

**POLICY INSTITUTE**

# **Fantasy Jobs**

**Finding A Better Measure Of Indirect Employment**

**Alan Peacock & David Simpson**

# *Fantasy Jobs*

## **Finding A Better Measure Of Indirect Employment**

### *Synopsis*

The usual measure of how much a sector or industry contributes to the economy is 'Value Added'. But recently another measure has come in to use because it exaggerates the contribution made by certain sectors. This is dangerous because it may distort economic policy. The new measure takes data which shows how much the sector buys from elsewhere in the economy, and calculates a 'multiplier' for the amount of 'indirect employment' it therefore supposedly creates. But if such a method were applied to the whole economy, we would have more employees than jobs! To avoid this double counting, we should take into account levels of demand, unemployment, savings and other factors before using such multipliers. In addition we should use them only by comparison with other sectors, instead of as an absolute measure.

### **POLICY INSTITUTE**

*108 Holyrood Road, Edinburgh EH8 8AS Tel 0131 620 8587*

### **About the Policy Institute**

The Policy Institute is committed to promoting liberal market values and solutions and applying these to current economic and social issues in Scotland. Its aim is to investigate, research and advance social and economic ideas that will improve Scotland's performance and prosperity, and her standing in the world.

It pursues this aim by publishing policy papers and analysis and presenting these to the highest editorial standards through publications, articles, seminars, public debates and other events. Current areas of concern are the Scottish economy; the quality and efficiency of public services; environmental and social issues and the governance of Scotland.

The Institute, founded in 1999, is a research and educational charity. It is independent of all political parties and political organisations. It is financed by voluntary donations and support from companies, trusts, foundations and individuals.

**If you would like to help support the Institute, or want to know more about its activities, please contact Tom Miers on [tmiers@policyinstitute.info](mailto:tmiers@policyinstitute.info) or phone 0131 620 8587, or visit the web site at [www.policyinstitute.info](http://www.policyinstitute.info)**

**Trustees:** Katie Grant, Prof. Peter Jones, Sir Donald MacKay, Colin McLean, Allan Massie, Andrew Neil, Ivor Tiefenbrun. **Director:** Bill Jamieson **Executive Director:** Tom Miers  
Registered charity No SC029012

## Fantasy Jobs

### Finding A Better Measure Of Indirect Employment

#### Introduction

'Value Added' is the conventional measure used of the contribution of any sector (or industry) to the Gross Domestic Product (GDP) of a country. Broadly speaking, it is calculated by taking the gross value of a sector's sales and deducting the value of purchases from other sectors by way of raw materials and services. The resulting figure mainly consists of salaries, taxes and profits. So the sector has created value which is used to employ people, pay taxes and reward investors<sup>1</sup> (see Box 1 below<sup>2</sup>).

Box 1		Illustration – The Haggis Sector in Glenbogle	
		Haggis Sector	
<b>Total Sales</b>		<b>17</b>	
Less purchases:			
Sheep		3	
Oatmeal		2	
Onion & Spices		1	
Other		1	
Imports		1	
<b>Total purchases</b>		<b>8</b>	
<b>Value Added</b>		<b>9</b>	
Salaries		4	} Contribution to GDP
Taxes		1	
Profits		4	

We are concerned that another approach is increasingly being used to exaggerate the economic contribution of particular sectors. Like cuckoos in a nest, they may be misleading policy makers into attributing greater importance to some sectors over others. This may distort and undermine the economic policy making process.

#### The Cuckoos In The Nest

In this new approach an employment measure is used to indicate the importance of the sector. However it typically comprises not only those directly employed in any sector but also those

<sup>1</sup> Environmentalists and others sometimes dispute the exclusive use of Value Added as an indicator of a sector's contribution to welfare. This is based on arguments about the social costs of economic activity, which should take account of its effect on pollution etc. Here is not the place to enter into such debate, but it is worth noting that both authors have participated in professional discussion of environmental factors and economic growth. Among their latest contributions are Simpson (2004), *Tilting at Windmills :The Economics of Wind Power*, Hume Occasional Paper No.65 and Peacock (2003), *The Political Economy of Sustainable Development*, Hume Occasional Paper, No.63.

<sup>2</sup> In this paper we have illustrated some of the economic concepts involved with simplified figures from the fictional economy of Glenbogle.

'indirectly' employed. That is to say one adds in some estimate of the number of people employed in industries or services selling to that sector.

This approach contrasts markedly with the Value Added measure. Rather than *subtract* the value of the inputs from the gross value of sales, the sector claims the *addition* of this value, expressed in employment terms, as part of its contribution to welfare (Box 2).

<b>Box 2</b>		<b>Two Contrasting Measures</b>	
The total 'indirectly employed' by the Haggis sector is 80 (circled), including 30 in the sheep sector and 10 making onion & spices (squared).			
	<b>Haggis Sector</b>		<b>Employed to make Haggis</b>
<b>Total Sales</b>	<b>17</b>		
Less purchases:			
Sheep	3		30
Oatmeal	2		20
Onion & Spices	1		10
Other	1		10
Imports	1		10
<b>Total purchases</b>	<b>8</b>	<b>Indirect Employment</b>	<b>80</b>
<b>Value Added</b>	<b>9</b>	<b>Total Employed</b>	<b>120</b>
Salaries	4	<b>Direct Employment</b>	<b>40</b>
Taxes	1		
Profits	4		

The political significance of this is immediately apparent when sectors wish to make a claim for public funding based on their overall contribution to national welfare. Economic impact studies of the arts seem particularly prone to using this approach<sup>3</sup>. Other examples are in recent reports on the whisky and fishing industries. In the case of the whisky industry, the astonishing claim is made that it employs 41,000 directly and indirectly, of which only 10,200 are directly employed in the industry.

What all these studies have in common is that they use numbers called multipliers that are prepared and published by government statisticians<sup>4</sup>.

### *The SFE Example*

The point we are making can be illustrated using data from a recent study of the Scottish financial sector.<sup>5</sup> The report claims

<sup>3</sup> See the extended discussion of this issue by Bruce Seaman (1987), *Arts Impact Studies: A Fashionable Excess* reprinted in Ruth Towse (Editor), *Cultural Economics: The Arts, The Heritage and The Media Industries, Volume II* Edward Elgar, 1997.

<sup>4</sup> For Example, Scottish Executive (2002) *Input-Output Tables and Multipliers for Scotland*, available from the Executive website, [www.scotland.gov.uk/](http://www.scotland.gov.uk/).

that the financial sector currently contributes about £17bn to Scottish GDP 'in direct and indirect outputs', and employs 91,000 people directly *plus another 89,000 indirectly*. This is ascribed to the 'multiplier effect' by which expansion in one sector is assumed to lead to expansion in other sectors which supply it. These multipliers can be worked out for all sectors of the economy based on the following formula:

$$M \text{ (MULTIPLIER)} = \frac{\text{Direct Employment} + \text{Indirect Employment}}{\text{Direct Employment}}$$

$$\text{Therefore } M \text{ (Financial Services)} = \frac{91,000 + 89,000}{91,000} = 1.98$$

The multiplier for our illustrative Haggis sector (see Box 2) would be 3!

Such analysis concludes that the financial services sector 'supports' directly and indirectly some **10% of all Scottish jobs**. By implication, an increase in direct employment of, say 10,000, would produce an increase in indirect employment which would add a further 9,800 jobs. These are intriguing results which call for detailed investigation, particularly if policy conclusions are to be based on them.

### *Wielding Occam's Razor<sup>6</sup>*

The difficulty with this type of multiplier analysis is revealed when it is applied to the economy as a whole. If the same multipliers were applied to all sectors of the economy, then the aggregate multiplier would be greater than 1. **This would produce the nonsensical result that the total number of jobs directly and indirectly created would exceed the total number of jobs in Scotland!**

This might satisfy anybody that it is dangerous to add indirect employment effects into any measure which tries to modify the traditional use of Value Added as the measure of a sector's contribution to GDP. All credit to Occam, then, for showing how scarce statistical resources should not be employed.

This does not mean that one should write off the multiplier analysis. In the following pages we examine more carefully the circumstances in which a link between direct and indirect

---

<sup>5</sup> See *Economic Impact of Financial Services in Scotland*, at [www.financescotland.com](http://www.financescotland.com). We would like to express our appreciation to Jeremy Peat, Chief Economic Adviser, Royal Bank of Scotland, for his help in making available the data and commentary from this study.

<sup>6</sup> William of Ockham (or Occam) is credited with this famous principle of reasoning that the best proofs limit themselves to the minimum number of arguments necessary to confirm or deny them.

employment might be established, and multiplier effects taken into account. In doing so, we suggest ways in which data drawn from **'input-output tables'**, where these multipliers are derived from (see Box 3 below), might more prudently be used<sup>7</sup>.

### Box 3

### Input-Output Tables

All sectors of the economy interact with each other, by buying raw materials and services from others to make their own products. This inter-relationship is represented in input-output tables, which use data such as in Box 1 to cross-reference the sectors.

Tables modeling the whole economy are compiled by government statisticians, and show the flows of goods and services between different sectors of the economy in any one year. They are available on the Scottish Executive web site at [www.Scotland.gov.uk/](http://www.Scotland.gov.uk/)

These flows can be turned into ratios by expressing them as a proportion of total sector outputs. By making a number of simplifying assumptions, the ratios can be used to calculate the 'knock-on' effects of a change in output and employment in any one sector on others. So in our illustration in boxes 1 and 2, a doubling in the demand for Haggis would supposedly result in an increase in demand for onion & spices creating 10 more 'indirect' jobs in that sector, or 30 more jobs in the sheep sector (see squared numbers in Box 2). In making these calculations, one should never lose sight of the implications of the simplifying assumptions, but unfortunately that is just what most multiplier studies do. These simplifications are discussed in the next section.

### *Making Sense Of The Multiplier Effect*

Why is it unlikely that an increase<sup>8</sup> in direct employment of say 10,000 jobs in the financial sector of the Scottish economy will *in practice* add a further 9,800 jobs in the rest of the economy, as the multiplier analysis suggests? The reason is that the multiplier analysis is based on at least **four simplifying assumptions**:

1) The 10,000 new jobs must have resulted from an increase in demand for financial services. But, if that were so, there should have been a commensurate *fall* in demand for the output of other sectors, leading to a fall in employment in these sectors. After all, the money has to be diverted from somewhere. **Multipliers assume no such fall.**

---

<sup>7</sup> Both authors have invested considerable intellectual capital in the input-output approach as a way of demonstrating economic interdependence. See David Simpson (with Jinkichi Tsukui), *The Fundamental Structure of Input-Output Tables*, in Ira Sohn (ed.) (1986), *Readings in Input-Output Analysis*, New York: Oxford University Press. Also Alan Peacock (with Harold Edey and Ronald Cooper), 2003, *National Income and Social Accounting*, Third Edition, Routledge Library Edition, London. Alan Peacock recalls, as a one-time (for a very short period in the 1990s) member of the Secretary of State for Scotland's council of economic advisers, fighting along with Sir Donald MacKay for the retention and updating of input-output tables. This was a view at variance with that of the (then) top brass. He cannot claim that their subsequent extension and expansion had anything to do with his advocacy.

<sup>8</sup> The following arguments apply to the assumption that *new* jobs in one sector create indirect ones in other sectors. They are equally applicable to *existing* jobs. So if 10,000 jobs were *lost* in the financial sector, it is unlikely that a further 9,800 jobs would go elsewhere, for equal and opposite reasons (i.e. demand would transfer to other sectors etc.)

2) The multiplier analysis assumes that **additional workers taken on by a new business were unemployed beforehand**. Otherwise they would have to be offered higher wages to attract them from other firms, and no net employment benefit would occur. In practice, it is most unlikely that unemployed labour will be available in every sector of the economy.

3) Multiplier analyses may incorrectly specify the '**leakages**' at each round of expenditure. So if a new business is established, it might *import* more goods and services instead of sourcing them locally. Likewise, more additional money in the economy might be saved instead of spent, lessening any increase in demand.

4) The numbers used in the analysis are necessarily **averages**, whereas in practice it is marginal changes that are relevant. So when one sector grows, the amount it sources from other sectors will change as a proportion of total output, therefore changing the multipliers as it goes.

How can we be more careful to improve the accuracy of multipliers? Here are four approaches to match the four assumptions:

### **1) Offsetting Decreases In Demand**

If the increase in the demand for financial services originates wholly from within Scotland, then, if total demand is to remain the same, one should logically expect other sectors to experience a corresponding *decrease* in demand of the same value.

If the pattern of that decrease could be specified across the sectors, then the results of a multiplier analysis should show employment increasing in some sectors and decreasing in others. The net result in aggregate employment should be small.

If, on the other hand, all of the increase in demand for Scottish financial services came from *outside* Scotland, then of course there need be no commensurate decrease in demand for other sectors of the Scottish economy.

This distinction is important. For many parts of the financial services sector, for example, (e.g. life assurance and fund management), most of demand *does* come from outside Scotland. In other words the demand for these activities is export-led. With the aid of an input-output table, the extent to which the different sectors of the Scottish economy are export-led can easily be quantified.

It follows that this information could be used to adapt multipliers. **A further measure should be calculated for each sector showing the extent to which the demand for its output is export-led.** This would provide an additional parameter that might be used by lobby groups in promotional arguments, along with such other parameters as measures of environmental benefits and costs.

Unfortunately this does not seem to be a calculation that is commonly undertaken in the promotional studies we have mentioned.

## **2) Full Employment**

The very high estimates of indirect employment produced by the multiplier analysis assume that there is prior general unemployment throughout the economy. This is so that the increases in expenditure which result from a new business can bring into employment people who were hitherto idle. This is an extreme assumption. The opposite extreme assumption would be that, prior to the new business, there was full employment everywhere. The result would then be that the number indirectly employed would be zero. The entire increment in expenditure would be absorbed in higher wages and prices.

What happens in practice depends on the *extent* of prior unemployment in the relevant sectors of the economy, and the flexibility of the labour markets in these sectors. These are the factors which will determine the extent to which any given increase in demand will result in increases in indirect employment rather than increases in prices. It is unrealistic to assert as a general proposition that no such price increases will be encountered. **Those using multipliers should find a way of factoring in the availability of labour.**

## **3) Correctly Specified 'Leakages'**

The most important leakages normally encountered in the flow of expenditure are those to savings and to imports. So an increase in demand might disproportionately result in additional imports, instead of production at home. Small and open economies like Scotland experience greater import 'leakage'. This should be reflected in a smaller multiplier and hence a smaller amount of employment indirectly created.

## **4) Marginal vs. Average Values**

The numbers which are used in multipliers are averages of the flows of inputs to, divided by the flow of output from, each sector.

That is how the data are recorded in input-output tables. We simply don't know how, in any given sector at any given time, the demand for inputs will respond to a *change* in the level of output. However, it seems probable that in most cases the unknown marginal values would be smaller than the average values used in the computation.

### *A Further Complication*

In the multiplier analysis, it makes a very big difference to the value of the multiplier whether the household sector, normally the largest in any sectoral division of economic activity, is included within the multiplier or not. This is the reason for the distinction between 'Type 1' and 'Type 2' multipliers, and between 'indirect' and 'induced' effects (see Box 4 below). It is important in any study that it is made clear what type of multiplier has been used.

<p><b>Box 4</b>                                      <b>Type 2 multipliers – The 'induced' effect</b></p> <p>Some analysts are not content with multiplying the effect of a new business being set up by the indirect employment it will create from sourcing from other sectors. In addition, it assumes that the additional salaries being earned by all these new employees will be spent, creating further demand still, and therefore yet more 'induced' employment. Calculating this effect produces a 'Type 2' multiplier.</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### *A Final Suggestion – Comparison Instead of Isolation*

The total effect of these four suggestions is likely to reduce very substantially the *absolute* amount of indirect (and induced) employment generated by any given sector in practice, compared to the numerical results produced by a multiplier analysis. In other words, the numerical results which are presented in the typical study designed to bolster the contribution of a particular industry or sector to the economy as a whole **cannot be accepted at face value**. The methodology used must be adapted first.

However, in the meantime multipliers can still play an important role:

**It is the *relative*, not the *absolute*, amount of indirect employment generated by a particular sector which should be the focus of promotional studies.** There are evidently some sectors which are more integrated into the regional economy than others. Given an equal stimulus of demand, these sectors are more likely than others to produce beneficial regional indirect employment effects. This is a calculation which input-output data are well suited to support.

*Meanwhile, Stick To What We Know*

Meanwhile, primary reliance for an assessment of the impact of any given sector on the economy as a whole can continue to rest with the straightforward measure of direct employment offered. If income is preferred, the corresponding measure is sectoral contribution to GDP or Value Added.

**Professor David Simpson is an Economic Adviser to the Water Industry Commissioner for Scotland, and a Trustee of the David Hume Institute.**

**Professor Sir Alan Peacock is Honorary President of the David Hume Institute, and a Fellow of both The British Academy and Royal Society of Edinburgh.**