Economic analysis of the agriculture and food sectors in Scotland using extended Input-Output analysis

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Executive summary

This note describes the scale of the agricultural sector in Scotland, as one part of the wider Food and Drink industry in Scotland. A disaggregation of the agricultural sector into red meat and non-red meat is conducted, and we discuss how extended Input-Output (IO) analysis can be used to analyse environmental issues associated with activity in these sectors.

This note is an intermediate output in the preparation of RESAS1.4.2ciii D3 "The economic impact of healthy eating as part of climate change policy" (due in 2017-18) which will be of considerable interest from a policy perspective as Scotland strives to meet its challenging Climate Change targets. The example that D3 will analyse is a reduction in consumption away from red-meat. Advocates of such a shift emphasise environmental benefits. But is there a benefit when system-wide ramifications are fully taken into account? This is an especially important question when the scenario is generalised to be a reallocation of consumption expenditures with a shift away from red meat, but combined with a compensating increase in spending on all other goods.

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The Scale of the Agricultural and Food Sectors in Scotland

Scottish Government (2016) Input-Output (IO) tables show the snapshot of activities within the Scottish economy in the year 2013. Fundamentally these offer a full analysis of the structure of economic activity and permit a detailed sectoral analysis to be undertaken (for the n = 98 sectors separately identified). Additionally, these accounts can be used for modelling the consequences of changes to the economy, using the interdependence between production and consumption to demonstrate the connectedness between these detailed sectors.

If we look solely at the Food and Drink industry (defined using the Scottish Government's "Growth Sector" definition as industrial classifications SIC 01, 03, 10 & 11), which includes the Agriculture sector, we can identify some high-level characteristics on the contribution to Scottish economic indicators. The Food and Drink industry comprises:

- Agriculture (SIC 01)
- Fishing and Aquaculture (SIC 03)[1]
- Manufacture of food products (SIC 10)[2]
- Manufacture of beverages (SIC 11)[3]

These categories combined to generate 4.2% of Scottish GVA and employment, and supply 2.3% of Scottish final demand (see Table 1). Clearly there are links between all these sectors with, say, final demand for e.g. sausages, being supplied by: a subset of Agriculture (Non-red Meat) supplying the Animal Feeds sector, which in turn supplies a different subset of the Agriculture sector (Red Meat), which then supplies the Meat Processing sector. An increase in demand for sausages then can be seen to spillover into increases in activity throughout the supply chain. Note however that there are also imports within this supply chain which vary across sectors and which therefore affect the levels of these spillovers that we see in other sectors.

A £1m increase in household demand[4] for the output for the Meat Processing sector (e.g. sausages) is associated (see Tables 2 & 3) with an increase in output from Meat Processing of £1.02m, an increase in output from Agriculture of £0.35m, and an increase in output across the whole economy of £1.66m (including the £1.02m and £0.35m contributions from Meat Processing and Agriculture). It is further associated with a total increase in GVA of £0.44m which includes an increase in wage income of £0.25m, and a total increase in employment of nearly 12 employees.

[1] Subdivided in the IO table as: Fishing (SIC 03.1), Aquaculture (SIC 03.2)

[2] Subdivided in the IO table as: Meat processing (SIC 10.1), Fish & fruit processing (SIC 10.2-3), Dairy products, oils & fats processing (SIC 10.4-5), Grain milling & starch (SIC 10.6), Bakery & farinaceous (SIC 10.7), Other food (SIC 10.8), Animal feeds (SIC 10.9).

[3] Subdivided in the IO table as: Spirits & wines (SIC 11.01-04), Beer & malt (SIC 11.05-06), Soft Drinks (SIC 11.07)

[4] Considering changes in household demand implies that we are looking at the Type I multipliers. We could also consider Type II multipliers in which changes in, for example, export demand can be considered and households then respond endogenously, with their own demand responding to the implied changes in income that they receive. In 1.4.2ciii D3 "The economic impact of healthy eating as part of climate change policy" we consider a(n exogenous) shift in household demand towards the healthy diet recommendations, and hence Type I multipliers are the appropriate multipliers to use.

Disaggregating the Agricultural sector into Red Meat and Non-red Meat allows us to further attribute some of these effects. After disaggregation, the above £1m increase in final demand for sausages is again (see Tables 4 & 5) associated with a total increase in output of £1.66m which includes a contribution of £1.02m from Meat Processing, but we now see that the £0.35m increase in the Agriculture sector is made up of £0.13m from Red Meat, and £0.22m from Non-red meat.

Disaggregation

The Agriculture sector comprises many heterogeneous activities: types of farming, quality of land, etc; the detail of which is lost when considering agriculture as a single sector. Further, in terms of climate change policy, both the emissions intensity and the putative policy instruments vary by farm type (see Scottish Government, 2017). In particular, red meat production has a higher emissions contribution per calorie produced than the production of other food. Given the usefulness of identifying Red Meat and Non-red Meat as distinct sectors then, this note demonstrates and implements a methodology for the disaggregation of the Agriculture sector. Of course, a detailed look at the Red Meat sector could be conducted in isolation and its carbon impacts examined. However, as noted in the Executive Summary, it is also important to fully consider the system wide impacts of changes in consumer demands. Investigating this in an IO framework will take full account of all the indirect impacts of such a demand shift on two key objectives of policy: economic activity and the environment. For this reason we disaggregate the Agriculture sector in the IO accounts to allow us separately to identify the red meat and non-red meat sub-sectors. A more complete disaggregation is clearly desirable for other applications, but is in no way precluded by starting with a simple 'Red Meat–Non-red Meat' disaggregation.

Moxey (2016) "An assessment of the economic contribution of Scotland's red meat supply chain" provides a starting point for disaggregating the Agriculture sector into Red Meat and Non-red Meat. This work draws upon the June 2016 Agricultural Census, the Farm Accounts Survey, and Input-Output tables, as well as data from the Quality Meat Scotland (QMS) trade association who commissioned that report.

Red Meat purchases from other sectors is a share of the (IO table) Agriculture sector purchases from other sectors, with the share based on figures from Table C5 of Moxey (2016)[5]. This table reports the estimated GVA "beyond farmgate arising from suppliers" to the Agriculture sector as a whole, and to Red Meat farms. Allocating Agriculture purchases (i.e. the Agriculture column in the IO table) to Red meat/Non-red Meat, based on these GVA figures is therefore akin to assuming that each sector supplies a homogenous good to both Red Meat and Non-red Meat sectors. The level of purchases from each sector by each of these two sub-sectors would therefore be linearly related to the GVA arising.

[5] Some of the resulting shares here are surprising – for example the Red Meat share of the Agriculture sector's purchases from the Animal Feeds sector is below its share for 'all other sectors'. This could be true though if a large percentage of Animal Feeds is going to poultry.

The level of Agriculture purchases from the Agriculture sector were split Red Meat–Non-red Meat by making this same assumption and using the GVA of these sectors from Tables B3 and B4 of Moxey (2016). If the Red Meat sector represents a share $0<x<1$ of the GVA of the whole Agriculture sector (so that Non-red Meat represents a share, 1-x), and total Agriculture purchases from Agriculture were y, then Red Meat purchases from Red Meat were estimated at yx^2, Red Meat purchases from Non-red Meat (and vice versa) estimated at $yx(1-x)$, and Non-red Meat purchases from Non-red Meat estimated at $y(1-x)^2$.

Table B3 & B5 of Moxey (2016) allows us to split the total intermediate input purchases, subsidies, GVA, and gross output of the Agriculture sector into Red Meat/Non-red Meat. This allows us to infer the split of imports by these sectors, as well as wage incomes and profits (assuming these are split in the same proportion across the two sub-sectors[6]).

Remaining assumptions needed to balance the IO Table:

- Share of Agriculture exports due to Red Meat: Table 1 shows that Agriculture exports 29% of its gross output, whereas Meat Processing exports 73% of its gross output. Assuming that the Red Meat portion of Agriculture is has same ratio of export demand to gross output as Meat Processing, would imply that the share of Agriculture exports that come from Red Meat is 61%[7].
- Total Red Meat intermediate demand, and components of Red Meat intermediate demand from Food and Drink sectors are chosen[8] so as to leave unaltered all the non-Agriculture Food and Drink sector multipliers.
- Components of Red Meat intermediate demand from non-Food and Drink sectors are determined as their pro-rata share of Agriculture intermediate demand from non-Food and Drink sectors.
- Total Red Meat final demand is then Gross Output less intermediate demand.
- Components of Red Meat final demand (other than exports as already calculated above) are determined as their pro-rata share of Agriculture final demand.

Employment levels in the Agriculture sector is split Red Meat–Non-red Meat based on figures from Table D3 of Moxey (2016)[9].

This allows us to generate an IO Table which has the Agriculture sector disaggregated into Red Meat–Non-red Meat. The multipliers associated with these two sectors are shown in Tables 4 & 5[10].

[6] Could perhaps instead assume wage rates are the same across the two sub-sectors and split wage incomes by employment numbers, leaving the gross operating surplus as a balancing item.

[7] These estimates and assumptions will be benchmarked against other data for the production of 1.4.2ciii D3 "The economic impact of healthy eating as part of climate change policy".

[8] Using Microsoft Excel's Solver tool.

[9] Note however that Moxey (2016) figure for total Agriculture employment, at 65,358, is almost double the figure implied by the Scottish Government IO table, at 39,778. These may differ due to self-employment, seasonal workers, farmers with additional jobs, etc. (and some reconciliation will be done for the production of 1.4.2ciii D3) but the figures produced by the IO team at Scottish Government do have the advantage of consistency with the national accounts.

[10] The Type I output multiplier for red meat is 1.392 (see Table 5). This should be compared with the ranges reported in Table E1 of Moxey (2016), drawn from previous international studies, of 1.2-2.4 for cattle, 1.5-2.3

Towards an Environmentally Augmented IO Framework

In its Leontief form (demand driven, with backwards linkages), an IO table is a matrix equation that equates the n element vector of sectoral gross outputs, X, with the vectors of sectoral intermediate, AX, and final, Y, demands i.e.

$$X = A \quad + Y \Longrightarrow X = (I - A)^{-1}Y$$

where A is an nxn matrix of coefficients, in which the ij-th entry describes how much of sector i's output is sold to sector j as an intermediate input, per unit of sector j gross output. A is calibrated using the published IO tables. Then, assuming production is Leontief and that prices are fixed, a change in final demand, ζY, will lead to a change in the outputs across all sectors of:

$$\Delta X = (I - A)^{-1}\Delta Y$$

Further, we can associate stocks or flows of other quantities with an IO system. The most obvious such item is employment, and this is done and reported in the Scottish Government tables. Anger et al (2014) report on a number of studies that associate environmental quantities with sector output in this form. For us, in 1.4.2ciii D3 "The economic impact of healthy eating as part of climate change policy", we primarily want to associate carbon emissions to sectoral outputs. If the vector C describes sectoral carbon emissions per unit gross output, then the aggregate impact of a change in final demand, ζY, upon total carbon emissions is:

$$C'\Delta X = C'(I - A)^{-1}\Delta Y$$

The pairwise multiplication of C and ζX gives the sectoral contribution of this impact, and this allows us to provide an attribution of the total impact into the direct effects (in this case the reduction caused directly by the fall in final demand for red meat) and indirect effects (reduced demand for red meat causes effects via the Red Meat sector's own purchases of inputs, which are associated with changes in demand and hence output in other sectors, which has knock-on implications for emissions from these other sectors).

Data for sectoral emissions in Scotland is available from Scottish Government (2016b). Further, we can also multiply the emissions for a sector by estimates of the social cost of carbon and quote a monetary cost of carbon emissions associated with economic activity in each sector. This same methodology could be used for other quantities such as energy inputs (in MWhrs/year), land area used (in km2), or ecosystem service flow values (in £/year) (from e.g. ONS, 2016), etc. One

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for pigs, and 1.4-1.9 for sheep, and with the range from Table E2 of Moxey (2016), drawn from Lloyd (2003), of 1.26-1.60 across the 3 animal types and across the 4 regions of Scotland. The Type I employment multiplier for red meat is 1.219 (see Table 5). This should be compared with the range reported in Table E1 of Moxey (2016), drawn from "previous international studies", of 1.5-2.7 for pigs, and with the range from Table E2 of Moxey (2016), drawn from Lloyd (2003), of 1.22-2.79 across the 3 animal types and across the 4 regions of Scotland. Note that we only report the Type I multipliers. This is because 1.4.2ciii D3 will model an exogenous shift in household demand, and Type I is the appropriate multiplier to consider in this case.

advantage of this method is that stocks or flows can be incorporated in the units that they are naturally quoted in, and which data is likely to be available in.

Note also however, that such a simple IO analysis is not the end of the analyses we can conduct, and that these simple calculations do have some problematic features.

- Firstly, simply associating a stock or a flow with a sector, performing standard IO analysis, and inferring the impact upon the stock or the flow, does not lead to any change in the economic impact calculated from the IO analysis as a result of incorporating this stock or flow. No economic constraints have been added[11].
- An alternative method is to ensure stocks or flows are expressed in monetary amounts, and create a sector that "supplies" this stock or flow, and incorporate a "demand" for this stock or flow from each of the sectors in the economy. Doing this will impose the constraint that, in the scenario generated in the IO analysis, we still have supply equals demand from this "new" sector. However, as a fully specified linear system of n equations in n unknowns, we cannot impose any additional constraints such as the level of the supply and demand in the scenario generated by the IO analysis being the same as in the data scenario. For example, land use could be modelled as a new sector with every sectors land rents estimated and paid to the land supply sector which supplies the land; an exogenous change in final demand for agricultural output would lead to changes across the economy that alter the supply and demand for land going to each sector; however we have no way to constrain the total value of land being supplied and demanded being unaltered, so the only way to rationalise a fixed supply of land is a change in land rents – which is contrary to the assumptions underlying IO modelling.

Given these problems with IO analysis for the wider incorporation of environmental quantities into models of the whole economy, we are investigating their incorporation in Computable General Equilibrium (CGE) models (see Comerford, 2017). This work will feed into 1.4.2ciii D4 (also due 2017-18)[12] and into future deliverables under this project in 2017-19 which will exploit linked ecosystem – economy-wide models.

Conclusion

[11] This is not a problem for an exercise with carbon emissions like 1.4.2ciii D3, since Scottish emissions do not feed back and affect Scottish economic activity – if economic activity is to be affected then it will be by global emissions, of which Scottish emissions are an insignificant part.

[12] 1.4.2ciii D4 will repeat the exercise of 1.4.2ciii D3 within the more complete CGE framework. In a CGE framework we can more naturally consider the impact of price or productivity changes. This allows us to compare the whole economic impact of the reduction in meat consumption being the equilibrium response to (1) a tax on meat policy; versus (2) a shift in consumer preferences; or (3) the adoption of new production practices that lower both productivity and emissions per unit produced (NB the difference between these scenarios is partly that revenues from the tax are recycled in the tax policy scenario - we can then look at the impact of different fiscal regimes as a point of added interest i.e. is government spending exogenous, or do we get to spend any extra revenues?). Different scenarios for what happens to excess supply in face of reduced demand can also be considered: rebound effect?; increased exports?; changes in meat production technology (e.g. shift to greater use of grass feed i.e. reduced feed inputs (imports), increased land use inputs per animal, increased quality (and price?), reduced supply for same total land input)?

This discussion note is an intermediate output in the delivery of RESAS1.4.2ciii D3 “The economic impact of healthy eating as part of climate change policy”. It shows a disaggregation of the Agriculture sector in the Scottish Government Input-Output tables and it describes how such a disaggregation can be used to tackle this question. Advocates of a policy to reduce red meat consumption can point to higher emissions per calorie of food produced in red meat production - but is there a benefit when system-wide ramifications are fully taken into account? The IO framework is appropriate for addressing such questions. It allows the question to modelled in a variety of ways e.g. a scenario in which red meat consumption is reduced may show system wide emissions reductions, but a scenario in which consumption shifts away from red meat and towards other consumption goods (such that total consumption expenditures are unchanged) may not. In both cases such modelling also allows an analysis not only of emissions reductions, but also of GDP and employment implications of policy, providing important additional information upon the two key objectives of a Sustainable Economic Growth policy: economic development (and its composition); and carbon emissions.

RESAS1.4.2ciii D3 “The economic impact of healthy eating as part of climate change policy” will illustrate the kind of analysis that an agriculture-disaggregated IO system, and an environmentally-augmented economy-wide approach can tackle. The note begins the discussion of how this work will be extended into CGE models and applied to other questions.

References

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Tables

Table 1 – Agriculture and Food & Drinks sectors in Scotland

	GVA	%Scot	Tax/Subsidy	Intermediate Imports	Intermediate Domestic Consumption	Gross Output	Intermediate Domestic Sales	Exports	%Scot	Other Final Demand	%Scot	Employment	%Scot
Agriculture	1,142	0.9%	46	1,013	863	3,064	1,244	889	1.4%	931	0.9%	39,778	1.8%
Fishing	74	0.1%	10	56	95	235	73	157	0.2%	6	0.0%	3,410	0.2%
Aquaculture	120	0.1%	4	126	233	483	142	337	0.5%	4	0.0%	4,049	0.2%
Meat processing	201	0.2%	-3	437	554	1,189	95	864	1.3%	230	0.2%	5,743	0.3%
Fish & fruit processing	305	0.2%	3	542	487	1,337	158	938	1.4%	241	0.2%	7,361	0.3%
Dairy products, oils & fats processing	130	0.1%	-3	220	335	682	98	346	0.5%	237	0.2%	2,670	0.1%
Grain milling & starch	19	0.0%	-0	32	35	87	16	63	0.1%	8	0.0%	251	0.0%
Bakery & farinaceous	408	0.3%	9	456	253	1,126	131	704	1.1%	290	0.3%	10,928	0.5%
Other food	214	0.2%	2	234	165	614	94	397	0.6%	124	0.1%	4,829	0.2%
Animal feeds	55	0.0%	3	99	58	214	53	134	0.2%	26	0.0%	975	0.0%
Spirits & wines	2,205	1.8%	107	886	820	4,018	211	3,628	5.6%	179	0.2%	9,335	0.4%
Beer & malt	107	0.1%	4	62	65	237	55	141	0.2%	41	0.0%	1,178	0.1%
Soft Drinks	170	0.1%	1	131	111	414	16	321	0.5%	77	0.1%	2,038	0.1%
Total	5,149	4.2%	183	4,295	4,074	13,700	2,388	8,919	13.8%	2,393	2.3%	92,544	4.2%

Table 2 – Sector Multipliers

Multipliers	Agriculture	Fishing	Aquaculture	Meat processing	Fish & fruit processing	Dairy products, oils & fats processing	Grain milling & starch	Bakery & farinaceous	Other food	Animal feeds	Spirits & wines	Beer & malt	Soft Drinks
Agriculture	1.1017	0.0012	0.0026	0.3529	0.0671	0.3855	0.2900	0.0155	0.0972	0.0767	0.0111	0.0170	0.0062
Fishing	0.0001	1.0000	0.0000	0.0001	0.0530	0.0001	0.0003	0.0004	0.0003	0.0003	0.0001	0.0000	0.0004
Aquaculture	0.0001	0.0000	1.1714	0.0001	0.0585	0.0001	0.0004	0.0004	0.0004	0.0003	0.0001	0.0001	0.0005
Meat processing	0.0022	0.0022	0.0025	1.0227	0.0014	0.0012	0.0015	0.0043	0.0102	0.0118	0.0003	0.0005	0.0024
Fish & fruit processing	0.0008	0.0003	0.0005	0.0014	1.0405	0.0008	0.0061	0.0070	0.0058	0.0053	0.0011	0.0006	0.0086
Dairy products, oils & fats processing	0.0001	0.0002	0.0003	0.0005	0.0031	1.0239	0.0014	0.0176	0.0103	0.0032	0.0002	0.0003	0.0021
Grain milling & starch	0.0001	0.0000	0.0001	0.0006	0.0003	0.0002	1.0027	0.0052	0.0006	0.0067	0.0010	0.0015	0.0000
Bakery & farinaceous	0.0002	0.0020	0.0015	0.0007	0.0020	0.0003	0.0012	1.0070	0.0027	0.0017	0.0004	0.0006	0.0023
Other food	0.0003	0.0011	0.0009	0.0028	0.0065	0.0010	0.0047	0.0138	1.0179	0.0053	0.0012	0.0020	0.0154
Animal feeds	0.0155	0.0000	0.0115	0.0050	0.0016	0.0057	0.0041	0.0004	0.0015	1.0021	0.0002	0.0003	0.0001
Spirits & wines	0.0006	0.0003	0.0010	0.0008	0.0009	0.0007	0.0007	0.0005	0.0006	0.0010	1.0076	0.0052	0.0005
Beer & malt	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0006	0.0037	1.0014	0.0000
Soft Drinks	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	1.0009

Table 3 – Total Multipliers

Total Multipliers	Gross Output	Income Effect	GVA Effect	Employment Effect	Income Multiplier	GVA Multiplier	Employment Multiplier
Agriculture	1.388	0.203	0.550	16.843	1.800	1.476	1.297
Fishing	1.596	0.219	0.554	18.261	3.116	1.765	1.261
Aquaculture	1.741	0.204	0.537	13.618	3.367	2.157	1.626
Meat processing	1.655	0.248	0.435	11.930	1.933	2.580	2.469
Fish & fruit processing	1.542	0.291	0.440	10.416	1.607	1.932	1.891
Dairy products, oils & fats processing	1.689	0.272	0.470	11.346	1.829	2.474	2.896
Grain milling & starch	1.571	0.252	0.457	8.883	1.738	2.054	3.070
Bakery & farinaceous	1.321	0.398	0.499	12.246	1.258	1.377	1.261
Other food	1.378	0.375	0.508	11.391	1.305	1.462	1.449
Animal feeds	1.375	0.257	0.422	7.591	1.509	1.649	1.666
Spirits & wines	1.283	0.325	0.684	4.666	1.307	1.246	2.008
Beer & malt	1.376	0.343	0.629	8.031	1.465	1.395	1.618
Soft Drinks	1.367	0.441	0.583	8.154	1.328	1.418	1.657

Table 4 – Disaggregated Sector Multipliers

Disaggregated Multipliers	Red Meat	Other Agriculture	Fishing	Aquaculture	Meat processing	Fish & fruit processing	Dairy products, oils & fats processing	Grain milling & starch	Bakery & farinaceous	Other food	Animal feeds	Spirits & wines	Beer & malt	Soft Drinks
Red Meat	1.0419	0.0393	0.0005	0.0010	0.1344	0.0256	0.1468	0.1104	0.0059	0.0370	0.0292	0.0042	0.0065	0.0024
Other Agriculture	0.0639	1.0599	0.0008	0.0016	0.2185	0.0416	0.2387	0.1796	0.0096	0.0602	0.0475	0.0068	0.0105	0.0038
Fishing	0.0001	0.0001	1.0000	0.0000	0.0001	0.0530	0.0001	0.0003	0.0004	0.0003	0.0003	0.0001	0.0000	0.0004
Aquaculture	0.0001	0.0001	0.0000	1.1714	0.0001	0.0585	0.0001	0.0004	0.0004	0.0004	0.0003	0.0001	0.0001	0.0005
Meat processing	0.0021	0.0023	0.0022	0.0025	1.0227	0.0014	0.0012	0.0015	0.0043	0.0102	0.0118	0.0003	0.0005	0.0024
Fish & fruit processing	0.0007	0.0008	0.0003	0.0005	0.0014	1.0405	0.0008	0.0061	0.0070	0.0058	0.0053	0.0011	0.0006	0.0086
Dairy products, oils & fats processing	0.0001	0.0001	0.0002	0.0003	0.0005	0.0031	1.0239	0.0014	0.0176	0.0103	0.0032	0.0002	0.0003	0.0021
Grain milling & starch	0.0001	0.0001	0.0000	0.0001	0.0006	0.0003	0.0002	1.0027	0.0052	0.0006	0.0067	0.0010	0.0015	0.0000
Bakery & farinaceous	0.0002	0.0002	0.0020	0.0015	0.0007	0.0020	0.0003	0.0012	1.0070	0.0027	0.0017	0.0004	0.0006	0.0023
Other food	0.0002	0.0003	0.0011	0.0009	0.0028	0.0065	0.0010	0.0047	0.0138	1.0179	0.0053	0.0012	0.0020	0.0154
Animal feeds	0.0144	0.0161	0.0000	0.0115	0.0050	0.0016	0.0057	0.0041	0.0004	0.0015	1.0021	0.0002	0.0003	0.0001
Spirits & wines	0.0006	0.0006	0.0003	0.0010	0.0008	0.0009	0.0007	0.0007	0.0005	0.0006	0.0010	1.0076	0.0052	0.0005
Beer & malt	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0006	0.0037	1.0014	0.0000
Soft Drinks	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	1.0009

Table 5 – Total Disaggregated Multipliers

Total Disaggregated Multipliers	Gross Output	Income Effect	GVA Effect	Employment Effect	Income Multiplier	GVA Multiplier	Employment Multiplier
Red Meat	1.392	0.226	0.579	22.114	1.679	1.450	1.219
Other Agriculture	1.385	0.189	0.532	13.623	1.901	1.494	1.389
Fishing	1.596	0.219	0.554	18.261	3.116	1.765	1.261
Aquaculture	1.741	0.204	0.537	13.618	3.367	2.157	1.626
Meat processing	1.655	0.248	0.435	11.930	1.933	2.580	2.469
Fish & fruit processing	1.542	0.291	0.440	10.416	1.607	1.932	1.891
Dairy products, oils & fats processing	1.689	0.272	0.470	11.346	1.829	2.474	2.896
Grain milling & starch	1.571	0.252	0.457	8.883	1.738	2.054	3.070
Bakery & farinaceous	1.321	0.398	0.499	12.246	1.258	1.377	1.261
Other food	1.378	0.375	0.508	11.391	1.305	1.462	1.449
Animal feeds	1.375	0.257	0.422	7.591	1.509	1.649	1.666
Spirits & wines	1.283	0.325	0.684	4.666	1.307	1.246	2.008
Beer & malt	1.376	0.343	0.629	8.031	1.465	1.395	1.618
Soft Drinks	1.367	0.441	0.583	8.154	1.328	1.418	1.657