FOLLOW-UP OF INVESTMENTS

Summary in English

SIKA Report 2000:11

Preface

In the official document placing appropriations for 2000, SIKA has been instructed to make "a follow-up of at least one major road and one major railway investment linked to infrastructural requirements". As both the National Rail Administration and the National Road Administration have reported retrospective cost-benefit analyses of major projects opened for traffic during the year since 1997, we have decided to focus on questions of method and overall problems with these retrospective analyses.

Magnus Bengtsson, Jimmy Bystedt, Pär Ström and Lena Wieweg at the National Rail Administration have been interviewed for the description of the National Rail Administration's forecasts and estimations. Gunnar Lundgren and Gunnar Sävenstedt at the Swedish State Railways, SJ, have assisted with information. Bo-Lennart Nelldal, The Royal Institute of Technology, KTH, has contributed a price index and points of view.

Gunnar Tunkrans, Östen Johansson, Jan Berglöf, Carsten Sachse and Leif Karlsson at the National Road Administration have been interviewed for the section on the National Road Administration's effect correlation.

Roger Pyddoke was project manager. Peter Roming has made calculations in SAMPERS and SAMKALK.

The report is a revised version of the report submitted to the Government in December 2000, and has been re-worked after points of view from the National Rail Administration, SJ and TFK (the Institute for Transport Research).

Stockholm, August 2002

Staffan Widlert

Follow-up of investments – Conclusions and summary

The assignment, the intention and SIKA's response

In the official document placing appropriations for 2000, SIKA has been instructed to carry out "a follow-up of at least one major road and one major railway investment linked to infrastructural requirements". As both the National Rail Administration and the National Road Administration have reported retrospective cost-benefit analyses of major projects opened for traffic during the year since 1997, we have decided to focus on questions of method and overall problems with these retrospective analyses.

The overall intention of the follow-up is to provide prerequisites for a better basis for future planning by identifying problems and deficiencies in present or previous planning practice. It is accordingly not a matter of taking a position on whether earlier underlying material and decisions have been correct in any absolute sense of the term. It is doubtful whether any such position could be arrived at retrospectively and, in SIKA's view, it would not contribute much to the future planning process.

It is hardly surprising that different assumptions and predictions that have to be made at the various stages of planning are seldom wholly in accord with the actual situation. On the contrary, the insight that this is the case should be an important basis for planning. At the same time, it is, of course, important to continuously develop planning so that risks and uncertainties can be dealt with as well as possible. Recurrent follow-ups of forecasts and cost-benefit ratios for, for instance, infrastructural investments, are an important component in this development work.

The original version of this report was submitted to the Government in December 2000. The report led to a lively discussion with the National Rail Administration, SJ and TFK (Institute for Transport Research) submitted written points of view on the report. SIKA then withdrew the report for re-working since we agreed that some important points in the analysis were misleading. The objection that we considered most serious was that we had not taken into consideration in the follow-up that railway investments are deliberately calculated with fictive starting years to permit fair comparisons between different items.

SIKA has now re-worked the report. However, we have restricted ourselves only to making the supplements that we regarded as most important for the report to be fairer. When the original report was re-worked, 1999 was the latest full year for

which follow-up data was available. 1999 was therefore chosen as a comparison year. This comparison year has mainly been retained even though data is now available for 2001. We have endeavoured to have the data and other information in the report confirmed by the National Rail Administration, the National Road Administration and SJ. However, it appears from the report that a follow-up of this kind is complicated from the point of view of method and requires that certain assumptions and simplifications can be made. In our view, however, this must be accepted taking into consideration the indispensable information that a survey follow-up can none the less provide from the point of view of transport policy.

Retrospective cost-benefit analyses can lead to cost-benefit ratios that come closer to real outcomes

Our impression is that government demands for retrospective cost-benefit analyses can provide a stronger incentive to make correct estimates. If these retrospective analyses show the actual costs, the cost outcome for the National Road Administration is also closer to the estimated level than in an initial follow-up made by the National Audit Office in 1994. The National Rail Administration's cost outcome is further off the estimated costs in 1999, however. Cost discrepancies can be expected to fall over the next 5-10 years since it can be expected that the requirements for retrospective cost-benefit analyses will have an impact on the design of advance costing.

It is not clear at present to what extent the National Rail Administration and the National Road Administration analyse the outcome of retrospective cost-benefit analyses s. In SIKA's view, it would be useful if the transport agencies made an annual analysis of the outcome of the retrospective analyses in a special memorandum. The more important prerequisites in the advance costing for investments and the alternatives analysed could also be presented in a memorandum of this kind. A special analysis should be made of the project in cases where the outcome in terms of volume of traffic during a follow-up diverged by more than 20 per cent from the forecast used in the calculations in the action plan. In order for such a follow-up to be fully comprehensive, the method of making calculations would have to be changed, however, so that they provide a picture of the expected development rate, the services operated and the development of the volume of traffic.

Rail travel increases more slowly than assumed in cost-benefit analyses

We have also studied the outcome of the traffic flows in relation to the forecasts and thereby the cost-benefit calculations. The traffic flows forecast by the National Road Administration are often quite close to the outcome. The biggest remaining problem is that the estimates for the railway are made in a way that makes it difficult to follow up the outcome. There are a number of reasons for this.

One reason is related to the fact that all investments (road and rail) are estimated in a planning round with the same start year – the first year in the planning period

concerned – to enable a comparison to be made on equal conditions. This leads to problems for some railway investments since major investments in corridors require that construction take place in several stages. In the plans, these stages are spread over a whole planning period (sometimes more than ten years). Sometimes, the investments start fully in accordance with plan. However, they often start after the starting date in the calculations and the entire corridor is completed several years after the first investment has been completed. In the calculation for the whole East Coast line corridor in 1993, it was assumed that a start was made on all component stages of the line at the same time. According to the plan subsequently produced, investments would begin successively during the planning period. Therefore, operation of traffic for certain investments starts a lot later than the date in the estimate.

There are also some additional causes. The start of certain investments is delayed due to insufficient appropriations, problems with environmental assessments, etc. Some construction projects are delayed during the period of construction and take a longer time to build than estimated. Sometimes, the start of full traffic is also delayed after the investment has been completed. In addition, traffic starts later in reality than in the estimates, which also leads to the actual traffic initially being long way off that estimated.

There are good reasons for the method of calculating railway projects described here. It is difficult to see how comparability between different railway investments can be achieved otherwise. This procedure has also been approved by SIKA, among others, in previous direction planning. However, this follow-up study makes it clearer that the calculation convention has some problematic consequences that were not wholly evident for SIKA earlier and which can also partly explain why we neglected in the original follow-up to take into consideration the fact that the calculations do not produce a picture of the volume of passenger travel that can be expected in a particular year.

One very difficult consequence of the calculation procedure in SIKA's view is thus there are considerable problems of method associated with providing a wholly fair picture of major rail investments within a reasonable period. Continuous follow-ups of investments are an important part of the feedback of experience in transport policy, the importance of which has been underlined on repeated occasions by the Riksdag and Government. It thus appears to be an extremely important task to achieve a solution as to how to tackle these problems of method. The present report can be seen as an attempt to deal with this problem. We consider that it should be followed up by further joint efforts from the National Rail Administration, the National Road Administration and SIKA within the working group for socio-economic methods (ASEK).

A further consequence of the method of calculation is, in our view, that there is a risk of the cost-benefit ratio of investment in railways being overestimated. This is because the time-lag between when the construction expense is incurred and when traffic starts in full is longer than assumed in the calculation. This problem has been taken up in the most recent ASEK work. A conceivable solution might be to replace the current calculations with estimates that contain a realistic assessment of the time between the start of construction and the start of full traffic, resulting

from the construction of sections of the line being spread over a long period of time, the time taken for operators to adjust the services offered and the time taken for passengers to adapt to the new travel opportunities.

In its annual report for 1999, the National Rail Administration has started to report traffic outcomes in comparison with estimated flows. With respect to the three investments for which traffic flows have been followed up to date in annual reports, the outcomes are clearly lower than the forecasts, see Table 1.1

Table 1.1. The volume of passenger travel - outcome on lines completed in 1994 and followed up by the National Rail Administration in 1999. Source: The National Rail Administration's annual reports

Investment	*Estimated volume of passenger travel in 000s*	*Outcome*	*Outcome as a percentage of forecast*
Degermyr	662	383	58 per cent
Holmån	662	383	58 per cent
Coast to coast line	610	484	79 per cent

Besides the aforesaid estimation convention (to set the same starting year and a short interval of time between the start of construction and full traffic for all investments), there are in our view a further two conceivable explanations for the discrepancies between forecast and outcome. One is that certain prerequisites in the surrounding world develop in a different way than that assumed. Important prerequisites that have developed differently are railway ticket prices (e.g. the increase in VAT in 1991), the services operated (even on other lines) and economic trends (e.g. household income) and population. We know that the cyclical downturn in the early 1990s was deeper than anticipated and that this led to a lower increase in the volume of travel than forecast.

Another explanation may be that the models as such contain deficiencies. Examples of such deficiencies could be that the method of estimating and modelling sensitivity to price, comfort, frequency of services or changes in journey times, leads to systematic errors. Furthermore, at present, we lack good possibilities for calculating the effects of running new trains. All these differences between assumed prerequisites and actual development probably contribute to the discrepancy between calculated and actual development.

With the above reservations, SIKA has compared the outcome and the estimates for traffic flows on the East Coast line. We have then been able to note that the East Coast line has to date been constructed at approximately the rate stated in the Trunk Network plan. According to the Trunk Network plan, the East Coast line would be built over a ten-year period. Construction start for the corridor (though not the part projects) also took place at about the time stated in the cost-benefit analysis. The major difference was instead that it was assumed in the cost-benefit analysis that the corridor would be completed three years after it had been started (during the first years of the planning period in 1994) and not ten years later as in the Trunk Network plan, which will probably actually be the case. If, notwithstanding this, we compare the actual and estimated flows for 1999, we can

note that the actual flows are under half of the estimated. The main reason for this is that the line has still not been completed and that services have not yet reached the intended level.

On the basis of the few observations we have, we can also find other reasons why the actual flows are less than those estimated. On the lines where a major part of the passenger transport consists of SJ's commercial services (the Western main line, the East Coast line, the Southern main line), large improvements in travelling times have been achieved due to investments followed by large price increases and up to 1999 small increases in the volume of passenger travel. This is a wholly reasonable consequence of there being a required return for SJ and that the traffic was previously not profitable. On lines where SJ or the county traffic principals have had a strong interest in making it possible to commute to work (the Svealand line and the Coast Arrow where improvements in the latter case mainly consist of new rolling stock, however), prices have been kept down and improvements in travelling times and/or frequency of services have led to large increases in the number of passengers!

Our estimates show that the difference between the forecasts and the actual numbers travelling on the East Coast line have led to some overestimation of the net social benefits of the investment. However, the result is not completely certain. Travel time gains for passengers on the improved line have been converted into increased income for SJ by a large increase in prices. If price elasticity is low, higher prices will have a small effect on socio-economic profitability. Further analyses should be made of the effect that this has on the profitability of the investments.

Forecast assumptions should be varied when forecasts are made for new investments

The over-estimates of the volume of passenger travel in the advance estimates for investments can partly be caused by the old forecast models giving a too high volume of passenger travel. However, this does not seem to be a problem with the new SAMPERS model. SIKA has tested the SAMPERS model by making a "retrospective forecast"[1] for train travel between Stockholm and Gothenburg. The result indicates that SAMPERS in this case provides a good picture of the actual aggregated number of passengers. However, the breakdown between different trains is less good in the model. Transek's follow-up study of the Svealand route shows that SAMPERS has not succeeded in wholly capturing the large increase in train travel on the Svealand line. However, SAMPERS accuracy seems to be satisfactory even in this case.

The discrepancies between estimates and outcome for the East Coast line mentioned previously seem to be largely due to the time between the start of construction and full start of services in reality being considerably longer than assumed in the estimate. In the report's other analyses of the forecasts, it seems as if the assumptions on the development, in particular of prices and services

[1] By "retrospective forecast" is meant that we calculate the volume of passenger travel for a past period using the forecast model, in this case the volume of travel for 1990.

operated, has given rise to overestimates. The model can therefore be regarded as being sufficiently good. Altogether, it seems then as if the discrepancy between forecast/estimate and outcome is primarily due to differences in services operated and prices rather than inherent deficiencies in the models. However, we have not attempted to test the old models.

SIKA makes the assessment that it would be possible to make some simple improvements in the prerequisites used in long-term investment planning. We should differentiate between services operated for the purpose of commuting to work and SJ's long-distance services. The most common assumption to date has been unchanged prices in real terms in the rail network. The most recent ASEK work included a discussion on when "forecasts" should be made for future prices. SIKA suggests there until further notice that this uncertainty be clarified with the aid of elasticity estimates showing how different assumption on price trends affect the outcome.

A further issue we have studied is the estimation of traffic safety benefits on the roads. At present, only standardised estimates of traffic safety effects are made for new stretches of road. This is related to it not being possible to achieve statistically significant estimates of the effects on a new stretch of road after three years. There are two problems with the National Road Administration's cost-benefit analyses and retrospective cost-benefit analyses . The first problem is that there is a risk in the planning stage of overestimating the effects on traffic safety of new roads by safety being increased by other measures undertaken at the same time. The other is that the standardised way of carrying out retrospective analyses risks underestimating the effects of new roads.

SIKA's suggested measures

On the basis of the follow-up now carried out, SIKA suggests that consideration be given to the following measures:

1. **Draw up new guidelines for how forecasts and cost-benefit analyses should be designed to be able to follow up road and rail investments.**

– The Government should instruct SIKA in consultation with the National Rail Administration and the National Road Administration to produce guidelines for the design of forecasts and cost-benefit analyses to enable investments to be followed up and how these follow-ups should take place.

2. **Include detailed requirements for retrospective cost-benefit analyses in the document allocating the appropriation.**

– The Government should make demands that the National Rail Administration and the National Road Administration should more actively analyse and use the experiences of retrospective analyses . SIKA therefore proposes that the National Rail Administration and the National Road Administration submit an annual memorandum to the Government reporting the conclusions they have drawn from the year's follow-up of estimates. In the cases where the volume of passenger travel outcome deviates by more than 20 per cent from the

forecast used in the estimate, an analysis should be made of the assumed forecast prerequisites.

– The official document placing appropriations should contain a clearer requirement that both the National Rail Administration and the National Road Administration should use the estimated cost in the most recent ten-year plan in their retrospective cost-benefit analyses. The reason is the decision to carry out the measure has been based on this cost.

– Demands are now made in the official document placing the appropriation to the National Rail Administration and the National Road Administration that all projects motivated by a cost-benefit analysis be post-costed. A demand should be made that the volume of costs for the investments which are to be followed up is to be accounted for and compared with the total cost for the projects completed during the year.

– At present, the National Rail Administration and the National Road Administration report the actual traffic flows in relation to the traffic flows assumed in the cost-benefit analysis for the projects that are post-costed five years after and reports the results in the annual reports. These traffic flows should also be analysed in the aforesaid memorandum.

3. Analyse how variation in use affects the profitability of road and rail investments.

– The Government should instruct the National Rail Administration and SIKA to analyse how variations in inter alia prices, ticket income, travelling times and the volume of passenger travel affect the profitability of investments in railways. The Government should instruct the National Road Administration and SIKA to analyse how variations in inter alia the flows of traffic affect the profitability of road investments.

THE SWEDISH INSTITUTE FOR TRANSPORT AND COMMUNICATIONS ANALYSIS

The Swedish Institute for Transport and Communications Analysis, SIKA, is an agency that is responsible to the Ministry of Industry, Employment and Communications. SIKA was established in 1995 and has three main areas of responsibility in the transport and communications sector:

- To carry out studies for the Government
- To develop forecasts and planning methods
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