BTE Publication Summary

The Effects on Small Towns of Being Bypassed by a Highway: A Case Study of Berrima and Miittagong

Working Paper

The Bureau of Transport and Communications Economics (BTCE) selected the Berrima and Mittagong bypasses as the first in a series of case studies which are examining the regional development effects of infrastructure investment, and assessing whether significant economic growth benefits are omitted from conventional benefit-cost analysis.







Bureau of Transport and Communications Economics

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FOREWORD

The Bureau of Transport and Communications Economics (BTCE) selected the Berrima and Mittagong bypasses as the first in a series of case studies which are examining the regional development effects of infrastructure investment, and assessing whether significant economic growth benefits are omitted from conventional benefit–cost analysis. The case studies are part of the BTCE research project on the economic benefits of investment in transport and communications infrastructure. Discussion in this paper includes what constitutes good practice in benefit–cost analysis, and how dubious practice affects some of the estimated benefits.

This pilot study is based on surveys conducted by the BTCE in Berrima and Mittagong, and the nearby towns of Bowral and Moss Vale. The Bureau is grateful to all the businesses, tourists, and other people who participated in the surveys. Assistance in the provision of supplementary information is gratefully acknowledged of: Jeff Lawrence and Michael Brearley of Wingecarribee Shire Council, Moss Vale; Trevor Johnson of Surveyor General Inn, Berrima; Tricia McClure and Ross Dearden of Roads and Traffic Authority (RTA), Wollongong Zone; Martin Nichols of RTA, Sydney; Allan Shepherd of Mittagong Chamber of Commerce & Industry; Geraldine Crane, who provided useful comments on the survey questionnaire, and other staff of the Australian Bureau of Statistics.

This paper was prepared by a BTCE project team under the supervision of David Luskin. Albert Ofei-Mensah and Maureen Allan (who was on secondment from the Australian International Development Assistance Bureau) each undertook major aspects of the survey and analysis. Bright Honu and David Luck were leaders of the project at earlier stages of the study.

> Russ Reynolds Research Manager

Bureau of Transport and Communications Economics Canberra August 1994

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ABSTRACT

A common argument is that road investments bring significant regional development benefits which go unmeasured in conventional benefit-cost analyses. The Bureau of Transport and Communications Economics has examined the regional development effects of two bypasses along the Hume Highway in New South Wales. The study finds that the economic effects on the bypassed towns are closely linked to environmental effects. In Berrima, tourism has taken off now that its historic charms are unblemished by heavy traffic. In Mittagong, the bypass was having a slightly negative impact on the economy about a year after its opening, due to the loss of traffic-serving business. Expectations are for the effect to turn mildly positive as people come to recognise that Mittagong has become a nicer place to shop and live in. People make themselves better off by adjusting their choices of where to live and spend money when towns become more appealing. The benefit-cost analysis of the bypasses, conducted by the Roads and Traffic Authority of New South Wales, omitted these hard-to-quantify benefits. Further benefits can arise from the regional development effects of faster and cheaper transport along the Hume Highway. The analysis of the Roads and Traffic Authority did not estimate these benefits, but it may have captured some of them indirectly in the estimated savings in road user costs. The general message is that double counting can easily result when savings in road user costs are combined with regional development or other 'secondary' benefits.

INTRODUCTION

Proposals for highway bypasses generate diverse reactions in the towns to be bypassed. Some people look forward to greater safety and quiet after traffic is diverted from their town to less populated areas. Others, particularly, those dependent on traffic-serving businesses like petrol stations, may worry about their livelihoods. Governments have an interest in predicting the economic effects of proposed bypasses to allow fair and informed decision-making. Parolin (1994) has reviewed the research on this topic and calls for more Australian studies to supplement the larger and generally more sophisticated literature from overseas (mainly the United States).

The present study of bypasses is part of the BTCE research project on the economic benefits of investment in transport and communications infrastructure. It is the pilot for a series of case studies which will examine whether significant economic growth benefits are omitted from conventional benefit–cost analyses (BCA). Cox (1994) has emphasised the omission of benefits arising from business logistic responses to better roads. Examples he gives are cost savings from inventory reductions or consolidation of warehouses. Other critiques of BCA have underscored the omission of benefits arising from regional development effects. The general theme is that investments induce various economic adjustments, including regional and logistical ones, which generate 'secondary' benefits not adequately captured by traditional BCA.

Secondary benefits can be either of the distributional or efficiency type. Investments in infrastructure can alter the distribution of economic well-being in ways that some would consider an improvement — for example, favouring the development of economically disadvantaged regions. Investments can also improve the overall efficiency of the economy, as indicated by the equivalent variation in national income. But conventional BCA can capture many of the secondary efficiency benefits, according to those who warn about double-counting (see Squire & van der Tak 1975).

Being a pilot, this study does not go far toward assessing these arguments. It does, however, find considerable merit in the double-counting defence of traditional BCA. In addition, on the issue of regional development benefits, it offers some reflections on what constitutes good practice in BCA and on how dubious practice affects the estimated benefit.

The proximity of the Berrima and Mittagong bypasses to Canberra reduced travel costs for BTCE staff, which partly explains their being selected for this pilot study. The Berrima bypass was the preferred choice, since sufficient time had elapsed since its completion in March 1989 to observe medium-term economic effects. Since the Mittagong bypass was completed in August 1992, only quite short-term effects were evident at the time of study. It was included in the study

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partly because both bypasses were treated as a single project in the original BCA. In addition, the differences between Berrima and Mittagong make for an interesting comparison of the experience of being bypassed.

Both towns are in the Southern Highlands Region of New South Wales (figure 1). The bypasses were part of an extensive upgrading of the Hume Highway, which runs between Sydney and Melbourne. Improved access to the Southern Highlands and quality of life considerations have contributed to the region's high population growth in recent years.



Figure 1 Berrima-Mittagong bypasses and the Southern Highlands Region

The pre-bypass economies of Berrima and Mittagong were broadly similar. The main industries were 'tourism' — that is, the provision of accommodation in hotels, motels and related establishments — and retailing. Manufacturing activity in the towns was limited.

The similarities between the towns exist along with differences relevant to their experience of being bypassed. Berrima had a 1986 population of 655 compared to 4240 in Mittagong, and the economic effects of being highway-bypassed are usually more adverse for smaller towns (see M.S.J. Keys Young Planners 1974).

Berrima also contrasts with Mittagong in having more well-preserved colonial buildings with tourist appeal. Mittagong is less of a tourist attraction in its own right, though both towns offer access to the scenic and recreational attractions of the Southern Highlands.

Tourism linkages are one of several reason for expecting the bypasses to economically affect other towns in the Southern Highlands, apart from Berrima and Mittagong. To investigate the wider economic effects on the region, this study has looked at Bowral and Moss Vale, which are just to the south of Mittagong along Bowral Road.

EFFECTS OF THE BYPASSES ON TRAFFIC AND ENVIRONMENT

The completion of the bypass enhanced the tourist appeal of Berrima by reducing the level of traffic in the town and virtually eliminating heavy vehicle traffic. Noise from traffic declined substantially and walking around the town has become easier and safer. About 80 per cent of tourists to Berrima who were interviewed in a recent BTCE survey commented that the reduction in heavy vehicle traffic had made the town a nicer place to visit.

In Mittagong, traffic on the old Hume Highway has declined substantially since the opening of the bypass. The decline in light vehicle traffic has been less than was predicted, however, due to the unexpectedly large stream of regional traffic connecting with Bowral Road (see figure 1). This necessitated the retention of four traffic lanes through Mittagong. Nevertheless, the reduction in traffic will permit some expansion of on-street angle parking along with other streetscape improvements such as pedestrian crossings. The improvements are aimed at attracting additional customers to replace some of the loss of business from through-traffic.

ECONOMIC EFFECTS OF THE BYPASSES

Methodology

To investigate the economic effects of the bypasses on Berrima and Mittagong and on the nearby towns of Bowral and Moss Vale, the BTCE conducted the following business surveys in September 1993:

- A face-to-face interview survey which contacted most retail and tourism businesses in Berrima and Mittagong, and a follow-up telephone survey of selected respondents;
- a mail survey of retail and tourist businesses in Moss Vale and Bowral;

• a mail survey of manufacturing businesses in all four towns and surrounding areas.

The questionnaire for the face-to-face interview survey in Berrima and Mittagong is reproduced as appendix I. Pilot testing of the survey in Goulburn, another town recently bypassed by the Hume Highway, revealed that many respondents were reticent about financial details and had difficulty quantifying the bypass effects on their business. The final survey therefore asked respondents for their qualitative impressions of how the bypasses had affected their gross sales and employment. Respondents who indicated there had been an effect categorised it as positive or negative and were then asked to describe it as 'small, medium or large'. The follow-up telephone survey asked for estimates of percentage effects from a subsample of respondents who appeared more capable of providing such information. Respondents in the subsample selected their estimate from among several suggested percentages which were determined after consultation with the local Chamber of Commerce. These estimates were combined with the categorical responses of the full sample to estimate the average percentage effects among the full sample of businesses (see box 1).

The ultimate effects of the bypasses could take many years to eventuate whereas the above-described questions pertain to effects to the time of survey (September 1993). The measured effects can be described as 'medium-term' for Berrima, which had been bypassed four years before the survey, and 'short-term' for Mittagong, where the bypass had been open for about a year. To gauge longer-term effects, the survey asked respondents in both towns, 'What do you think will be the effect of the Berrima (and/or Mittagong) bypasses after 1995?' The question did not distinguish between effects on employment and on gross sales, but the follow-up mail survey asked for separate estimates of post-1995 effects on these variables (in percentages). The average percentage effects on employment and gross business sales in the longer-term were estimated in basically the same way as for the short- to medium-term.

Admittedly, the estimation procedure does not deal rigorously with openings and closing of businesses caused by the bypasses. If a business opened to cater to demands created by the bypass, the effect would be to raise its gross sales from zero to some positive figure. In that case, how would they answer a question about the percentage effect on their gross sales? Alternatively, if a business has already closed as a result of the bypass, it would be missed in a survey of existing businesses.

The other business surveys used much the same questionnaire as the face-to-face surveys in Berrima and Mittagong. The main difference was the inclusion in the manufacturing survey of questions about effects on production and freight costs. Sample sizes and response rates for all the business surveys are given in table 1.

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BOX 1 PROCEDURE FOR ESTIMATION OF AVERAGE PERCENTAGE EFFECTS OF THE BYPASSES

The procedure described below was used to estimate the effects on gross sales and employment. The symbol x denotes a percentage effect on either of these variables.

STEP 1: Translate qualitative effect categories into percentage equivalents.

For the category, 'no effect', assign a zero percentage effect.

For each other category (for example, 'small negative effect'), define the subsample of respondents to the follow-up survey who reported experiencing that type of effect. Next, calculate the average percentage effect reported by respondents in the subsample. In other words, calculate:

$$\overline{\mathbf{X}}_i = \frac{\sum_{i} \sum_{j} w_{ij} x_{ij}}{\sum_{j} w_{ij}}$$

where: *i* indexes over qualitative effect categories and corresponding sub samples; *j* indexes over percentages; x_{ij} is the *j*th figure suggested to respondents as a possible percentage effect equivalent of the *i*th qualitative effect category; and w_{ij} is the number of respondents in subsample *i* who select x_{ij} as their estimate of percentage effect.

STEP 2: Calculate the average percentage effect for the full sample of respondents by combining their qualitative impressions with the results of the previous step. That is, calculate:

$$\overline{X} = \frac{\sum n_i \overline{x}_i}{\sum n_i}$$

where n is the number of respondents to the interview survey who indicated a qualitative effect in the category i.

Effects of the bypasses on Berrima and Mittagong have also been measured for land and property values and for income tax revenues from the towns' residents and companies (not just retail and tourism businesses). Officials of the Wingecarribee Shire Council who were interviewed by the BTCE estimated percentage effects on land and property values, as did real estate businesses included in the business surveys of Berrima and Mittagong. The estimates from these two sources were similar and an overall average is reported below. The Council officials were likewise questioned about income tax revenues. In each case, the estimates were simply averaged.

		No. of businesses				
Survey of:	Within scope of survey	Contacted for survey	Responding	Response rate (per cent)		
Tourism and retail						
Berrima	50	45	40	89		
Mittagong	60	45	25	56		
Bowral	50	30	16	53		
Moss Vale	30	18	9	50		
Manufacturing	15	13	11	85		
Total	205	151	101	67		

TABLE 1 SURVEYS OF BUSINESSES FOR THE BTCE BYPASS STUDY: SAMPLE STATISTICS

TABLE 2 ESTIMATED EFFECTS OF THE BYPASSES IN BERRIMA AND MITTAGONG

	Berrin	ia	Mittagong		
Variable	Medium-term (per cent)	Long-term (per cent)	Short-term (per cent)	Long-term (per cent)	
Gross sales					
Tourism	18.1	17.5	-4.4	0	
Retailing	5.6	8.3	-4.5	3.2	
Combined	7.1	9.8	-5.9	2.6	
Employment		·			
Tourism	3.8	15.5	5.6	0	
Retailing	1.3	6.9	-2.4	2.7	
Combined	1.7	8.1	-2.9	2.2	
Tax revenue	5.4	10.5	-4.5	3.9	
Land and property values	7.5	21.7	0	0	

Effects on the bypassed towns

The estimated effects of the bypasses on Berrima's economy are all positive, reflecting the increase in the town's tourist appeal (table 2). The medium-term estimates for the town's retail and tourist establishments indicate that the bypasses caused about a 7 per cent increase in gross sales and a 2 per cent increase in employment. Estimates of medium-term effects on tax revenues and land and property values are of the same percentage order as for gross sales. Berrima now attracts the same high property values that Bowral does; before the bypass, it was on a par with less expensive Moss Vale.

Estimated effects on Berrima are larger for the longer term than for the medium term, particularly for land and property values and for employment. For the period after 1995 it is projected that retail and tourist employment will be 8 per cent larger as a result of the bypasses, and that land and property values will be 22 per cent higher. Estimates for both time frames indicate that the bypasses will stimulate tourist (that is, accommodation) establishments proportionally more than the retail industry.

Part of the bypass-driven expansion of Berrima's economy has occurred through an increase in the number of businesses. Approximately half of the 45 retail and tourist businesses surveyed in Berrima had opened after the bypass, and many of these new businesses occupied premises which had been built after the bypass. Products of the new businesses include gifts, coffee and light meals, and jams. Establishments offering bed and breakfast accommodation in historic houses and nearby rural properties have also increased.

Mittagong's economy appears to have suffered from the bypasses in the short term. In the tourism and retailing sector, the bypasses have reduced sales by 6 per cent and employment by nearly 3 per cent, according to estimates in table 2. Take-away food shops, petrol stations and budget-priced motels were among the businesses most adversely affected. The BTCE did not obtain statistics on businesses that closed as a result of the bypass, but most of the businesses adversely affected would probably have taken a wait-and-see approach to so recent an event.

Overall, tourism and retail operators in Mittagong expected little effect from the bypasses after 1995. The surveyed tourism operators mostly said they expected no effect, while the retailers expected a slight boost to their business. The responses of both groups combined indicate long-term *increases* of between two and three per cent for both gross sales and employment. The anticipation of this longer-term stimulus could be why the council officials and realtors interviewed generally reported no short-term effect of the bypasses on land and property values, despite the short-term contractionary effect on business. (Why these sources expected no longer-term effect on land and property values is less readily

explained.) The effects of the bypasses on income tax collections from Mittagong are estimated to be about four per cent in absolute value — negative in the short term and positive in the longer term.

The bypasses may attract population to Berrima and Mittagong in the longer term, and this could explain part of any positive effect on local retailing. The increase in safety and tranquillity would attract population, as would any increase in business from visitors.

In both the longer- and nearer-term scenarios, the economic effects of the bypasses are more favourable for Berrima than for Mittagong. Several explanations for this can be offered. First, Berrima was bypassed several years ahead of Mittagong and thus has had more time to reorient its business from through-travellers to other clientele. In line with this, the estimated effects to date have been described as 'short-term' for Mittagong and 'medium-term' for Berrima. The difference in the bypass opening dates may also affect the estimates of long-term effects, since 'after 1995' still implies a longer adjustment period for Berrima than for Mittagong. Second, the post-bypass reduction in through traffic has made each town a more pleasant place to visit, but in Berrima this has magnified an historic appeal with which Mittagong is much less endowed. Third, and less certainly, the bypasses have increased the supply of parking more significantly in Berrima than in Mittagong. Since patronage of retail establishments depends on the availability of parking, this would have advantaged Berrima.

Broader economic effects

The bypasses are undoubtedly having economic effects outside Berrima and Mittagong and on manufacturing, but scant evidence of these effects has emerged from the BTCE surveys. The surveyed retail and tourist operators in the nearby towns of Bowral and Moss Vale perceived no effect on their businesses from the bypasses. Surveyed manufacturers in the vicinity of these towns and the bypassed towns also reported no effect. Conceivably, respondents would answer differently if the survey were repeated some years from now, after adjustments to the bypasses are more complete. But it is also possible that aside from effects on retailing and tourism in the bypassed towns, the effects on other sectors and localities are generally too small to be noticed. The most noticeable effect is probably the relocation of traffic-serving business from Mittagong and Berrima to other places along the Hume Highway. The recent opening of service centres at the Sutton Forest interchange, just south of Berrima, partly reflects this.

The BTCE survey of tourists provides some slight evidence of broader economic effects. Thirty-six tourists were interviewed — nearly all of those approached for the survey — on a Saturday in September 1993. Many volunteered that they frequently travelled by car between Sydney and Canberra, which means that they

often have the opportunity of visiting Berrima and other places en route. Over a third (14 people) said that they would have visited somewhere else had they not gone to Berrima (see appendix 2 for the questionnaire). Six of the surveyed visitors indicated that under pre-bypass conditions they 'would have gone [that is, visited] somewhere else in preference to Berrima.' The difficulties people have in answering hypothetical questions, combined with the smallness of the sample, limit the inferences which can be drawn from these responses. They do suggest, however, that the bypasses have led some tourists to substitute Berrima for other destinations, including places in the Southern Highlands. But tourist itineraries often include multiple stops, and some of the tourists interviewed in Berrima mentioned stopping elsewhere in the Southern Highlands, including in Bowral (with its arts and crafts shops) and the Kangaroo Valley. So some tourists may now be visiting Berrima in addition to, rather than instead of, the places they would normally visit in the Southern Highlands. Still others may react to the bypasses by increasing their visits to both Berrima and other places nearby, a reaction not measured in the BTCE survey. For the latter tourists, the increase in Berrima's appeal clinches their decision to visit the region.

Other economic effects of the bypasses would include the following:

- If the bypasses stimulate the economies of Berrima and Mittagong in the longer run, as the present findings suggest, spillover effects would arise through input linkages. Nearby towns could supply labour and inputs of materials and services to support the economic expansion of Berrima and Mittagong.
- The reduction in transport costs due to the bypasses could have both positive and negative economic effects along the Hume Highway corridor, including on towns distant from Berrima and Mittagong. Manufacturers in Goulburn, for example, could transport their products more cheaply to Sydney markets, but could also face greater competition from Sydney producers.

LESSONS FOR BENEFIT-COST ANALYSIS

Findings specific to Berrima and Mittagong

The original BCA of the Berrima-Mittagong bypasses was conducted by the Roads and Traffic Authority (RTA) of New South Wales in 1978. It is fairly representative of benefit-cost analyses of Australian road projects, including in the respect that it did not estimate the regional development effects of better roads. The major benefits in the RTA analysis were savings in travel time and vehicle operating costs, which together comprised 90 per cent of the estimated dollar benefit from the bypasses. Savings in maintenance costs on the existing highway (resulting from the reduction in traffic) and savings in accident costs

comprised the remainder. The benefit stream was calculated from 1986 — when the bypasses were supposed to have been completed — to 2015. The volume of highway traffic on which benefits were calculated was projected to increase by 5 per cent annually.

The findings of the present study direct attention to the environmental benefits of the bypasses, and to their effects on regional development, neither of which were valued in the RTA's analysis. Tourism to Berrima has taken off now that the historic charms of the town are unblemished by heavy traffic. In Mittagong, the prospects are for the improvement in the town's environment to stimulate retail business in the longer run. People make themselves better off by adjusting their shopping and visiting patterns in these ways after the environment changes. The findings may thus serve as a reminder to benefit–cost analysts, if one is needed, that the benefit of an environmental improvement can be magnified through regional development effects.

Another counsel which results from these reflections is that benefits from regional development effects should not be automatically equated with increases in national income. In the present context, the peace and quiet granted by a highway bypass might affect national income through only marginal channels, like greater productivity from sounder sleep. Yet even without any change in national income, consumers realise a non pecuniary benefit by shifting their expenditure to what has become more enjoyable after the bypass, such as tourism to the bypassed town. Although the point may seem painfully obvious, the current debate over public infrastructure investment seems at times to centre so much on 'economic growth' benefits that non pecuniary benefits may get overlooked.

It is also important to avoid confusing measures of regional effects with measures of social benefit. Buffington et al. (1992), in their study of two proposed highway bypasses in Texas, used as a measure of benefit the predicted increase in local retail and service sales. The finding of a positive effect may stem partly from their combining sales along the new bypass corridor with sales in the vicinity of the existing highway. The authors include the estimated increase in sales as one of several measures of 'non-user' benefits, as distinct from the benefits to road users of reductions in travel time, accidents and vehicle operating costs. However, they do not explain exactly what benefit is being measured by the increase in local gross sales of retail and service establishments. True, the output of these establishments contributes in some fashion to national income, but the bypasses may have quite widespread effects on production elsewhere in the economy, including some negative ones. More importantly, to count the increase in national income as additional to road user benefits would involve substantial double-counting. This is because some of the savings in transport costs which result from the bypasses — and which are measured by the road user benefits are used to expand production. As a measure of regional benefit, the increase in local retail and service sales is also seriously flawed, most obviously because it does not measure the increase in local incomes, which is the more relevant indicator of the welfare of the region's residents. Some of the increase in sales will not accrue as income to local residents, but will go toward meeting the costs of the inputs supplied from other regions, including capital.

If one accepts the increase in local retail and service sales as a meaningful measure of benefit (which it is not), the question arises of whether this 'benefit' is significant compared to road user benefits. The findings of Buffington et al. indicate to the contrary. In present value terms, the ratio of the increase in sales to user benefits varies across scenarios in their study, but is less than six per cent in all cases.

To check whether similar results hold for the Berrima and Mittagong bypasses, the Bureau estimated the dollar effect of the bypasses on retail and tourism sales in Berrima and Mittagong over the same period as in the RTA analysis (that is, from 1986 to 2015, on the assumption that the bypasses had been completed on time). For this purpose, it was assumed that sales would have grown at 5 per cent annually in the absence of the bypasses, or by the same rate at which the RTA projected traffic to grow along the Hume Highway. These base case sales figures were then multiplied by the percentage effects estimated in this paper — the short- and medium-term percentage effects for 1986 to 1990 and the long-term effects for subsequent years. The procedure and the estimated dollar effects on gross sales in 1986 and 1991 are indicated in table 3. As indicated, the negative short-term effect on sales in Mittagong outweighs the positive effect on sales in Berrima over the initial period, after which the effects on both towns are positive. Effects on sales in the vicinity of the bypasses around Berrima and Mittagong have not been measured, since no development along the bypasses has occurred thus far. (However, the new service centre at the Sutton Forest interchange is close to the southern end of the Berrima bypass.)

The upshot of the calculations is to provide further evidence that in the case of highway bypasses, the 'benefit' from any increase in retail and service sales in the general region of the bypass is far smaller than road user benefits. The estimated increase in sales has a present value of \$19 million at 1986 prices, or only about 7 per cent of the estimated present value of the road user benefits.¹ This finding is notably close to that identified by Buffington et al. (1992) in the case of United States bypasses.

^{1.} The present value of road user benefits was estimated at \$277 milion at 1986 prices, assuming annual traffic growth of 5 per cent and using a real discount rate of 7 per cent.

		Short/medium	e-term effect	Long-term effect	
Gross sales	1986 value ^a (\$'000)	(per cent)	(\$'000)	(per cent)	(\$'000)
Retail					
Berrima	4 335	5.57	242	8.31	460
Mittagong	29 772	-4.5	-1 340	3.17	1 204
Tourism					
Berrima	660	18.1	120	17.47	147
Mittagong	1 320	-4.44	-59	0	0
Total effect			-1 037 ^b		1 811 ^c

TABLE 3 ESTIMATED EFFECTS OF THE BYPASSES ON BUSINESS SALES

a. Net of excise and sales taxes. Estimates of total sales were derived from data published by the Australian Bureau of Statistics (ABS Catalogues 1304.1 and 8635.1). The data include total sales for each sector in the Wingecarribee Shire, but not for the individual towns. However, they do provide figures by town on retail employment and the number of tourist establishments. For each sector and town, the total sales figures for the Shire were prorated on the basis of these statistics.

b. Base value which was used to estimate the projected effect of the bypasses from 1986 to 1990.

c. Base value which was used to estimate the projected effect of the bypasses from 1991 to 2015.

Source BTCE estimates based on survey and Australian Bureau of Statistics data.

Findings more general to bypass projects

What, then, of the question which largely motivated this study? Did the original BCA of the Berrima–Mittagong bypasses omit significant benefits arising from regional development effects? The answer to this question depends on what is deemed a benefit. Some people believe on equity grounds that government should favour particular regions for economic development, usually regions with bleak long-term prospects. The idea is that an increase in income or employment in such areas will make society fairer, even if it is merely diversion from other areas. The present findings suggest that the bypasses will economically benefit Berrima and Mittagong in the longer run, and will have small and diffuse effects over the wider Southern Highlands region. However, by national standards, the region in which Berrima and Mittagong are located is in reasonable economic health. Hence, if the bypasses have benefited residents of these towns more than other Australians, it is not apparent that they have made society fairer.

If distributional considerations are ignored, the question about omitted regional development benefits can be usefully recast. One might well ask, are there theoretical grounds for believing that such omissions occurred in the original analysis of the bypasses? The fact that the analysis did not estimate regional development effects proves little, since the benefits from these effects may have shown up indirectly. Granted, the analysis did not value some environmental benefits for the bypassed towns, and these can be magnified through their regional development effects. However, for the major benefits which the analysis did value — savings in travel time and vehicle operating costs — there may not be much of problem. To show this, a brief digression on the basics of benefit–cost analysis is warranted, despite their familiarity to many readers.

The theory for BCA of road projects identifies two benefits which result from a reduction in transport cost (either time or money cost). One of these is the savings in transport costs on 'existing' traffic — that is, on the volume of traffic that would normally flow in the absence of the proposed road improvement. This is represented in figure 2 by the area of the shaded rectangle. The other is the benefit from generated traffic which results when people take advantage of lower transport costs to demand more traffic. This is the area of the darkened triangle. The benefit or cost which an individual realises from using the road system may differ from the benefit or cost to society — for example, due to congestion and pollution effects — but this consideration does not affect the thrust of the current argument. Abstracting from it, the benefit from generated traffic is the difference between how much the additional transport is worth to the people demanding it — their 'willingness to pay' — and the cost they actually incur.



Figure 2 Traditional consumer surplus estimation of the benefits from lower road user costs using a generalised cost of travel schedule

To see that regional development benefits are captured by the generated traffic benefit, consider a hypothetical example. Suppose that a producer in Sydney can order an identical shipment from a supplier in Goulburn at a cost of \$100 excluding freight charges or from a local supplier at an inclusive cost of \$110. The most the producer is willing to pay for the freight charge from Goulburn is \$10, since any higher charge would make it cheaper to source locally. If completion of the Berrima-Mittagong bypasses reduces the freight charge from, say, \$15 to \$5, the producer would switch from the local supplier to the one in Goulburn. The benefit from the traffic thus generated on the Hume Highway would be \$5 — the excess of willingness to pay for transport over the actual cost. This reduction in the producer's costs is also an indication of the benefit to society from the regional adjustment which has taken place.

The same argument can be made for other adjustments to cheaper road transport — including inventory and warehousing responses and adjustments without a significant regional dimension. The common logic is that demand for transport is a derived demand — producers demand additional transport to effect certain changes in their operations; hence, the benefits from those changes are reflected in the willingness to pay for the additional transport. The 'secondary' benefits from cheaper road transport are thus captured, if imperfectly, in the generated traffic benefit in the conventional framework. In other words, combining measures of secondary and generated traffic benefits can easily entail doublecounting.

In practice, many benefit-cost analyses of Australian road projects, including that conducted for the Berrima-Mittagong bypasses, do not estimate generated traffic. Analysts are discouraged from the task both by its difficulty, and by their expectation for many projects that the benefit from generated traffic is far smaller than the benefit on the 'existing' traffic. The standard practice is to project traffic volumes using historical trends and expectations of regional and national developments. Estimated benefits are the projected traffic volumes times the estimated savings in costs per trip. If the projections approximate 'existing' traffic volumes (those that would prevail without the project), the generated traffic benefit is omitted and total benefits will be underestimated (assuming no other errors in the analysis). If, on the other hand, the traffic projections exceed the 'existing' levels, underestimation of benefits cannot be assumed. In fact, the estimates should be about right if the projected traffic volume in each period is an average of the volumes with and without the reduction in road costs (in figure 2, the average of V^0 and V^1). If, in addition, the demand curve is linear, the estimate of benefit is theoretically precise, since projection of traffic above base case levels exactly offsets the omission of a generated traffic benefit. (This can be verified by applying basic geometry to figure 2, where the demand curve is drawn to be linear.)

The BTCE obtained insufficient information for assessing the traffic projections in the original bypass analysis, but would question the accuracy of projections made so far in advance (in 1978 or earlier, for the period 1986 to 2015). Traffic levels could easily have been overestimated, in which case adequate (or more than adequate) allowance could have been made for generated traffic.

Thus, without a detailed assessment of the traffic projections, it would be rash to claim that the original analysis understated the benefit of cheaper road transport cost by ignoring regional development or other secondary effects. On the question of whether the reduction in transport cost brought significant regional development benefits — forgetting about whether or not the original analysis picked them up — another study would be required. The surveys conducted for the present study were limited to Berrima and Mittagong and two nearby towns. However, the regional development effects of the reduction in transport cost would be spread along the Hume Highway corridor, as in the above example of the Sydney producer switching to a Goulburn supplier. The interpretation of the survey findings is that the bypasses will stimulate the economies of Berrima and Mittagong mainly through their positive environmental effects rather than by improving these towns' transport links.

CONCLUDING COMMENTS

This case study has provided insights into the economic effects of highway bypasses, which was one of its two main objectives. Berrima's experience with tourism has shown that towns can profit from the improvement in their environment after being bypassed. This is particularly so in the longer run, after towns have time to exploit new opportunities. Mittagong's situation about a year after being bypassed shows that even when new opportunities have not compensated for the loss of traffic-serving business, the net economic effects may still be small.

To these cheerful messages must be added some words of caution. Profiting from the improved environment takes initiative and a tolerance for risk, and a constructive role by government (as in Mittagong, where the government is undertaking various streetscape improvements). Moreover, even with optimal adjustments, bypasses may harm the economies of some towns, especially small towns highly dependent on traffic-serving business. Indeed, the surveyed Mittagong businesses could have been overly optimistic about the effects after 1995. Goulburn, also on the Hume Highway but with a larger population than Mittagong, was also recently bypassed and negative effects on the town's economy have been predicted for both the short and long run (Phibbs 1980). Research commissioned by the RTA is now examining the economic effects of bypasses on Goulburn and other towns along the Hume Highway (excluding those studied here). The results should reinforce the findings of this study that effects depend very much on the characteristics of bypassed towns.²

The other main objective of this study was to serve as a pilot exercise for further BTCE case studies on the economic benefits of investment in transport and communications infrastructure. In this respect, its principal contribution has been to highlight the need for conceptual groundwork before proceeding with a case study. Attention to the following questions, in particular, could make for a better case study of regional development benefits:

• What is the 'regional development benefit' the study is concerned with?

If it is benefit of a fairer distribution of income between regions (or some other welfare indicator like employment), the study should focus on an infrastructure investment which benefits an economically disadvantaged region. The Southern Highlands region was chosen for the present study not for this reason, but because of its proximity to Canberra. The study may also be concerned with the efficiency benefits arising from the regional development effects — that is, with the improvement in society's overall welfare as indicated by variables like national income (the size of the pie rather than how it is sliced). Returning to the above example, upgrading of the Hume Highway might cause some business to shift from Sydney to Goulburn, and this could raise national income. But benefits of this type have nothing to do with distribution of income, and can be addressed without focusing on economically disadvantaged regions.

How are the costs and benefits of transport and communications infrastructure investments currently analysed in Australia and what are the reasons for believing that regional development benefits are understated?

A decent critique of 'conventional' BCA requires familiarity with current practice. The observation in this paper that benefit-cost analyses of Australian road projects do not usually estimate generated traffic is probably correct, but there are exceptions which would be worth looking into. As was argued, the measurement of existing and generated traffic does much to determine whether regional development benefits are adequately represented (abstracting from distributional concerns). Evaluations of current practices for analysing costs and benefits of transport projects in

^{2.} Yass, which was bypassed in July 1994, may turn out be another town where the effects are positive. The local council expects the improved environment in the town to lure residents from Canberra, which is only about forty minutes away by car. The council is doing some enhancements to the main street (formerly the Hume Highway) which will attract residents and visitors: planting trees, improving footpaths and restoring old heritage buildings. In addition, two service centres along the new bypass just outside Yass will employ about 250 people when they open in October.

Australia have been recently undertaken for AUSTROADS and the National Transport Planning Taskforce. These should be useful in the BTCE's future work.

• How should regional development benefits be measured?

This question requires a lot more hard thinking. The answer depends, of course, on the type of benefit one is trying to measure — distributional or efficiency. In either case, one should recognise the limitations of simple measures of regional effect, such as the change in local retail sales, as measures of benefit. It also important to recognise that an infrastructure investment which stimulates one region's economy may have contractionary effects elsewhere.

APPENDIX I BTCE SURVEY OF BUSINESSES: ECONOMIC IMPACTS OF THE BERRIMA AND MITTAGONG BYPASSES

Please answer the descriptive questions in this questionnaire as fully as possible.

1.	What is the name and	street address of you	r business?	
, ·	Name: Street address:			
2.	Please indicate the typ	e or nature of your h	ousiness	
	Please	tick the most appropr	riate box	
	Hotel/Motel Bed & Breakfast Take-away food Cafe Restaurant Arts & crafts		Antiques Butcher Fruit & Veg Bakery Newsagent Real Estate	
	Other (Please s	pecity) I		
3.	Approximately what p	proportion of your cu	stomers are visitors	and tourists?
	Before 1989 After 1989	Please inc of visitors	dicate percentage and tourists	
4.	Have you shifted the l	ocation of your busin	ness since 1988?	
	If 'Yes', why?		Yes No	Please tick one
5.	When did your busine	ss begin operation a	t the current location	?
6.	Before 1989 In 1989 After 1989 Was the bypass or ant	<u>Please tic</u>	<u>k one</u> u uss an important facto	or in choosing to
	locate in the Berrima	and/or Mittagong ar	ea?	
			Yes No	Please tick one
7.	Did the bypass influer	ce the site location?		
			Yes No	Please tick one
8.	Have you spent mone	y for business expans	sion and/or renovatio	on in the last five years?
·	Expansion Renovation Both expansio Other (Please	n and renovation specify)	Please tick or	<u>ne</u>
	Not at all	4.1		\Rightarrow Go to Q11

9.

Please indicate the years and order of expenditure

Please specify appr	oximate amount
Year	Expenditure (\$)
1993/94	
1992/93	
1991/92	
1990/91	
1989/90	
1988/89	

10.

Was your decision to invest more money in the business influenced by the construction of the Berrima and/or Mittagong bypasses?

	Please tick one
Yes	
No	

11. Please indicate the average number of employees (including family members) in your establishment for the past 5 years?

Please fill in as far back as possible

Year	Number of employees			
	Full-time	Part-time		
1993/94		·		
1992/93				
1991/92				
1990/91				
1989/90	•••••			
1988/89				

12.

2. Do you think that the Berrima and/or Mittagong bypasses have had an effect on employment in your establishment?

	Please tick one	
Positive effect		
Negative effect		
No effect		\Rightarrow Go to Q14
Don't know		\Rightarrow Go to Q14

13. Please comment on how you think the bypass has affected employment in your establishment

	Please tick one			
Large effect				
Medium effect				
Small effect				
Don't know	0			
Comment				

14. Please estimate the approximate annual gross sales in your establishment for the past 5 years

Please fill in as far back as possible	
Year	<u>Sales (\$)</u>
1993/94	·····
1992/93	
1991/92	
1990/91	
1989/90	
1988/89	

15.

Do you think that the Berrima and/or Mittagong bypasses have had an effect on gross sales in your establishment?

	Please tick one	
Positive effect		
Negative effect		
No effect		\Rightarrow Go to Q17
Don't know		\Rightarrow Go to Q17

16.

Please comment on how you think the bypass has affected gross sales in your establishment

	Please tick one						
	Large effect						
	Medium effect	. 🗖		-			
	Small effect	. 🗖					
	Don't know	. 🗖					
	Comment						
17.	What do you think will be the effect of the Berrima and/or Mittagong bypasses after 1995?						
		5a					
		Please t	<u>ick one</u>				
	Positive effect						
	Negative effect						
	No effect			\Rightarrow Go to Q2	27		
	Don't know			\Rightarrow Go to Q2	27		
18.	Please comment on how you think the effect of the Berrima and/or Mittagong bypasses would be after 1995						
		Please tick one					
	Large effect						
	Medium effect						
	Small effect						
	Don't know						
	Comment	· · · · · · ·					
19.	Are there any other important factors which you think may have contributed positively or negatively to your business?						
	Please comment on the positive factors:			r			
	Please comment on the negative factors:						
20.	What do you think are the more important environmental impacts which have resulted from the construction of the Berrima and/or Mittagong bypasses?						
	- for example, reduction in air pollution r	esulting from decreas	ed numb	per of heavy tr	ucks in the area		
	••••••••••						
21.	What do you think stands out as the single most important issue which is likely to affect the future economic prosperity of the Mittagong town?						
22.	Council has recently undertaken a number of streetscape improvements in Mittagong. Would you say that these improvements have been worthwhile and have made a positive contribution to the town?						
				Ple	ease tick one		
			Yes				
			No		0		
	Please give your reason(s) for saving Ves	s of No					
	Bre Jour remon(o) for buy Ing To						
	·····						
23	Would you like to make any other comments about the effect of the Berrima and/or Mittagong bypasses?						

APPENDIX II BTCE SURVEY OF TOURISTS IN BERRIMA

1. What town/city do you live at?

.....

2. Did you specifically come to Berrima?

YES..... NO.....

3. Are you a tourist or visitor?

•

- 4. What are your reasons for visiting Berrima?
 - site seeing
 - bush walking
 - craft shops
 - antiques
 - restaurant
 - other.....
- 5. Have you visited Berrima before?
 - Before the bypass..... How often?....
 - After the bypass..... How often?....
 - Not at all.....
- 6. If you had not come to Berrima would you have visited somewhere else?
- 7. Before the bypass, would you have gone somewhere else in preference to Berrima?

YES.....Where?....

NO.....

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