



The Macro Economic Effects of the Operational Programme on Peripherality

**Report to the Technical Assistance Programme
Steering Committee**

by

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Introduction

The Operational Programme on Peripherality covers a wide range of different investment projects which are designed to improve transport infrastructure and to contribute to the overall economic objective of raising per capita incomes in Ireland towards average Community levels. While some of the investment is in infrastructure at airports, sea ports and in railways, the bulk of the expenditure is on the road system.

In this report we estimate the likely macro-economic impact of the OPP measures considered as an aggregate. As yet the information available does not allow for a more disaggregated approach treating each area of OPP investment separately.

The analysis in this report uses the methodology developed by the ESRI for evaluating the impact of the EC Community Support Framework (CSF) on the Irish economy. Details of this methodology are given in the recent ESRI report 'The Role of the Structural Funds'. The approach was also described in a paper submitted by the External Evaluator to the TAP Steering Committee in December 1991 entitled 'Economic Evaluation and Ex Post Appraisal of the OPP'.

The paper is organised as follows:

Section 2 contains a summary of the methodology used in estimating the macro economic impact of the OPP using the Hermes model,

Section 3 estimates the macro-economic consequences of the OPP (including the related transfers from the EC) by comparing the economic outturn under two simulations - a benchmark simulation with the OPP and related EC transfers and an alternative simulation without the OPP and related transfers,

Section 4 examines the macro-economic consequences of the OPP by comparing the economic outturn with and without EC finances. The level of OPP expenditure is the same in both simulations but in the alternative hypothesis it is assumed that the entire OPP is funded domestically by raising income taxation to compensate for the loss of transfers from the EC and

Section 5 presents some conclusions to our analysis and outlines the work in progress to improve the measurement of the economic impact of the OPP using the model.

Investment in roads or other elements of physical infrastructure will affect the economy through two different channels: through the demand for goods and services in building the infrastructure and through the effects on the competitiveness of the economy once the infrastructure is installed.

Using the ESRI Medium-Term Model a benchmark scenario was first constructed running from 1989 out to the year 2000. In this case we have used the benchmark scenario described in the last ESRI Medium-Term Review. The long time scale is necessary in such a study as the major beneficial effects from such an investment programme on the output potential of the economy can be expected to take a long time to mature. Having established the benchmark scenario, the effects of the OPP are estimated by subtracting out the key changes which the programme will bring about and running the model again to see how the economy would perform without the benefit of the OPP measures. The change between the benchmark and the alternative scenario is then attributed to the OPP. (It should be noted that the alternative scenario assumes that 'OPP' investment would have been sustained over the projection period at its 1988 level.)

The model handles the actual demand side effects of the investment in a straightforward manner. In so far as the investment involves increased construction it increases demand for the output of that sector. To the limited extent that it involves increased purchases of machinery and equipment it increases import demand (the bulk of machinery and equipment are imported). The model then handles the second round effects as incomes, employment, wages, and prices adjust to the change in demand.

However, the more important long-term effects of the OPP can be expected on the supply side of the economy as the efficiency of the productive sector improves. The improved infrastructure will reduce the costs of industry below the level they would otherwise have been. This will improve the sector's competitiveness on foreign markets. In addition, the costs of distributing goods within the economy will fall and there can be expected to be some fall in the prices faced by consumers.

While the channels through which this improvement in efficiency will impact on the economy are well known, there is limited information on the magnitude of these effects. As in the ESRI report - 'The Role of the Structural Funds', we have to make certain assumptions about the possible rate of return from the investment. It is hoped that further research will allow a more precise estimate of the rate of return.

The study by Durkan and Reynolds-Feighan* indicated that transport costs on sales account for around 4% of the output price of industry. To allow for the transport costs included in the inputs bought by industry it is assumed that the direct and indirect transport cost content of goods produced in Ireland is 6% of the final sale price. In the case of consumption it is estimated that the direct and indirect transport cost element of a unit of consumers' expenditure is 6.6%.

The effects of the infrastructural investment on transport costs are quite uncertain. It is likely that they will be quite non-linear producing high rates of return when major blockages or constraints are overcome. In other cases, where the investment is inadequate or where bottle-necks are not serious, the rate of return in terms of a reduction in transport costs to industry and services may be low. In the simulation discussed below it is assumed that the investment in transport infrastructure reduces transport costs by around 1% a year beginning in the year after the OPP began (1990). As the investment is assumed to continue beyond 1993 transport costs fall throughout the period examined. The fall in costs is fed into the model improving competitiveness. Allowance is made for the flow of funds from the EC. This serves to improve the Government's budgetary position with consequential effects on borrowing and debt interest payments.

It should be noted that in this study the effects of the increase in OPP expenditure over its base 1988 level is examined. It is assumed that in the years after the end of the current OPP (1994-2000) the level of investment will remain at the 1993 level in real terms. All the results are presented as changes compared to a benchmark "what would otherwise have been" scenario.

Section 3

Economic Impact of OPP (With OPP vs Without OPP)

The main results of our assessment of the macro economic consequences of the OPP are set out in Table 1 and in the graphs on the following pages.

The impact of the OPP investment is felt first by the building sector as the volume of demand for its services grows rapidly. By 1992 the volume of building sector output is over 5% above the level it would otherwise have been without the OPP. However, this increase in demand does not have a lasting effect on the economy. If the investment was halted then output would fall.

In the long-run the most important channel through which the investment can achieve a lasting impact is through the supply side. The unit cost of production in manufacturing industry is reduced in line with the assumed reduction in transport costs. This, in turn, improves Ireland's competitiveness and results in an increase in long-term capacity output and employment. The adjustment pattern is quite slow in manufacturing industry as the reduction in transport costs takes time to gain credibility.

The impact on GDP and on GNP are shown in graph a. The demand effects build up rapidly so that by 1993 GDP is 0.33 per cent above the benchmark level. The supply side effects take longer to come through. However, their effects are apparent in the continued rise in GDP to a level 0.44 per cent above the benchmark in 2000.

The long-run impact on GNP is identical to that on GDP. This reflects the fact that the impact on the balance of payments in the long run is negligible (graph c). The EC transfers to the Irish government are offset by the big increase in investment, some of which has a significant import content, and increased imports induced by the higher volume of consumption.

The effects on the government borrowing requirement are also quite small (graph c). In spite of the increased exchequer expenditure, the fact that a sizeable proportion of the investment is financed by the EC means that the Exchequer position actually improves in the early years.

While the volume of GNP increases, because the investment reduces costs and, therefore, domestic inflation, the value of GNP actually falls. This means that the debt/GNP ratio is roughly unchanged at the end of the period (graph g).

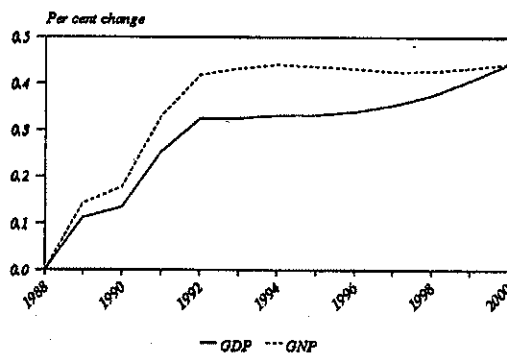
The demand effects of this stimulus on the construction industry are very substantial. The increase in the volume of construction output

Table 1 Macro Economic Consequences of the OPP (Comparison of with and without OPP Scenarios)

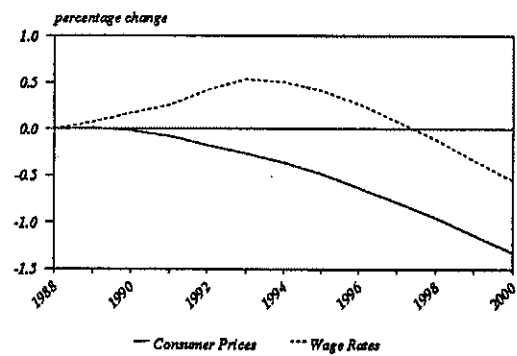
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GNP												
%	0.14	0.18	0.33	0.42	0.43	0.44	0.44	0.43	0.43	0.43	0.43	0.44
GDP												
%	0.11	0.13	0.25	0.33	0.33	0.33	0.33	0.34	0.35	0.38	0.41	0.44
Output - Industry												
%	0.15	0.17	0.27	0.34	0.31	0.31	0.30	0.32	0.34	0.38	0.43	0.49
Output Market Services												
%	0.13	0.17	0.33	0.44	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.46
Consumer Prices												
%	0.01	-0.03	-0.09	-0.18	-0.27	-0.37	-0.49	-0.63	-0.79	-0.95	-1.14	-1.32
Wage Rates												
%	0.08	0.17	0.26	0.42	0.53	0.50	0.41	0.27	0.08	-0.12	-0.33	-0.55
B of P Surplus												
% of GNP	-0.03	0.01	0.01	0.04	0.07	0.06	0.06	0.05	0.05	0.04	0.02	0.00
Exchequer Surplus												
% of GNP	0.00	0.05	0.09	0.13	0.13	0.11	0.07	0.04	0.00	-0.03	-0.05	-0.06
Debt/GNP Ratio												
% of GNP	-0.25	-0.33	-0.60	-0.79	-0.84	-0.82	-0.74	-0.60	-0.42	-0.24	-0.05	0.13
Total Employment												
(000)	1.26	1.51	2.99	4.78	4.92	5.59	6.06	6.51	6.97	7.49	8.05	8.65
Labour Force												
(000)	0.18	0.41	0.86	0.97	1.66	2.52	3.51	4.59	5.74	6.89	8.04	9.15
Migration												
(000)	-0.17	-0.33	-0.64	-1.20	-1.62	-2.00	-2.28	-2.46	-2.55	-2.56	-2.50	-2.39
Unemployment Rate												
% of Labour Force	-0.09	-0.09	-0.17	-0.29	-0.26	-0.25	-0.22	-0.19	-0.15	-0.12	-0.08	-0.06

Figure 1: Macroeconomic Consequences.

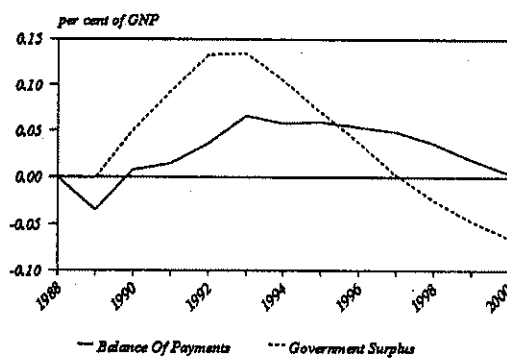
(a)
GDP and GNP



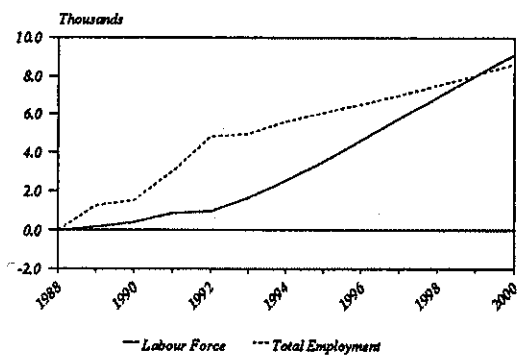
(b)
Prices & Wages



(c)
BOP & Government Surplus



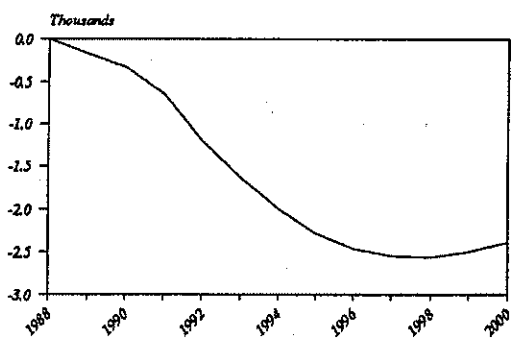
(d)
Labour Force and Employment



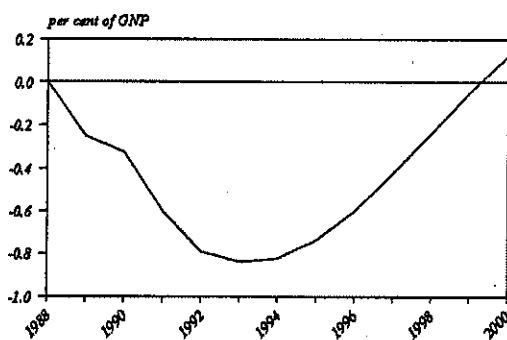
(e)
Unemployment Rate



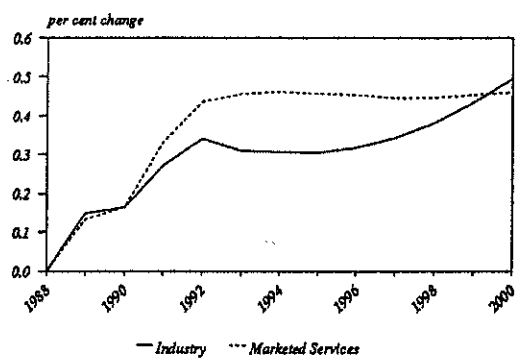
(f)
Net Migration Abroad



(g)
Debt/GNP Ratio



(h)
Output



peaks at around 5.3 per cent above the benchmark in 1992 and is still around 3.5 per cent up on the benchmark in 2000. Thus the CSF is providing important support for the construction industry in the current period of low growth.

The increase in building output gives rise to a growth in building sector employment above the level which would otherwise have occurred of over 3,500. Even with the improvement in the cost competitiveness of the manufacturing sector, employment in that sector is only around 1,300 up by the year 2000. However, the long-run optimal level of output in both the traditional manufacturing and the food-processing sectors is still well above the actual level in the year 2000. This indicates that output and employment in those sectors would continue to rise well into the next decade. This highlights the long-term nature of the return on the investment projects undertaken.

Output in the market services sector is up by around 0.45 per cent (graph h) and employment is up by approximately 3,700 by the end of the period. Overall there is a rise in employment of almost 9,000 (0.7 per cent) by the year 2000. The improved labour market prospects arising from the infrastructural investment leads to a reduction in emigration of up to 2,500 a year (graph f). The net effect is a substantial rise in the labour force (graph d) which offsets the increase in employment resulting in little change in unemployment by the year 2000 (graph e). However, the impact effect of the measures has resulted in a sizeable reduction in unemployment in recent years below the level it would otherwise have been. While the major effect of this measure appears to be a reduction in emigration rather than in unemployment, the benefits would probably be more equally shared if the model was used to analyse the early years of the next century. This highlights the uncertainty about the timing of the dynamic effects of this aspect of the CSF.

The improved efficiency of distribution means that by the end of the century consumer prices could be over 1 percentage point below the level they would have been without the CSF (graph b). The tightening in the labour market in the years up to 1993 adds around 0.5 per cent to wage rates (above the level they would otherwise have been), adversely affecting the competitiveness of the industrial sector. However, the change in migration reduces tensions in the labour market so that wage rates are back below benchmark levels by the year 2000.

Section 4

Economic Impact of OPP (OPP with vs OPP without EC Funding)

The main results of our assessment of the macro economic consequences of EC funding for the OPP are set out in Table 2 and in the graphs on the following pages.

In this simulation it is assumed that all of the increased infrastructural investment is financed from domestic sources without changing the debt/GNP ratio in the year 2000. While there are many ways that this investment could be financed, such as cutting other expenditure or raising a variety of taxes, the results presented here assume that it is financed by raising income tax above the level it would otherwise have been. This method of paying for the investment is probably less satisfactory from the point of view of economic growth than cutting some forms of expenditure or raising indirect taxes. However, it may well represent the kind of trade off a Government would face in a period when it would wish to cut direct taxation (i.e. higher investment would pre-empt resources allocated for cutting taxation).

Initially the higher taxation reduces purchasing power. However, employees react rapidly by seeking compensation through raising wage rates (graph b). This, in turn, results in a disimprovement in the competitive position of the industrial sector compared to the EC funded OPP simulation. Taken together the increase in labour costs and the reduction in transport costs leaves the competitive position of the industrial sector roughly unchanged (graph h).

Overall, the effect of the higher taxation cancels out the beneficial effects of the infrastructural investment so that the level of real GNP in the year 2000 is almost unchanged (graph a). The employment effects are also minimal.

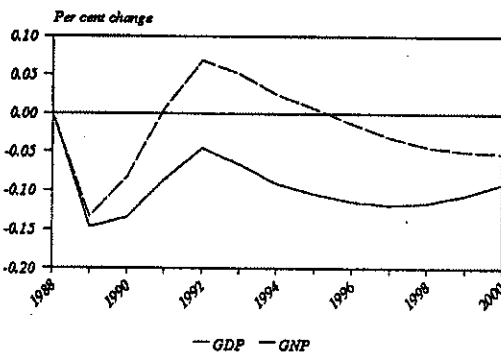
The results of the simulations depend crucially on the rate of return from the infrastructural investment. In this case, where all the investment is domestically funded, the rate of return assumed is just about sufficient to make the investment cover its long-run costs to the nation. However, if the rate of return were to fall below the assumed level it would mean that the investment should not be undertaken without EC funding.

Table 2 Macro Economic Consequences of the OPP (Comparison of with and without EC transfers Scenarios)

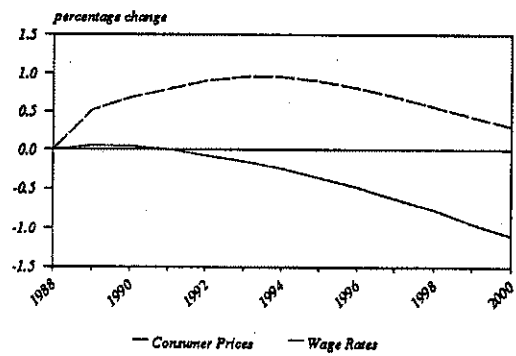
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GNP												
GDP	%	-0.13	-0.08	0.01	0.07	0.05	0.02	0.01	-0.01	-0.03	-0.04	-0.05
	%	-0.15	-0.13	-0.09	-0.05	-0.07	-0.09	-0.11	-0.11	-0.12	-0.12	-0.11
Output - Industry	%	0.00	-0.01	0.07	0.10	0.06	0.02	0.00	-0.02	-0.02	-0.01	0.01
Output Market Services	%	-0.17	-0.14	-0.07	0.00	-0.01	-0.04	-0.05	-0.07	-0.08	-0.09	-0.10
Consumer Prices	%	0.06	0.04	0.00	-0.07	-0.15	-0.24	-0.35	-0.48	-0.62	-0.77	-0.94
Wage Rates	%	0.52	0.68	0.79	0.90	0.95	0.95	0.90	0.81	0.70	0.57	0.43
B of P Surplus	% of GNP	0.16	0.13	0.07	0.01	0.02	0.04	0.05	0.06	0.06	0.07	0.07
Exchequer Surplus	% of GNP	0.35	0.30	0.18	0.10	0.08	0.06	0.03	0.02	0.00	-0.01	-0.01
Debt/GNP Ratio	% of GNP	-0.36	-0.67	-0.98	-1.08	-1.02	-0.92	-0.79	-0.62	-0.45	-0.29	-0.14
Total Employment	(000)	-0.87	-1.11	-0.11	0.51	0.71	0.82	0.87	0.86	0.85	0.88	0.94
Labour Force	(000)	-0.16	-0.35	-0.41	-0.23	-0.20	-0.11	0.02	0.18	0.37	0.57	0.77
Migration	(000)	0.11	0.23	0.17	0.05	-0.09	-0.22	-0.32	-0.40	-0.44	-0.46	-0.46
Unemployment Rate	% of Labour Force	0.06	0.06	-0.02	-0.05	-0.06	-0.07	-0.06	-0.05	-0.04	-0.03	-0.02

Figure 2: Macroeconomic Consequences

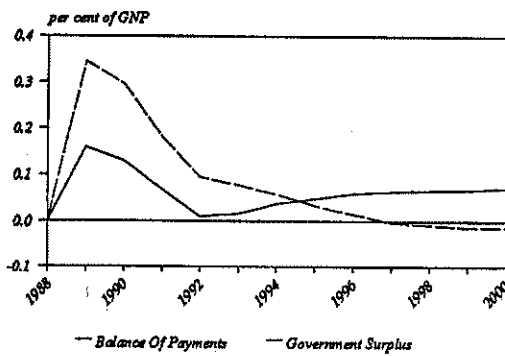
(a)
GDP and GNP



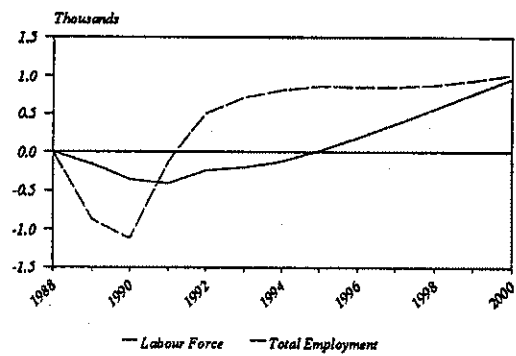
(b)
Prices & Wages



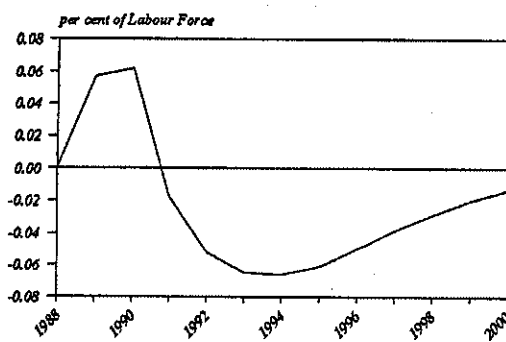
(c)
BOP & Government Surplus



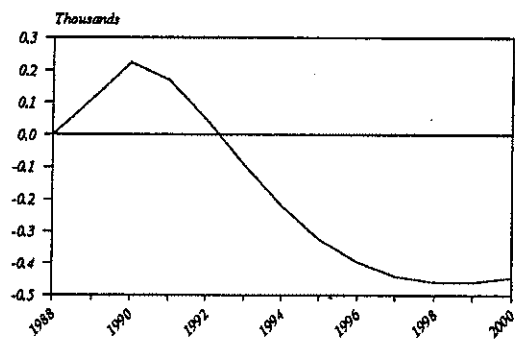
(d)
Labour Force and Employment



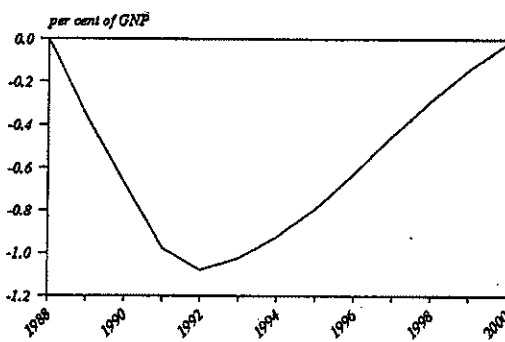
(e)
Unemployment Rate



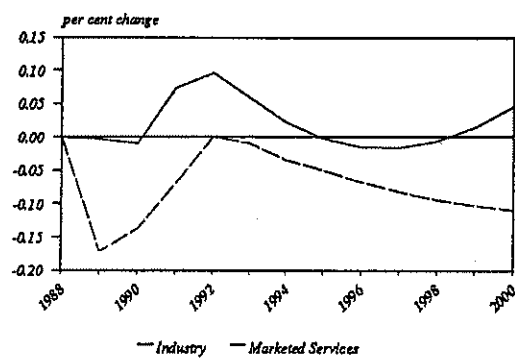
(f)
Net Migration Abroad



(g)
Debt/GNP Ratio



(h)
Output



Conclusions

The analysis presented in this paper is based on an assumed impact of infrastructural expenditure on transport costs. Until more detailed data become available on this matter it is hard to provide firm estimates of the economic impact of the OPP.

Work is continuing on refining the HERMES model and on collecting data with a view to improving the measurement of both the supply and the demand side effects of the OPP investment measures as follows:

- a project is underway which will provide more accurate information on the direct, indirect and induced employment and material demand impacts of major road improvement schemes which account for a very high proportion (75%) of total OPP expenditure. The results of this study will be used to adjust the model estimates of the demand side effects of the OPP and
- the implementation of computer simulated road transit time monitoring will provide a better basis for estimating the impact of the OPP on transport costs.

The work by the External Evaluator has suggested that the likely rate of return on investment in some of the sub programmes could fall below the rate assumed here (e.g. the Dublin-Belfast railway line). In the light of the results presented above in Section 4 this must be a cause for concern. However, taking the OPP as a whole, the assumption that there is a significant reduction in transport costs over the life of the programme of around 5% seems a not unrealistic target.

On the basis of the assumptions set out above we estimate that the programme will add something over 0.4% to the level of GNP by the end of the decade and it will increase employment by around 9,000. The analysis indicates that the important supply side benefits will take a considerable time to mature and that the programme must be seen as part of a long-term plan for promoting Irish economic development.