



## AFBI IO Development and Multipliers

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Based on NISRA Supply and Use Tables (SUTs) for 2016 and data from DAERANI, the Systems Modelling unit at AFBI has been able to expand agriculture and food sectors within the Input-Output tables (IOTs). This was done through rebalancing NI SUTs with revised production and trade figures in the Agri-food sectors. The resultant table was used to calculate new multipliers for Industry-by-Industry (I<sub>XI</sub>) and Product-by-Product (P<sub>xP</sub>) IOTs for Northern Ireland. This publication brings the main results of multipliers for the NI Agri-food sectors.

IOTs capture the interdependencies between different economic sectors of a national/ regional economy. They have been used widely in the national/ regional policy analysis such as the calculation of GDP and economic impacts of events as well as public investments or programs. A simple and straightforward way to use the IOTs is to use its multipliers.

Input-Output multipliers are derived from the Leontief inverse. The multipliers represent the impact of producing one additional unit of final demand in one sector of the economy on the overall domestic economy. Such a change in the economy can have direct effects, indirect effects, and induced effects. The concept is based on following logic: If an economy, say NI, must produce an additional unit of final demand in a specific sector (e.g. wheat), the NI economy will need to

produce this extra unit of product with certain units of inputs (e.g. fertilisers, seeds, etc.). Note that inputs here are also products in upstream economic sectors in the supply chain. They can be met by either domestic and/ or external production. If this input is domestically supplied (e.g. fertilisers), demand for inputs for its upstream sector will also increase (i.e. fossil fuels and other inputs), and so forth. Thus, meeting one additional unit of demand in one sector will affect all sectors in the economy. The direct effect, as in this example, is the wheat production required. The indirect effect is the increase of production of inputs such as fertilisers etc. for wheat production, fossil fuels etc. for fertiliser production and so forth in the upstream of supply chain for the production of inputs, inputs of inputs etc.. Furthermore, as an extra unit of wheat is produced, farmers will increase their income. They may use a proportion of its increased income to increase their household consumption, which is called induced effect.

In the calculation of multipliers, the multipliers are classified into Type I and Type II multipliers, depending on the inclusion of induced effects. The output multiplier for an industry/ product is expressed as the ratio of direct and indirect (and induced if Type II multipliers) output changes to the direct output change. Broadly, these are represented in the equations below.

Type I multiplier = (Direct effect + Indirect effect) / Direct effect

Type II multiplier = (Direct effect + Indirect effect + Induced effect) / Direct effect

As we can see from table below the multiplier for the wheat sector is 1.45. This implies that to meet £1m of extra wheat demand in NI, other economic sectors in NI will boost for extra £0.45m of output.

In this briefing, we have used “industry” and “sector” interchangeably. As an industry usually produces several products as described in the Supply Table, we assume that there will be no difference in the structure of inputs required from that shown by the industry (an Industry Technology Assumption), or, conversely, assume that in producing secondary outputs an industry would need to use the inputs typically shown by the main industry producing the product in question (a Product Technology Assumption). The IOT developed by using an Industry Technology Assumption is an Industry-by-Industry (IxI) IOT and the one by a Product Technology Assumption is a Product-by-Product (PxP) IOT.

However, the use of a pure Product Technology Assumption may yield results that do not represent the economy well. In order to circumvent this, a combination of the two approaches mentioned above is used for the calculation of the multipliers in this publication. This is the Hybrid Technology Assumption. Herein, inputs to

some sectors may be assumed to have an Industry Technology Assumption, while the rest of the economy is assumed to have a Product Technology Assumption. This widely established method, which is used for producing IOTs of several European economies, has been employed to produce the multipliers below.

It is important to note that an IOT is only an approximate and linear representation of an economy in a given time. The multipliers calculated based on the IOTs are with many assumptions and have many limitations. These limitation and assumptions are discussed in many publications such as that in the NISRA website (<https://www.nisra.gov.uk/statistics/economic-accounts-project/analytical-input-output-tables>). It is important to use the multipliers with caution and only where appropriate.

### Type I Output Multipliers for agri-food sectors in NI

Industry / Product	By industry (Ixl)	By Product (PxP)
Wheat	1.45	1.49
Barley & Oats	1.43	1.43
Potatoes	1.45	1.45
Horticulture	1.44	1.44
Finished cattle and calves	1.86	1.85
Milk production	2.09	2.09
Finished sheep and lambs	1.78	1.78
Swine production	2.26	2.26
Poultry and egg production	2.33	2.33
Other	1.54	1.54
Agricultural Services	1.72	1.72
Forestry	1.26	1.26
Fishing	1.37	1.31
Mining and quarrying products	1.56	1.56
Beef & sheep meat (includes by-products)	2.10	2.03
Pig meat (includes by-products)	2.15	2.15
Poultry meat (includes by-products)	2.00	2.00
Fish & fish products	1.89	1.89
Fruit & vegetables	1.80	1.80
Dairy products	2.11	2.13
Bakeries and grain milling	1.70	1.67
Other food products	1.96	1.92
Prepared animal feeds	1.97	1.92
Beverages	1.57	1.60

Note: A hybrid approach is used in transforming Supply and Use Tables to the Ixl and PxP IOTs.

If you are interested in output multipliers in other economic sectors in NI from AFBI IO 2016, please contact [ziping.wu@afbini.gov.uk](mailto:ziping.wu@afbini.gov.uk).