

# Economic Impact Analysis

## Introduction

If there is one technique or method of analysis in economics which has risen in popularity and demand in recent years it has to be economic impact analysis or EIA. If there is a deep suspicion about the amount of EIA undertaken it is that much of it has arisen from the favour with which politicians look upon the apparently good news such analyses produce and the manner in which regulatory demands can be met by EIA.

In New Zealand EIA has been applied to mining activity, casino development, energy development and primary production intensification amongst other things. The latest fad has been its application in the promotion or defence of events, notably sporting events which has seen analyses of yacht racing (Americas Cup), rugby, and motor racing.

This primer describes the main concepts, their application and the strengths and weaknesses of EIA – largely from a New Zealand perspective but in a manner which is readily generalisable.

## Uses

Initial uses of EIA grew from a desire to recognise that as well as the most obvious benefits arising from expenditure in projects (chiefly development projects of one or another type) there were associated economic gains which arise from associated activities. Moreover gains arising from associated activity extended into potential job creation and improvements in household income.

Three main applications of the concept may be recognised at present:

1. Investment and Expenditure Assessment and Justification

It has become common practice, especially where taxes or other forms of public funding are involved in developing certain assets or in promoting or staging various events, to seek estimates of economic benefit likely to accrue above and beyond the direct investment proposed.

2. Meeting Compliance Requirements under Regulatory Regimes

Several pieces of legislation, most notably the Resource Management Act 1991 have provisions which can be addressed by the estimation of economic impacts. Typically economic impact analyses are used to provide estimates of increases in GDP output, value added and full time equivalent employment potential which can reasonably be attributed to a proposal.

3. Assessing Likely Adverse Impacts from Closures or Slow Downs

Concerns also frequently arise in respect of converse situations where some type of closure, development slow down, prohibition or other proposed process is likely to lessen activity which has some form of economic spinoff. This is simply the reverse of net economic gain expected from development. Indeed, one form of argument for promoting development involves citing economic gains as an opportunity associated with not allowing developments of one or another type to proceed.

## Fundamental Concept

The fundamental concept of economic impact analysis goes back to Nobel prize winner Wassily Leontief and recognises that the production of any good or service for a consumer involves the input of numerous other raw materials, processed materials, and other intermediate goods and services.

The final product purchased by a consumer (final consumption) represents the end of a significant chain which produces value and involve employment above and beyond that involved in the direct production of the good or service in question.

These additional outputs are variously referred to as multiplier effects, spin offs or economic impacts. Economic impact analysis is concerned with assessing the nature and magnitude of these multiplier effects for any given amount of investment and final consumption.

In simple terms economic impact analysis might be said to be concerned with answering the question "if we invest x number of dollars producing y goods, what is the effect on the rest of the economy?"

The nature of economic impacts can be understood by breaking the concept down.

### Direct Impacts

When a new project is developed, for example a gold mine or the construction of a commercial building, there are immediate or direct impacts on the economy in two ways.

First, the project itself generates new economic output. Typically that output takes the form of and is measured as gross domestic product. The production of that output requires labour input and there are therefore impacts on employment.

New investments therefore produce output and employment impacts. Those inputs are referred to as direct impacts.

### Indirect Impacts

In order to develop a new project (say a gold mine or commercial building as referred to as above) various other inputs are required. In the case of a commercial building, input from the construction industry is required, transportation is used to bring raw materials to the development and there are numerous service inputs such as architectural and legal advice inputs.

For the ongoing operation (for example operating a gold mine or running a commercial property) various inputs are also required in the form of servicing the operations. For example a commercial building requires input of energy, maintenance, cleaning and like services.

In the case of a gold mine there is significant consumption of petroleum products to run machinery, the servicing of vehicles and the administration of the operation through banking insurance and like services.

All of these impacts are referred to as indirect impacts.

## Induced Impacts

Production of all of these impacts (direct and indirect) has impacts on households. The households providing workers whose jobs involve the production of intermediate goods and services. Such households also consume items required to run a household (energy, groceries, rent and the like).

These impacts, in terms of both monetary output and employment are referred to as induced impact.

These effects combine to form the multiplier impact which economic impact analysis seeks to determine.

## Types of Multiplier

There are several types of multiplier. The most popular are:

### Output Multipliers

Output multipliers seek to assess the monetary value of economic impacts and typically are expressed as a proxy for GDP output. The measures therefore seek to assess the size of the increase in monetary flows over a period of time (typically a year) generated by both the capital and operating phases of a new project.

Output multipliers use total project expenditure as the basis for calculation.

### Value Added Multipliers

Value added multipliers seek to focus on the profit or, more broadly, the surplus generated by new projects and measured in dollar terms. The purpose of value added multipliers is to overcome difficulties which may be involved in "double counting" when output multipliers based purely on total expenditure are used.

An output multiplier focuses on total expenditure involves in a project. That may overstate economic impacts in the sense that some of the inputs might have been either used for other purposes (and therefore make no net addition to economic output) or, alternatively having been used once by (say) a servicing industry, should not be counted again in the new project itself.

Value added multipliers are typically expressed for a given period of time (normally a year), expressed in dollar terms and are derived by identifying the wages and salaries along with the profit minus any subsidies which are associated with all of the direct, indirect and induced impacts associated with a new project.

### Employment Multipliers

The employment effect of a new project are typically measures in terms of full time equivalent (FTE) jobs created through direct, indirect and induced impacts associated with a new project.

Typically employment impacts have to be treated in a "hypothetical sense" as a job created opportunity per year. The reason for this is simply that the same job and the same employee may be employed over periods of time much longer than a year but

by treating the job creation as an annual “equivalent”, comparisons with output can be made. This allows assessments to take the form of statements such as “the equivalent of x jobs created per year”.

Various other multipliers are sometimes used – for example income multipliers which seek to assess the impact on household (or other entity) income – but output, value added and employment multipliers are the most commonly used.

### Use of Multiple Measures

While debate continues over the most appropriate multiplier to use in various circumstances, it has become common practice to use several multipliers as a means for providing different perspectives on e impacts.

### Net Value and Opportunity Cost

Some care needs to be taken in drawing conclusions about the overall economic impact of new projects (or the closure of other projects) in economic impact assessment. It might appear at first glance for example that the simple development of new projects can lead to an apparently never ending stream of economic benefits. That is not the case.

Economist Henry Hazlitt demonstrates graphically that when the window of a tailor is broken, the repair of that window leads to increased activity in a significant number of other economic activities, (such as glaziers, transport etc) and produces direct, indirect and induced impacts throughout the economy. All of these benefits arise because a window has been vandalized. Are these genuine economic gains?

The answer is, of course, “no”. Because there is an opportunity cost to the breaking of the window in the first place. That opportunity cost in this example, takes the form of time lost to the tailor in doing what would otherwise be his standard work and producing value for his consumers. The same is true for suppliers of intermediate inputs. It is for this reason that we cannot “vandalise” our way to economic growth and prosperity.

Economic gains then will only be made where there are net additions to value over and above activities in which the resources are currently invested.

It should be recalled that, given competitive markets, resources already allocated are likely to be in operating in their most valued uses. Thus where resources need to be shifted or more resource imported this can only be justified where the reallocation of resources adds value over and above what would otherwise be the case.

Equally, in situations where resource would not be reallocated unless a new project was to proceed (or be allowed to proceed under regulatory constraints) then sub optimal resource allocation is likely to arise where this is prevented.

The key point is that in assessing economic impact gains stress must be laid on the addition of net value, that is, value added after opportunity costs are taken into account.

### Transfers Versus Positive Impacts

A frequently canvassed issue concerns whether or not the substitution of one activity with another or the move of an activity from one location to another involves the

adding of value (a positive economic impact) or simply the substitution of identical activities with no net gain. Does for example, the transfer of cafe sales in the Auckland suburb Ponsonby to the Viaduct Harbour as a result of the latter location being the America's Cup venue involve the adding of value or merely a shift with no net gain?

The two key concepts involved are relative value and the fact that unless there is net gain to be made via substitution of activity or location, it will not take place. The logic of the second proposition is reasonably clear. If customers do not value drinking coffee in the Viaduct Basin more highly than in Ponsonby they will not do so. If increased sales are observed in the Viaduct at the demonstrable loss of custom in Ponsonby then, evidently, for the time being at least higher value is attached to such sales.

The example is naturally a highly simplified one and numerous complicating factors such as the longevity of such trends and their permanence, the frequency of customers shifting, the fact that there may be part shifts rather than entire simple migrations and the strong likelihood that "bundles of value" rather than single items are being purchased, all combine to make a much richer picture.

The principle remains however.

It should also be noted that overall, i.e. net of Ponsonby's losses, value is added regardless of price as long as former Ponsonby customers continue to shift from one location to the other. The amount of additional value relative to the previously prevailing situation does depend upon cost but the fact of value being added does not.

#### Regional Issues and Leakage

A common motivating factor for economic impact analysis is the idea that the attraction of a particular event to a certain city or region or the development of a new project in a given city or region will generate economic impacts which are valuable to a local economy.

At the same time it is readily apparent that many of the inputs into a new project come from beyond any specific city or region or even country. Thus in the case of almost any development in New Zealand involving significant plant and machinery imports from outside of the country are involved. In any project where there is a significant administrative or financial services input into the project then resources are likely to come outside of the city or the region.

This raises the issue of "leakage" of benefits outside the region and how that should be dealt with.

Typically the means by which such leakage is dealt with is:

- at a conceptual level to recognise that the economic gains frequently accrue to the entire economy and that although they may not accrue in the area where the new project or development or event is to take place that does not mean that economic value is not being added; and,
- at an applied level, some adjustment is made through the multipliers used to estimate economic impacts so as to reflect that proportion of gain which remains in the city or region of concern.

A form of analysis known as location quotient analysis is typically used to adjust (upwards or downwards) the economic impact depending upon the extent to which resources available locally are equivalent to those available at a national level.

Using employment data, the pro rata availability resources as between the national economy and the local economy is used to adjust economic impact multipliers up or down so as to reflect the extent to which the region “imports” affected goods and services with the economic impacts being greater or lower in accord with local economic structures.

### Conceptual Weaknesses

The economic impact analysis discussed in this paper and derived from the input output technique discussed above has a number of conceptual weaknesses which should be recognised. Principal amongst these are:

#### Static View

Input output analysis and the economic multipliers derived from that analysis are drawn from data sets which represent a single point in time. Obviously the economy is dynamic with changes going on all the time and thus the relationships between various inputs and outputs (and consequently their impact on multipliers) are forever changing.

This problem is of greatest importance where there are significant changes occurring in the structure of an economy (for example over the period 1984 to 1990 in New Zealand ). Changes which are typically of importance include improvements in productivity such that economic multipliers may over estimate job creation associated with given projects and events.

Similarly changes in, for example, manufacturing processes, may mean that greater output can be achieved with lower or different forms of impact and the consequence of that is likely to be altered economic impact.

#### Forward Linkages

Input output analysis primarily looks “backwards” from final consumption to the inputs and servicing which produces a final consumption. It does not therefore consider additional economic impacts which might arise where the product being developed is used further “along” a value chain.

Thus for example in assessing the economic impacts of a gold mine traditional economic impact analysis pays no attention to the economic impacts which are likely to arise when (raw material) is used to produce further value added to product. In other words the analysis does not isolate forward linkages and their economic impact.

Clearly the extent of this problem depends upon the place in the value chain which the economic analysis is focused on. The closer to a “raw” or unfinished product analysis is concerned the more this is likely to be a problem. On the other hand where the analysis is concerned with, say, an event it is very likely that most economic gains are identified because the activity of concern takes the form of final consumption (for example watching a sports event).

#### Supply Side Effects

The introduction of a new project or even an event is also likely to result in increased competition which in turn generates both incentives and opportunity for participation from other players in a given market.

A good example is that the development of the casino in Auckland led to a number of surrounding hotels introducing new entertainment services, repairing buildings, and establishing different forms of business to “cash in” on the increased pedestrian traffic in the area and the increased interest in gambling.

These supply side effects are not captured by orthodox impact analysis.

### Employment Effects

It should be noted that the creation of jobs is, in general, not an end in itself but rather a means to the end of enhancing societal wealth. Consequently the simple “production” of jobs ought to be treated carefully as an economic gain.

While job creation may be a major means for enhancing wealth there are also significant and important reasons for seeking to reduce the amount of labour input in producing wealth. Over the full length of economic history it is clear that the reduction of labour required to produce a given unit of wealth has led to economic and social benefits.

Consequently job creation should not be seen as necessarily a gain in and of itself.

### Productivity in Employment

It should also be noted that in a number of cases economic impact analysis may overestimate the level of job creation (or use of additional resource and any other factor market) because productivity may change.

At a simple level, for example, should the level of activity rise in a restaurant or hotel, the response may simply be for workers to become more productive and serve more customers without there necessarily being any additional jobs created. The same may be true of other resources such as overhead and administration.

This is especially likely to be the case where there are economies at scale and it is important not to overestimate the beneficial impacts identified by economic impact analysis.

### Technical Issues

There are numerous technical difficulties surrounding the estimation of economic impacts. The more common difficulties are:

#### Data and Timeliness

Because of the exhaustive nature of input output tables – the essential databases for estimating multipliers – most countries undertake the necessary surveys only infrequently. Consequently data are often out of date.

While various forms of manipulation have been used to adjust such data (e.g. use of more recent national accounts data etc) none of these goes to the heart of the problem which is that relationships (not just quantities) may alter over time.

Typically the best that can be done is to take care in interpretation and look for ranges of estimate not point estimates.

### Employment Productivity

Typically employment multipliers are estimated on the basis of productivity estimates per unit of labour (usually FTE units). These are estimated (in the absence of other convenient means) by relating GDP output to labour force statistics – usually by simple ratio calculation.

This approach ignores changes in productivity per labour unit. The consequence is that should productivity improve over time (typically the case) then multipliers for FTE job creation may over estimate the labour requirements.

Some adjustments might be employed to counter this – e.g. downward adjustments based on productivity change statistics or like proxies. The problem with such attempts is that productivity statistics are usually aggregate in nature and results may therefore be somewhat crude.

It pays then to remember that the implicit assumption in using FTE estimates derived from this family of methods is that productivity alters in a linear fashion in a fixed ratio.

### Economies of Scope and Scale

While this is as much a conceptual as a technical issue, it is nonetheless technical in that the assumptions about economies of scope and scale become “buried” in the techniques (perforce) used in arriving at estimates.

In estimating economic impacts the implicit assumption tends to be that relationships are invariant to scale and apply regardless of the orders of magnitude being considered. That is unlikely to be the case where significant change is involved.

Equally EIA does not take any explicit account of likely alterations in scope which may have the effect of altering productivity and thus output.

Again there are no simple technical “fixes” for these problems. It pays then to remember that typical activities have a “threshold” below which they will not be viable and may not be undertaken, various “break points” or inflexions in the upward curve where economies of scale kick in and greater productivity is attained per unit of input (dollars or jobs) and perhaps “plateau points” beyond which no further economies of scale apply.

### Conclusion

EIA is and is likely to remain popular not least because as a potential political weapon it is potent, as a regulatory weapon it can be useful and as one of the very few means of demonstrating benefit as opposed to just cost in developments it can be powerful.

Providing limitations are recognised and analysts resist the temptation to “push it” beyond its design limits it remains a valid and legitimate tool.