which has gained in influence over time in the studied field, seems thus to have opened for more active policy and government intervention, which could be a political solution in a situation with demand for a revised policy orientation. Through the use of cost benefit analysis there was a method for including external variables into the discussion without losing too much of the rationalist stance of earlier government led expert oriented infrastructure planning.

The fiscal interest in the net revenues from vehicle and fuel taxes, which grew stronger through the 1970s, might also have made the earlier strict connection between revenues and government appropriations less favored from a fiscal policy (Ministry of Finance) perspective. The net income surplus from these taxes could be used for other purposes in a situation with growing public financing of different activities, e.g. coverage of growing deficits in railroads.

It is of course difficult to single out which one of the arguments that was most influential in the change from the earlier financing principles to the new principles. It seems reasonable to see the different arguments as having varying strength in different situations according to which angle of the policies was in focus in each specific situation. Welfare economics with its wider cost (and benefit) perspective seems to have offered a solution to the political dilemmas in the 1970s. Thus, it was not only that new economic theory and principles were developed; they seem to have fitted well into the discussions and debates at the time.

4.3 Focus on incentives for organizational efficiency changed?

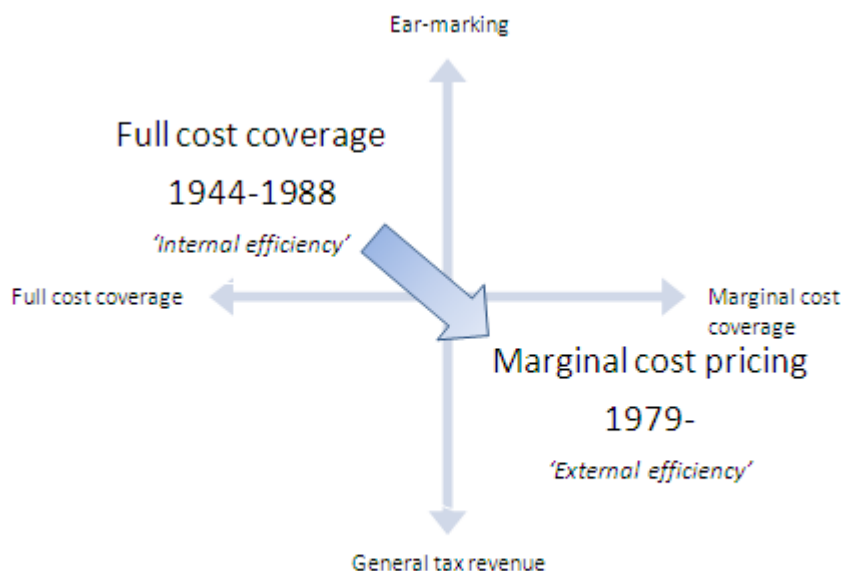
The shift in the policy view on the financing principles seems also to have been reflected in a weaker interest in the organizational aspects. This shift in policy stance is presented in Figure 4 below.

The shift might be interpreted as a departure from the focus on internal efficiency of the producing organizations and their relation to the users to a focus on the transport infrastructure systems as having a number of relations with the surrounding economy and society at large. These wider relations are seen as not being reflected in the more narrow decisions on costs and income generated internally in the infrastructure system. The two concepts, internal and external efficiency, were used by government

committees in the 1970s and 1980s as these discussed the different efficiency concepts and the perspectives that should be favored.

Figure 4

The marginal cost controversy of Sweden's transport infrastructure policy – a shift in focus



The two concepts seem to reflect different views on the role and functioning of the transport infrastructure system in the society and in the economy. A focus on the internal perspective, where the transport system was primarily a service function in relation to the economy, responding to demand as it fluctuated, was outlined by the 1944 Transport Committee. A wider role for the transport infrastructure system, interacting with the society and users of the system, and thus both enabling economic development and availability in general as well as producing services demanded by the users, has been the preferred view in later and more recent government committees and government proposals to the Parliament.

As Figure 4 shows this focus-change has also been combined with a move from a principle close to ear-marking of the government's revenues from (primarily) road transport to be used primarily for cost for road-maintenance and investments - a basic view in the traditional policies in the sector since the introduction of vehicle and fuel taxes in the 1920s - to a situation where all government revenues are treated as general tax revenues to be used at the discretion of the Parliament and government in yearly budget decisions. The former principle reflects a view that there should be a connection between revenues and actual spending in the same sector, perhaps a parallel to the Wicksellian interest principle for taxation. The latter principle comes closer to a theoretical public finance view, where all decisions on government spending should be taken as a comprehensive package, where all available revenues are reflected against all spending purposes. This latter principle is also reflected in fiscal regulation framework in Sweden.

The shift in practical handling of the revenues and costs has been combined with a growing fiscal net surplus from road taxes and fees compared to government's spending on roads. For railroads the opposite is true. Growing deficits in the railroad sector have led to a strong dependence on government funding in the railroad sector on national, regional and local level. If Coase's cautions towards policies of this kind should be listened to we should expect the overall efficiency of the operations of the systems to have been reduced as the incentives pushing for internal efficiency has become weaker.

One additional observation is that the government, at least since the 1990s, has acted with a market-failure stance as the dominant view on the functioning of the transport infrastructure system, quite a move from the market-economy stance expressed e.g. by the 1944 Transport Committee. There are less obvious examples where the government has acted in order to strengthen the institutional arrangements, such as proprietary rights, in order to enable more efficient spontaneous processes of negotiations between parties involved in market-failure situations.

The possible reciprocity of such negotiations and the institutional variance that Coase (1960) pointed to as important for efficiency and sustainability have thus not been in focus of the government's policies. The government's interventionist stance might have rather enforced less efficient structures compared to those Coase suggested, if analyzed from a cost efficiency and customer perspective. Growing dependence on subsidies in the railroad sector as a result of marginal cost pricing of railroad user-fees have led to investment management practices separated from direct user demand. The government's view that revenues from vehicle and fuel taxes should be seen as general tax income and the legal ban on ear-marking in the government's budget have made the connection between users' payments and the available resources for road investment less clear.

Even if the welfare economics inspired pricing policies thus might have led to the better fulfillment of the wider political goals developed over time for the infrastructure sector the internal efficiency of the government agencies responsible for roads and railroads has probably become less marked over time.

This conclusion has to be seen primarily as a hypothesis that should be further tested e.g. by comparing the cost structures over time in the responsible agencies. Such comparisons over time are difficult to perform since the organizational structures and financing principles have been altered frequently. The theoretical discussion in this article could be a possible basis for how to structure such a study and how to generate further hypotheses.

5 Conclusions

The article aims for an analysis of the financing principles used for roads and railroads in Sweden from the 1940s to the 2010s as these have been expressed in government committee reports and government proposals.

The article has shown that there are several examples in the official documents in Sweden of a discussion around the financing principles for roads and railroads which fit well into the discussion between primacy of the full cost coverage principle and the marginal cost principle reflected in economics literature. There have been a number of shifts in Sweden's public policies since the 1940s in this respect, with clearly mixed policy content during the 1970s-1980s. It seems reasonable to see this as a controversy in line with Coase who addressed this dilemma already in the 1940s.

At the same time it has been pointed at that for congested roads a marginal cost pricing principle including congestion costs can give full cost coverage, thus easing the controversy. A gradually increasing taxation on road-transport in general has also led to a situation where something close to full cost coverage is upheld, even if marginal costs are the formal basis for pricing decisions in general. This has also led to a high degree of cross subsidization between different regional areas in Sweden. For railroads on the other hand the current Swedish policies leads to a result far from full cost coverage.

A number of reasons for the gradual change in the financing principles have been presented and discussed. There seems to have been a number of different policy aims that interacted. Most importantly perhaps the development in economics, where welfare economics and a marginal cost view gradually evolved, seems to have matched the political aims well. Both supported a wider political perspective with a more interactive

view where transport infrastructure is seen as involved in a number of other policy areas as compared to earlier, where transport infrastructure was treated as a separate system.

It is further argued that there is a less obvious interest for the organizational or internal efficiency, which is also reflected in the official documents over time as these are more or less silent on these issues and their relation to the financing principles. This observation is consistent with Coase's cautions that a growing dependence on public sector subsidies would lead away from a customer orientation and focus on organizational efficiency towards a focus on the political system and the ministries. This would, according to Coase, lead to a risk for mal-distribution of the production factors in the economy. In this respect the article concludes that further analysis is necessary to arrive at a conclusion whether the shift in pricing policies actually has led to less efficient organizations.

The article has given a deeper understanding of the development of the discussion around the financing and pricing principles for roads and railroads in Sweden. This gives a developed insight into the policy evolution over time and a better connection to the theoretical perspectives during the time period following the nationalization in Sweden, but also to the current economic theories. The accuracy of the tendency for a one-sided focus on welfare economics during the latest decades in Sweden as the primary theoretical basis for financing and pricing discussions and policies in the sector might, based on the findings, be questioned. These findings can also be of use for the current discussions on alternative financing and alternative organization of transport infrastructure in many countries.

In a situation with high demand for increased investments in transport infrastructure, the introduction of new technology which enables more of market-like solutions, and the interest for sustainable solutions, an increased focus both on resource allocation and organizational efficiency is crucial. Structures where the private sector takes on more responsibility for the operations of transport infrastructure systems as well as for the construction of these systems is consequently discussed more often today than earlier. PPPs are a group of organizational solutions that strives for meeting some of these concerns. Until now PPPs have though only been used to a limited extent in Sweden. Another outcome of the present turn in the transport infrastructure discussion, with more interest for alternative financing, might be a revival of full cost principles in financing rather than marginal cost models. Once again the financing and pricing principles and their relation to efficiency might become a centerpiece of the debate.

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