

# ECONOMIC *Perspective*

## THE IMPACT OF SCOTTISH ENTERPRISE POLICIES ON THE ECONOMIES OF SCOTLAND AND THE REST OF THE UK<sup>1</sup>

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### 1. INTRODUCTION

The broad objectives of Scottish Enterprise (SE) are to create jobs, prosperity and a high quality of life for the people of Scotland. In order to assess its own effectiveness in achieving these goals, SE commissioned a study from the Fraser of Allander Institute to evaluate the set of SE policies operating over the financial year 1997/8. The aim was to identify and quantify the wider impact of these policies on both the Scottish economy and the economy of the UK as a whole. In order to make the analysis manageable and more easily comprehended, the study focused primarily on variables measuring changes in economic activity. The study therefore neglects a whole range of outputs of SE, particularly those covering social inclusion and environmental improvement.

This work is innovative in its attempt to measure the UK-wide impacts of SE activity. The present Treasury guidance given in the "Green Book" is that such regeneration policies should be assumed to have no net effect on activity in the UK economy as a whole. Essentially the Treasury asserts that any expansion in Scotland would "crowd out" activity in the rest of the UK. Our work challenges this assumption. We find that if

SE policies do generate significant direct improvements in Scotland's export performance or efficiency, then there are positive benefits to the UK economy as a whole in terms of increased output and employment. Furthermore, if one accepts SE estimates of the direct effects of its policies, our measured system-wide impacts on the UK are large. By the end of year 3, the time period over which SE believe their policies reach maximum effectiveness, we estimate that 1 net additional UK job is created for every £19,000 of public expenditure on SE-assisted programmes. Further, over this time period there are £3 of exchequer savings, in terms of increased tax take and reduced benefit costs, for every initial £1 of public expenditure associated with SE-assisted activity.

### 2. GENERAL METHOD

In identifying the policy impacts, we adopt a hybrid method. For the direct impact of SE policies we use results derived through "Industrial Survey" techniques. These techniques generally involve the recipients assessing the impact of assistance on their level of activity. The nature of SE assistance makes it difficult to imagine an alternative evaluation method that could capture the direct impact of individual policies. First, there are numerous policies operating simultaneously in Scotland and aided firms are often in receipt of assistance under a range of programmes. It is therefore difficult to isolate statistically the impact of one individual policy. Second, the flexible and discretionary nature of SE assistance and the attendant problems of confidentiality, render the modelling of direct effects problematic. Thirdly, it should be said that this is the Treasury-recommended method for assessing the direct impacts of regeneration policies.

However, to identify the system-wide impacts we use formal modelling techniques. Specifically we employ the two-region (Scotland/rest of the UK) version of our Computable General Equilibrium model, AMOSRUK. The model predicts the changes in the Scottish and rest of the UK activity that occur when we change a key parameter or exogenous variable such as export demand or the rate of income tax. The AMOSRUK model simulates market processes so that impacts on wages and prices (and therefore competitiveness) are determined simultaneously with changes in output and employment. In this application of the model, the adjustments to exogenous variables and parameters are chosen so as to replicate SE policy.

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In the financial year 1997/8, Scottish Enterprise organised its activities around seven Strategic Objectives. These are shown in the first column of Table 1. Columns 2 and 3 identify the total public and SE expenditures associated with these Strategic Objectives together with those SE overhead expenditures that cannot be directly allocated to a particular Strategic Objective. Total SE expenditure in the year was £427 million, with an additional £211 million directly linked to SE-assisted programmes. Columns 4 and 5 indicate the gross and net direct employment impacts of these Objectives. The gross direct impacts are, except for the inward investment figures, estimates taken from SE's annual operating plan. They are based on the results of numerous evaluation studies undertaken by the SE network. The net direct impacts adjust the gross figures to take into account non-additionality and product market displacement. Non-additionality is where the project would have gone ahead anyway, even without assistance. Product market displacement is the extent to which aided Scottish employment displaces unaided Scottish employment. These adjustments from gross to net come primarily from a Cambridge Policy Consultants study commissioned by SE. These figures suggest that in 1997/8 SE activity generated 70,454 gross and 22,769 net direct jobs in Scotland. We have not tested these estimates. However, in order to provide a measure of the robustness of our own conclusions, we have undertaken sensitivity analysis where we vary the direct impacts of SE activity.

Our modelling work involves specifying these direct policy impacts as inputs to our inter-regional UK model, AMOSRUK, and using the model to quantify the indirect and induced effects on the Scottish and UK economies. These indirect and induced effects incorporate:

- Demand-side consumption multiplier effects. These are the changes in Scottish and rest of the UK activity generated by the changes in consumption demand associated with the variations in direct employment.
- Demand-side linkage effects. These are the changes in demand for intermediate inputs generated as a result of the direct changes in productive activity.
- Supply-side labour market effects. These relate to the effects of changes in wage, participation and migration that accompany the changes in labour demand in the two regions.
- Supply-side competitiveness effects. These

are the changes in commodity prices in the two regions that have impacts on regional exports and imports.

These simulations are performed for each Strategic Objective individually. The total impact of SE policy is then calculated by summing the effects under the individual Strategic Objectives.

AMOSRUK can be set up with a range of alternative wage-setting and migration assumptions. For this report we impose regional bargaining in both Scotland and RUK, so that the value of the real wage in each region is a function of the level of labour market pressure in that region, as measured by the region's unemployment rate. Also we assume regional in-migration to be positively related to the region's relative real wage and negatively to its relative unemployment rate.

In the AMOSRUK model, for both Scotland and the rest of the UK we identify three industrial sectors. These are the manufacturing, non-manufacturing traded and the sheltered sector. The sheltered sector comprises industries where inter-regional and inter-national trade is minimal. It is made up of industries such as construction, retailing and public administration. In our evaluation we assume that SE policy is not orientated towards the sheltered (non-traded) sector of the Scottish economy. That is to say, the direct stimulus generally applies to the manufacturing and the non-manufacturing traded sectors. We do not impose any external balance of payments or national government budget constraint on the operation of the model, although we do track these variables.

We assume that it takes some time for the SE policies to bite. We therefore incorporate a three-year build up for the direct effects, which broadly reflects the view within Scottish Enterprise concerning the time scale over which their policies reach maximum effectiveness. The model is then run forward over seven additional periods (each period representing one year). The total ten-year time horizon is the time period specified in the Treasury "Green Book" as being relevant for official government evaluations of regeneration programmes. We have experimented with various assumptions concerning the rate of decay of direct SE policy effectiveness. The results presented here assume a linear 5-year decay from maximum direct effectiveness, which occurs in period 3. This means that by year 8 there is no direct stimulus coming from the policy expenditure made in year 1. However, system-wide impacts might continue beyond year 8. Specifically, both the capital stock and population distribution

(through induced investment and migration, respectively) are likely to differ from what would have been the case without SE intervention.

### **3. MODELLING THE DIRECT EFFECTS**

There are two challenges involved in attempting to quantify accurately the system-wide impacts of such initiatives. The first is to identify the changes in parameters and/or exogenous variables that will, in the context of the model, capture the qualitative impacts of each Strategic Objective. The second is to calibrate the size of these exogenous model changes so as to produce the appropriate scale for the direct effects. We begin by considering the qualitative nature of the changes.

For all the Strategic Objectives we were able to identify appropriate exogenous changes in model variables or parameters that would emulate the supply-side impacts of SE policy. For most, the impact of policy was modelled as an increase in Scottish exports, efficiency or capacity, or some combination of these three. In some Strategic Objectives, the nature of the disturbance is transparent and easy to simulate. For example, the simulations for the "Export" Strategic Objective simply require an exogenous shock to Scottish exports to the rest of the world. In this case both the manner in which the policy operates and the way in which this translates into an exogenous change in the model is non-controversial. However, with other Strategic Objectives it is less straightforward to capture fully the direct policy stimulus.

For example, we identify the effect of the Strategic Objective "Business Competitiveness" as generating an increase in the efficiency of the targeted sectors. This is very easy for us to model, but one might question whether the impact of all of the expenditures under this heading are captured by this parameter change. On the other hand, both the "New Business" and "Inward Investment" Strategic Objectives are thought to generate direct displacement in activity in the rest of the UK. This direct displacement has been incorporated into the model simulations but only in a rather roundabout way.

Once the qualitative characteristics of SE policy have been identified, the scale of the exogenous changes has to be determined. That is to say, we introduce changes to the parameters or exogenous variables of the AMOSRUK model that replicate the direct impacts of the policy initiative. These changes are calibrated to generate period-three

impacts in simulated activity in the relevant Scottish sectors that hit the estimated direct effects given by SE's independent evaluation methods. For most Strategic Objectives there is no problem in hitting the period-3 target although for some it is difficult to calibrate the model to achieve the appropriate scale of direct estimated effects. This is where the direct effects are small (Access to Opportunity) or where improvements in labour efficiency fail, in the model, to generate positive employment in the targeted sectors (Skills and Knowledge).

### **4. AGGREGATE IMPACTS**

In this section we report the estimated aggregate impact of SE's activity. These data incorporate returns under all the Strategic Objectives. We begin by presenting the aggregate period-by-period results. These figures are generated by simply adding the impacts of the individual Strategic Objectives and are represented diagrammatically in Figures 1 to 6. We here focus on six key variables: Scottish and UK GDP; Scottish and UK total employment; Government savings; and balance of payments. In each chart, figures are given that have been derived by aggregating the results from our simulations and also the simulations where policy effectiveness is changed by plus or minus 50%. The diagrams therefore present not only our best estimate of the aggregate effects, but also the sensitivity of these estimates to changes in the measured direct policy effectiveness.

Figures 1 and 2 show Scottish and UK GDP. There is a substantial increase in both Scottish and UK activity associated with the operation of all SE's Strategic Objective in aggregate, even where low estimates of direct policy effectiveness are used. Therefore the Treasury assumption that there is 100% crowding out at the national level is not supported by our model. Further, up to period 6 the UK increase in GDP is greater than the corresponding Scottish figure. This means that up to year 6, our model predicts a stimulus to activity in the rest of the UK as the result of SE activity in Scotland. This operates primarily through multiplier effects, that is the increased consumption and intermediate demand for the output of the rest of the UK generated by the increase in activity in Scotland. However, it should be noted that the broad pattern of GDP change over time is clearly strongly driven by the assumed build-up and decay of the direct policy effects.

Figures 3 and 4 show Scottish and UK total employment change. These broadly follow the change in GDP although the Scottish employment effects are smoother and more sustained, primarily

because of the impact of policy on stimulating Scottish immigration. In period 3 the default estimate for the increase in Scottish employment is over 33,148 jobs and for the UK employment almost 39,497 jobs. This is the maximum value for the UK but for Scotland total employment peaks in period 5.

Figure 5 shows the Government savings which are made up of increased tax payments and reduced expenditure on unemployment benefit. These are the savings identified through the model and, at a period-3 value of £884 million, they are substantial. To get the net effect, these savings need to be offset against the total public expenditure that is associated with SE total activity. From Table 1 these expenditures are identified as £638 million. Note that this is less than the default period-3 savings and even with an assumed 50% lower policy effectiveness, savings will be greater than additional expenditure over the first 3 years. Figure 6 gives the balance of payments implications, where a negative change implies a reduction in the deficit. Here the situation is a little less advantageous. We get continuing benefits from period 3, but a clearly adverse movement in the balance of payments in period 1. This is caused by the big increase in period-1 investment that is associated with a number of these Strategic Objectives.

Table 2 simply gives a more compact representation of these results. As with the data given in Figures 1 to 6, these are simply the aggregated results from the simulations relating to the individual Strategic Objectives. The data in columns 2 and 3 of Table 2 are the period-3 values, with additional sectoral disaggregation for employment and government savings separated into increased tax receipts and reduced benefit payments. These figures indicate substantial benefits to the economies both of Scotland and the rest of the UK at the point at which SE's policies are assumed to reach their maximum direct effectiveness. Total employment in both Scotland and the rest of the UK is increased by 33,148 and 6,349 respectively. Taking the figure for the initial public expenditure that supports SE-assisted schemes, this implies an exchequer cost per net UK job of £19,044. Gains in Scottish and rest of the UK employment are experienced in all sectors. There are corresponding increases in Scottish and rest of the UK GDP. There are clearly no indications of "crowding out" in these figures. Finally, in period 3 the UK tax take and balance of payments position improves and there is a reduction in benefit payments.

Columns 4 to 7 of Table 2 give the discounted

values of those variables (GDP, tax revenues, benefit payments and balance of payments) which are expressed in monetary values. Two sets of figures are given: for the first 3 years and over the full 10 years. Note that these results suggest very substantial GDP gains, even over the first 3 years, with the UK values greater than the Scottish values, implying a positive benefit to the rest of the UK. Similarly there are impressive improvements in the government finances.

## 5. CONCLUSIONS

It is important to stress that the evaluation undertaken here is innovative and that specific figures are necessarily rather tentative. Nevertheless, we are comfortable with the orders of magnitude of the results. In our view, the evaluation process using the AMOSRUK model could be strengthened in a number of ways and we briefly discuss these below. However, a key qualitative finding is that the Treasury position - that spatial regeneration programmes generate no net benefit to national economic activity - finds no support in our work. We do not observe 100% "crowding out" in these simulations. The reason lies in the labour market. We employ a conventional wage-curve in each regional labour market. This implies that to increase employment, with the corresponding reduction in the unemployment rate, the real consumption wage must rise as union bargaining power strengthens. However, the supply-side policies adopted by SE, if successful, allow an increase in the real wage with a simultaneous rise in competitiveness. Labour demand and supply are therefore able to increase together.

We believe that the simulation results given in this paper present a more accurate account of the regional and national operation of regional supply-side policy than the present official UK evaluation procedures. However, the validity and accuracy of these evaluation results could be improved. The main sources for such improvement are as follows:

- Improvements in regional data would aid modelling. In particular, more up-to-date and reliable data on inter-regional flows would assist in the construction of the inter-regional accounts necessary for this type of modelling. Also, more extensive time series would allow more accurate econometric parameterisation of the model.
- Closer integration of the "industrial survey" estimation of direct effects with the modelling of the system-wide impacts. This would ensure that the assumptions made in each part of the

evaluation process were consistent. Also it would force a closer scrutiny of the appropriateness of the way in which the SE policies are incorporated in the AMOSRUK model.

Over the past decade and a half, the regional-policy evaluation procedures adopted by the government have stressed identifying the direct impacts of policy, focusing on the attendant notions of additionality and displacement. This shift of focus has been accompanied by a reduced – almost perfunctory – concern over the system-

wide effects of such policies. We believe that such an approach is misconceived. In this work we have taken what we hope is the first step towards a more holistic analysis. This fuses both “industrial survey” and system-wide modelling techniques that can capture the impact on both demand and supply sides of the economy. In this paper we have attempted to demonstrate that these disparate approaches are complementary, not competing, evaluation techniques.

**Table 1: Public expenditure and the direct employment effects associated with SE activity, 1997/98.**

	Total Public Expenditure (£ thousands)	SE Expenditure (£ thousands)	Direct Employment Impact Gross	Direct Employment Impact Net
Business Competitiveness	90,472	58,949	17,475	7,998
New Business	34,000	28,394	13,550	3,316
Inward Investment	125,000	60,000	17,947	5,743
Exports	20,203	16,025	3,867	2,838
Skills and Knowledge	102,908	82,111	8,077	498
Physical Business Infrastructure	153,532	81,800	6,183	2,289
Access to Opportunity	52,806	40,659	3,355	87
Unallocated SE Expenditure	59,000	59,000		
<b>Total</b>	<b>637,921</b>	<b>426,938</b>	<b>70,454</b>	<b>22,769</b>

**Sources:**

Cambridge Policy Consultants (1998), Scottish Enterprise Estimates of Impacts, Scottish Enterprise, Glasgow.

Locate in Scotland estimates.

Scottish Enterprise (1998), 1997/98 Operating Plan – Year End Report, Scottish Enterprise, Glasgow.

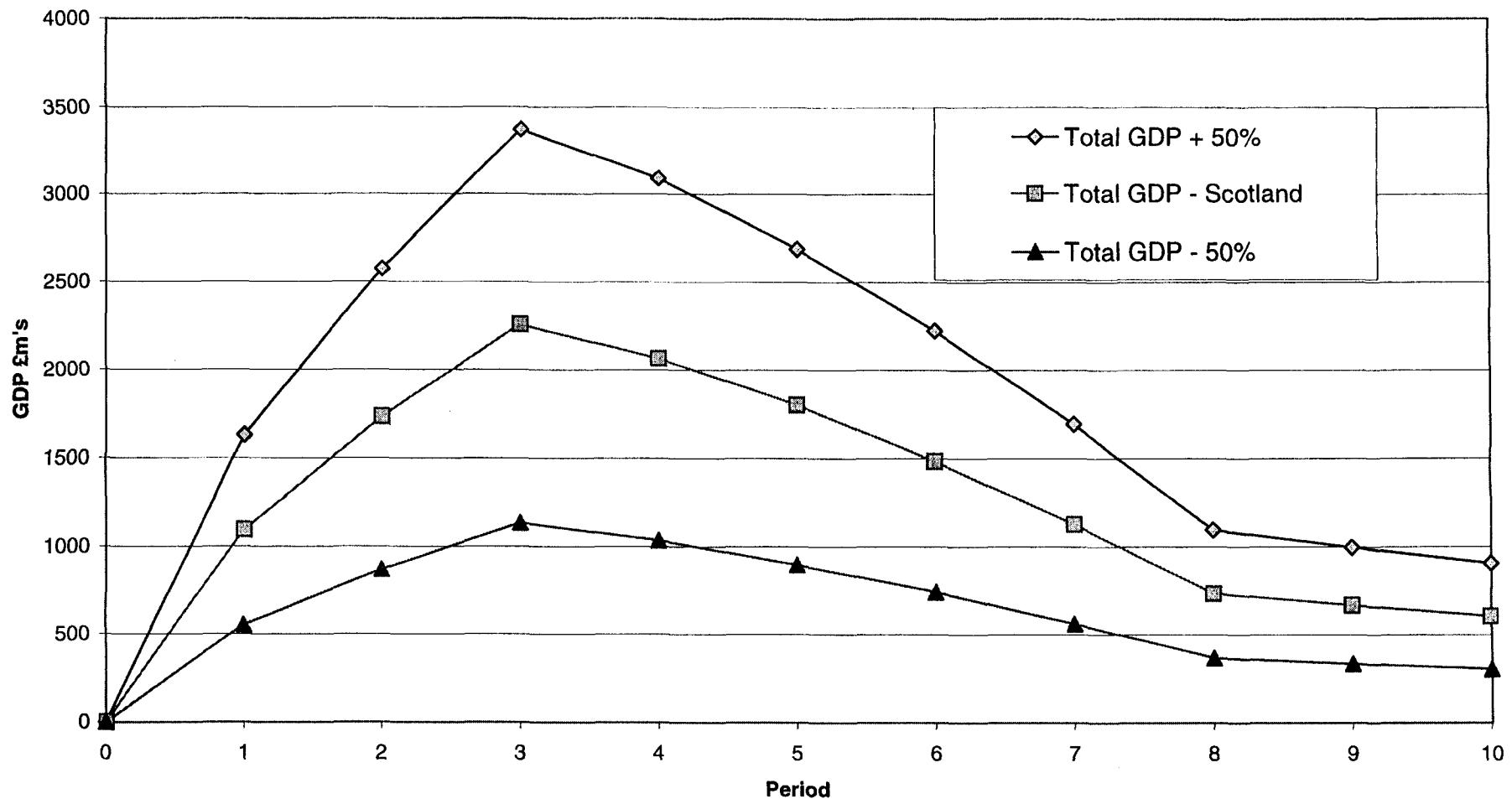
**Table 2 : The Total Scottish and UK effects of Scottish Enterprise**

			Cumulative Discounted Values					
	Period 3		Periods 1 - 3		Periods 1 - 10			
	Scotland	UK	Scotland	UK	Scotland	UK		
GDP (real), £million	2258.158	2544.147	4736.541	5413.198	11050.807	11449.493		
Total employment (000's)	33.148	39.497	-	-	-	-		
Manufacturing:	4.025	9.530	-	-	-	-		
Non-manu traded:	7.936	8.014	-	-	-	-		
Sheltered:	21.180	21.948	-	-	-	-		
Government tax revenue, £million	-	867.660	-	1852.408	-	5805.692		
Expenditure on benefits, £million	-	-16.710	-	-29.388	-	-67.735		
Balance of payments, £million (1)	-	-83.531	-	475.019	-	-1205.243		

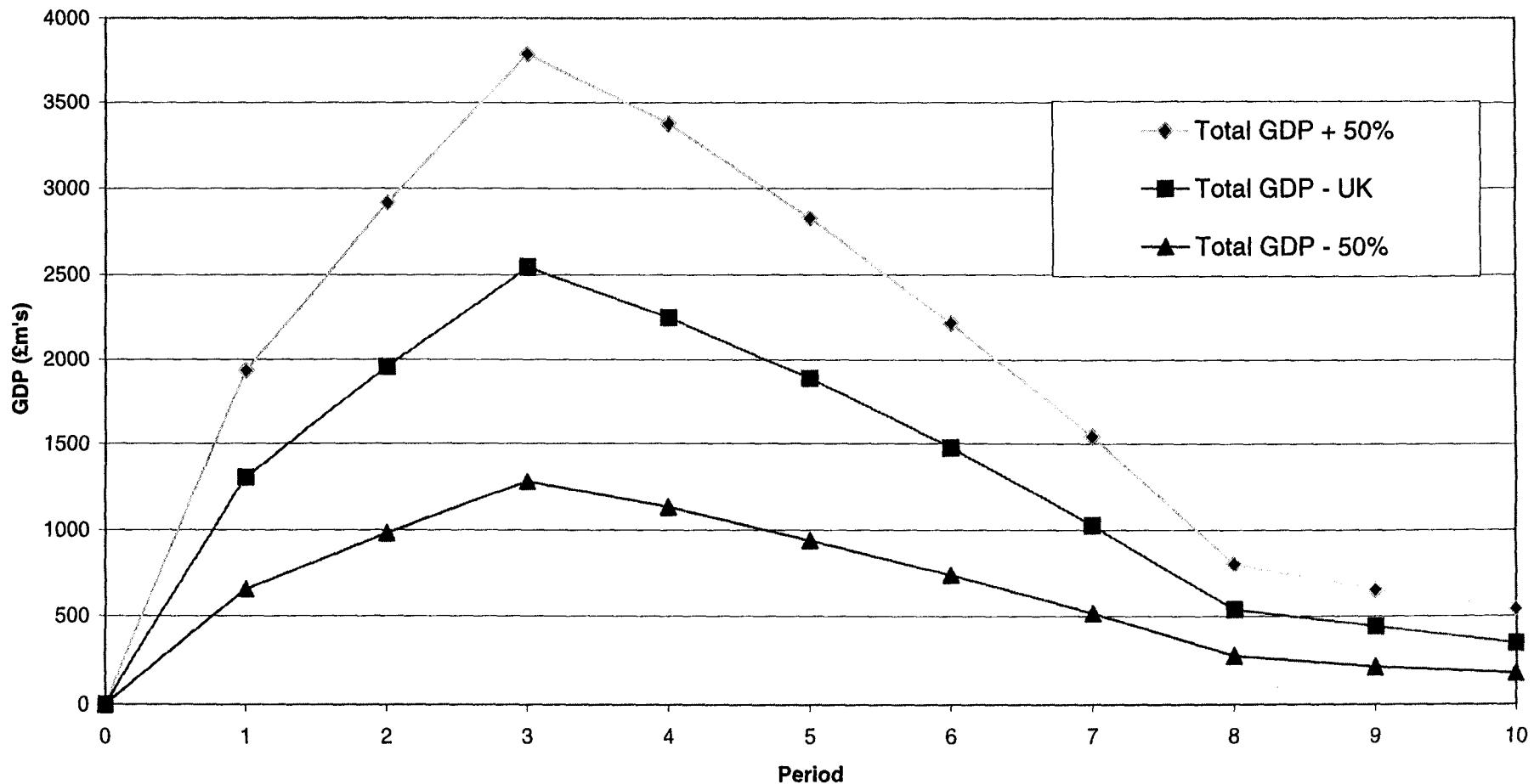
Monetary values measured at 1997 prices.

(1) Negative values indicate improvements in balance of payments.

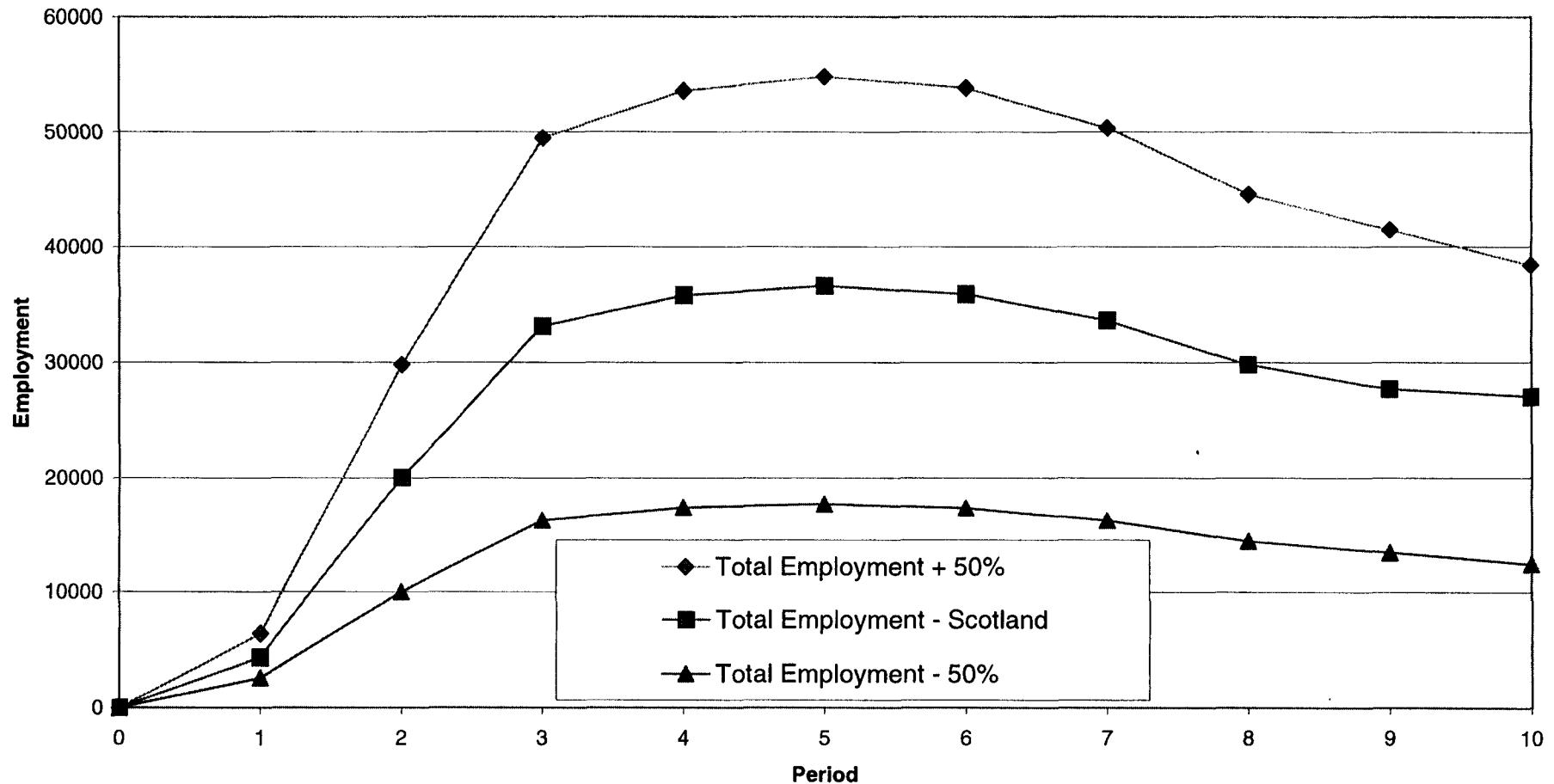
**Figure 1 - Period by period change in total Scottish GDP (1997 Prices) as a result of SE's Strategic Objectives, with 5 year decay and +/- 50% variation in direct effectiveness.**



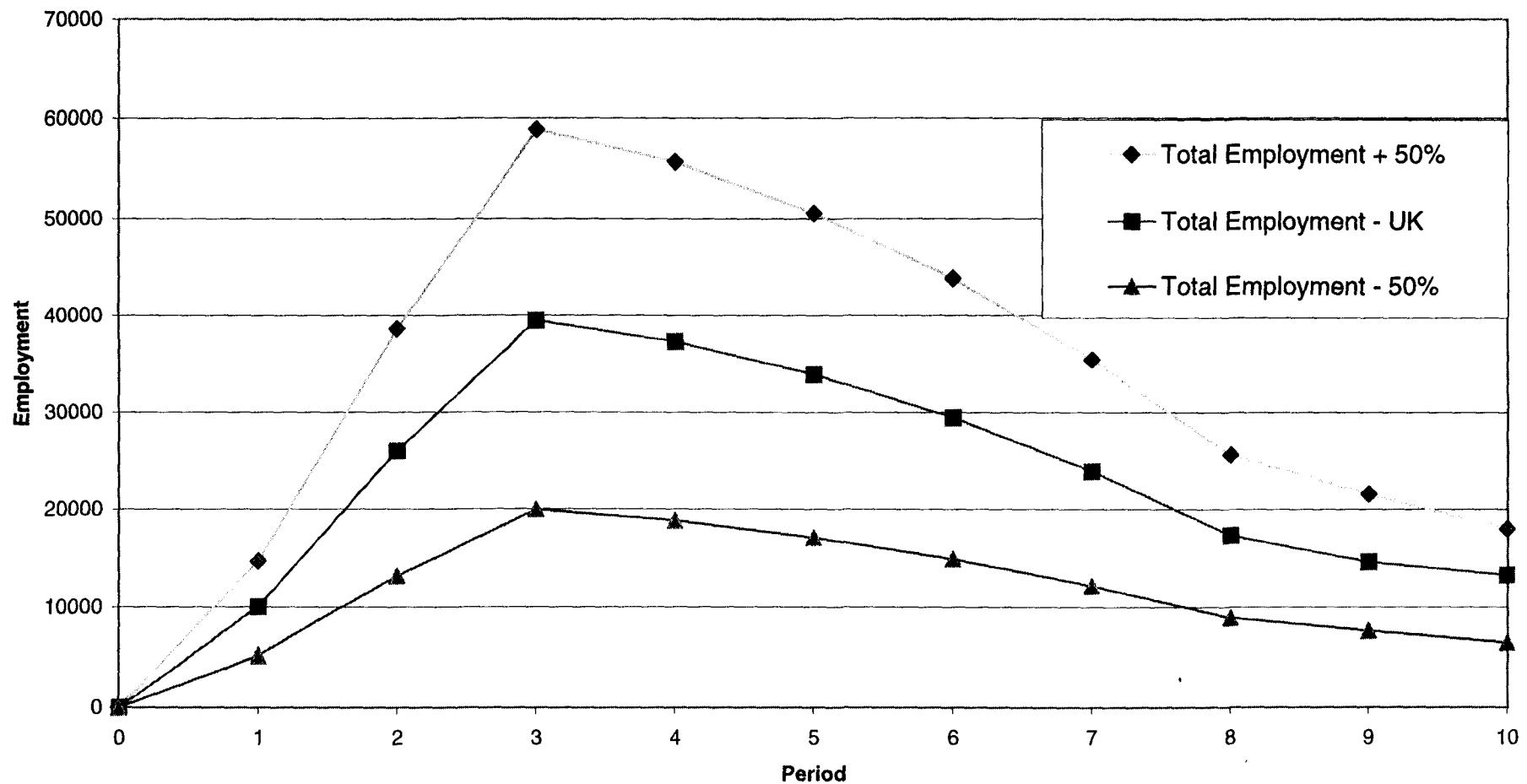
**Figure 2 - Period by period change in total UK GDP (1997 Prices) as a result of SE's Strategic Objectives, with 5 year decay and +/- 50% variation in direct effectiveness.**



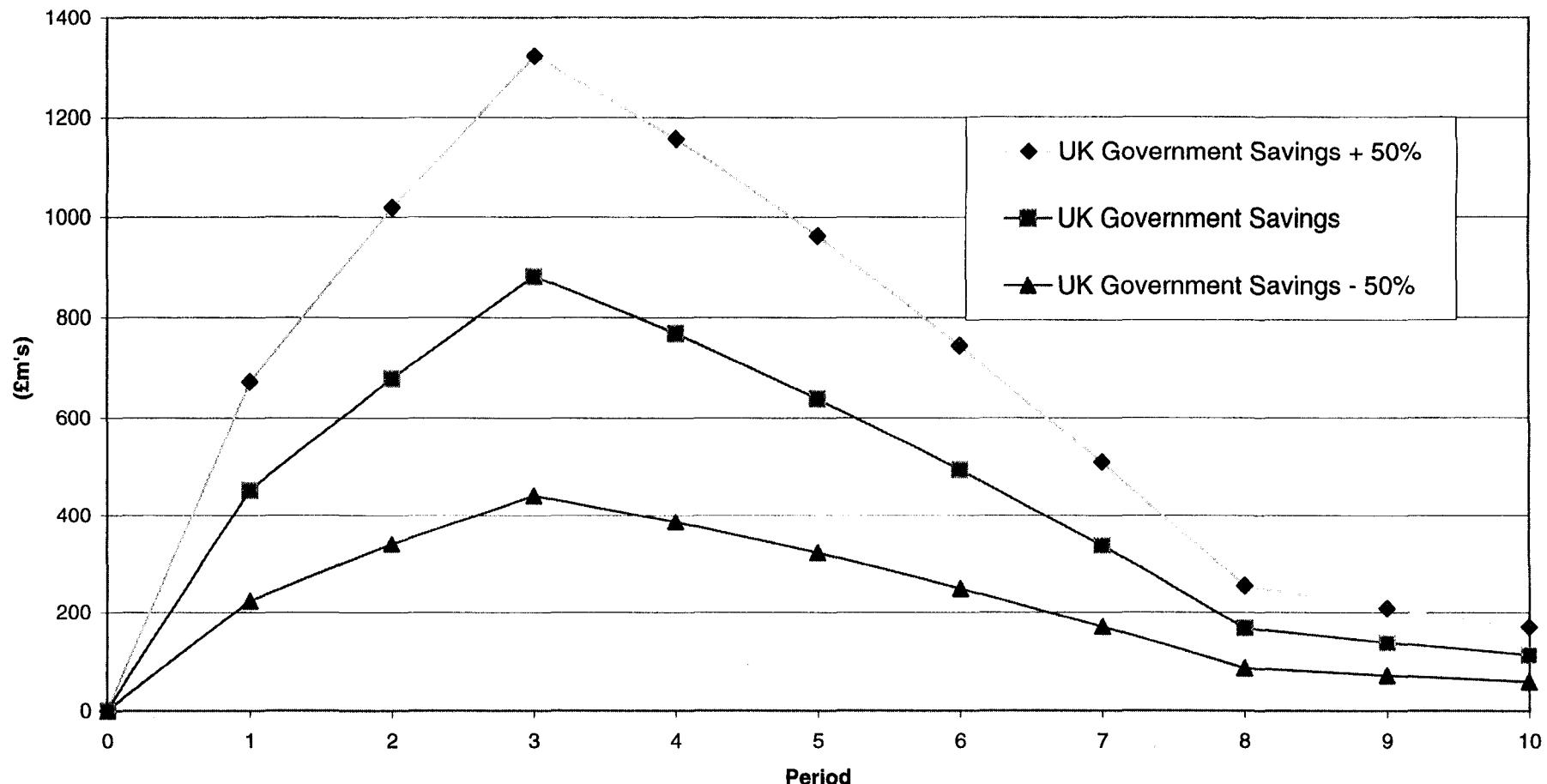
**Figure 3 - Period by period change in total Scottish employment as a result of SE's Strategic Objectives, with 5 year decay and +/- 50% variation in direct effectiveness.**



**Figure 4 - Period by period change in total UK employment as a result of SE's Strategic Objectives,  
with 5 year decay and +/- 50% variation in direct effectiveness.**



**Figure 5 - Period by period change in total UK Government savings as a result of SE's Strategic Objectives, with 5 year decay and +/- 50% variation in direct effectiveness.**



**Figure 6 - Period by period change in UK balance of payments as a result of SE's Strategic Objectives, with 5 year decay and +/- 50% variation in direct effectiveness.**

