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Impacts of pricing agricultural emissions on the wider economy and rural communities

Key points

- This paper illustrates statistically how pricing of agricultural emissions could affect industries upstream and downstream of agriculture, and the communities where they are located.
- It assumes that the agricultural emissions pricing regime outlined in the consultation document is implemented.
- Three upstream industries (Fertiliser and pesticides, Veterinary services, and Agriculture support services) can be said to be critically dependent on sheep, beef and dairy farming).
- Virtually all of the outputs of sheep, beef and dairy farming go to just two downstream industries: Meat processing and Dairy processing.
- It is estimated that 54,607 jobs in the key upstream and downstream industries nationally are vulnerable, if agricultural emissions become subject to pricing. This excludes vulnerable on-farm employment in sheep, beef and dairy farming, which, together, employ a further 44,500 people.
- Five Districts in New Zealand have more than 40% of their total employment in the vulnerable upstream and downstream industries, and in sheep, beef and dairy farming. The equivalent proportions are 30-40% in 6 other Districts, and a 20-30% in a further 10 Districts.
- Exactly how large, and where, the employment losses will be is uncertain. However, based on the scenario in the consultation document of a 6-7% income loss to dairy farming and a 18-24% income loss in sheep and beef farming, the losses will be large.
- Some Districts that specialise in sheep and beef farming, and also have a meat works, will be especially hard hit. Some meat works are likely to close.
- Any employment losses resulting from the introduction of pricing agricultural emissions will have flow-on effects into other parts of local economies (e.g. local public and private services) because incomes and spending power will be lost.
- Some communities will be devasted, and some are likely to become unviable through employment and population loss.
- There might be some offsetting impacts from the alternative land uses to replace sheep, beef and dairy farms that are lost but, at minimum, affected local economies will experience very large upheaval.
- If pricing of agricultural emissions is introduced, it will require a very strong policy response to mitigate the community level harms. Relying on offsetting impacts associated with alternative land uses, and the hope that remaining sheep and beef exports will attract premium prices on world markets, is unlikely to secure a just transition for the communities affected.

Introduction

The government's consultation document on pricing agricultural emissions goes into some detail about how agriculture itself is likely to be affected by the imposition of payments by farmers for the greenhouse gas emissions from their farms. But, while it acknowledges that any direct effects on farming activity are likely to be associated with indirect effects on upstream and downstream industries (i.e. industries supplying and purchasing from agriculture), it says virtually nothing about what the distribution and magnitude of these indirect effects might be.

Similarly, while the consultation document acknowledges that there is the potential for pricing of agricultural emissions to result, amongst other things, in a reduction in employment and de-population in some rural communities, it shies away from exploring where and how large these community impacts might be.

This note presents the results of an analysis, designed to do what the consultation did not: illustrate statistically how pricing of agricultural emissions could have impacts on industries upstream and downstream of agriculture, and on the communities where they are located. The analysis focuses on the potential flow-on effects of changes in activity levels in sheep, beef and dairy farming.

Impacts on upstream and downstream industries

Upstream industries

The financial interactions between any industry in the economy, and the industries upstream and downstream from that industry, are described in the New Zealand Input-Output tables, produced by Statistics New Zealand. The tables show the sales and purchase relationships between 108 different industries, and latest version edition is for 2020.

The first two tables below are based on data taken from the Input-Output tables.

Table 1 illustrates the extent to which key industries upstream of sheep, beef and dairy farming are dependent on sheep, beef and dairy farming for their sales. The first column of data in the table shows the share of the various industries total sales that are to sheep, beef and dairy farming, and it might be said that at least the first three upstream industries are critically dependent on sheep, beef and dairying. It follows that these three upstream industries listed would be hard hit by a reduction in sheep, beef and dairy farming activity, following the imposition of emissions charging. The seven other upstream industries would also be significantly affected, albeit to different extents.

The second column of data in Table 1 shows the dollar value of sales to sheep, beef and dairy farming by the top 10 most dependent upstream industries[1]. In combination, these 10 industries had sales worth $5.6 billion to sheep, beef and dairy farming (slightly more to dairy farming than to sheep and beef), representing 55% of all purchases by sheep, beef and dairy farming from other New Zealand industries.

Table 1 Upstream industries most dependent on Sheep, beef and dairy farming for their sales

Upstream industry	Value of sales to sheep, beef and dairy as a share of the industry's total sales, %	Value of sales to sheep, beef and dairy farming, $m
Fertiliser & pesticide manufacturing	46.2	636
Veterinary & other professional services	31.3	189
Agriculture, forestry, & fishing support services	29.5	1,404
Pharmaceutical, cleaning, & other chemical mfg	19.0	128
Poultry, deer, & other livestock farming	12.3	108
Basic material wholesaling	11.2	432
Building cleaning, pest control, & other support services	10.3	406
Other goods & commission-based wholesaling	10.2	331
Sheep, beef & dairy cattle farming	8.4	1,876
Pharmaceutical & other store-based retailing	8.1	59

Source: Statistics New Zealand, Input-output tables 2020 – inter-industry transactions

[1] The input-output tables indicate that, in total, around 60 industries provide inputs into sheep, beef and dairy farming, but the dollar value of inputs from most of these is relatively small.

Another feature of the table is that it shows sheep, beef and dairy farming as having the largest sales to itself. This is mainly the result of inter-farm stock sales.

It should be noted that the data in the table above includes inputs into grain farming because the Input-Output tables combine grain farming with sheep, beef and dairy farming. However, based on the land area used, the sheep, beef and dairy farming industry is around 10 times the size of the grain farming industry. This implies that the exclusion of grain farming from the data would make relatively little qualitative difference to what table 1 shows.

Downstream industries

The first column of table 2 expresses the extent to which the 10 most dependent downstream industries[2] rely on sheep, beef and dairy farming for their purchases. Unsurprisingly, it implies that the dairy and meat processing industries are overwhelmingly dependent on sheep, beef and dairy farming, and it follows that they would be very hard hit by a reduction in sheep, beef and dairy farming activity, following the imposition of emissions pricing.

The second column of data in the table shows the dollar value of purchases from sheep, beef and dairy farming by the 10 most dependent downstream industries. In combination, these 10 industries had purchases of $22.2 billion from sheep, beef and dairy farming, representing virtually of all of the purchases (99.5%) by other New Zealand industries from sheep, beef and dairy farming. In fact, the three largest purchasing industries accounted for 96.2% of all the purchases from sheep, beef and dairy farming.

Table 2 Downstream industries most dependent on Sheep, beef and dairy farming for their purchases

Downstream industry	Value of purchases from sheep, beef and dairy as a share of the industry's total purchases, %	Value of purchases from sheep, beef and dairy farming, $m
Dairy product manufacturing	67.4	13,476
Meat & meat product manufacturing	59.5	6,071
Textile & leather manufacturing	28.8	285
Sheep, beef cattle, & grain farming	15.5	1,876
Poultry, deer, & other livestock farming	8.7	104
Fruit, oil, cereal, & other food product mfg	2.9	158
Horticulture & fruit growing	2.4	74
Agriculture, forestry, & fishing support services	2.1	58
Local government administration services	1.2	11
Beverage & tobacco product manufacturing	1.1	40

Source: Statistics New Zealand, Input-output tables 2020 – inter-industry transactions

The same caveats about grain farming as applied to table 1 also apply to table 2.

Effects on rural communities

The next two tables use 2020 employment counts[3] from Statistics New Zealand. Table 3 simply presents national level employment counts in the 10 most dependent upstream and downstream industries identified in tables 1 and 2, respectively. Excluding sheep, beef and dairy farming itself,

[2] The input-output tables indicate that, in total, around 30 industries buy the outputs of sheep, beef and dairy farming, but that most of these have a very small dollar value.

[3] The employment counts here include all wage and salary earners, except those in very small businesses with an annual GST turnover of less than $30,000.

the national employment count in the most dependent upstream industries is 105,200, while the corresponding figure for the most dependent downstream industries is 178,240.

Table 3 Employment in the most dependent upstream and downstream industries

Upstream industries	Employment count
Sheep, beef cattle & dairy farming	44,500
Agriculture, forestry, & fishing support services	29,200
Other goods & commission based wholesaling	23,600
Basic material wholesaling	22,000
Pharmaceutical & other store based retailing	12,000
Poultry, deer, & other livestock farming	6,820
Veterinary & other professional services	5,900
Fertiliser & pesticide manufacturing	2,200
Pharmaceutical, cleaning, & other chemical manufacturing	2,200
Building cleaning, pest control, & other support services	1,300
Total upstream industries	149,720

Downstream industries	Employment count
Sheep, beef cattle & dairy farming	44,500
Local government administration services	36,400
Meat & meat product manufacturing	31,900
Horticulture & fruit growing	30,900
Agriculture, forestry, fishing support services	29,200
Dairy product manufacturing	17,100
Beverage manufacturing	10,700
Textile & leather manufacturing	7,900
Fruit, oil, cereal, & other food product manufacturing	7,320
Poultry, deer, & other livestock farming	6,820
Total downstream industries	222,740

Source: Statistics New Zealand – Business Demography statistics

Table 4 presents estimates of the number of jobs in the upstream and downstream industries that could be vulnerable, following the introduction of agricultural emissions pricing. The numbers in the table are based on multiplying the employment counts for the most dependent upstream and downstream industries, from Table 3, by the corresponding sales and purchase shares from Tables 1 and 2. So, for example, Table 3 shows that there is an upstream and downstream employment count of 29,200 in Agriculture, forestry and fishing support services, while Table 1 shows that 29.5% of the sales from this industry are to Sheep, beef and dairy farming, while Table 2 shows that 2.1% of the purchases by this industry are from Sheep, beef and dairy farming.

It is emphasised that, in this context, 'vulnerable' means exposed to impacts from the introduction of pricing of agricultural emissions. The actual magnitude of the impacts will depend on exactly what pricing regime is implemented.

Table 4 implies that, excluding vulnerable employment in sheep, beef and dairy farming itself, vulnerable employment in the most dependent upstream industries totals 18,131 at national level. The corresponding total for the most dependent downstream industries is 36,476. Accordingly, 54,607 jobs nationally are vulnerable, if agricultural emissions become subject to pricing.

In combination, the three upstream and downstream industries that have the most vulnerable employment (i.e. Meat processing, Dairy processing, and Agriculture support services) account for almost three-quarters (72.7%) of all employment in vulnerable industries. Using Statistics New Zealand's Business Demography data, it is possible to identify the Districts within New Zealand where the vulnerable employment is located. But it should be explained that, in order to simplify the calculations, only the various Districts' employment in the national top three vulnerable upstream and downstream industries was used.

Table 4 Vulnerable employment in the most dependent upstream and downstream industries

Upstream industries	Employment count
Agriculture, forestry, and fishing support services	8,602
Sheep, beef cattle and dairy farming	3,738
Basic material wholesaling	2,457
Other goods and commission based wholesaling	2,410
Veterinary and other professional services	1,849
Fertiliser and pesticide manufacturing	1,015
Pharmaceutical and other store based retailing	974
Poultry, deer, and other livestock farming	270
Pharmaceutical, cleaning, and other chemical manufacturing	418
Building cleaning, pest control, and other support services	134
Total upstream industries	21,869

Downstream industries	Employment count
Meat and meat product manufacturing	18,976
Dairy product manufacturing	11,518
Sheep, beef cattle and dairy farming	6,898
Textile and leather manufacturing	2,274
Horticulture and fruit growing	731
Agriculture, forestry, and fishing support services	627
Poultry, deer, and other livestock farming	596
Local government administration services	432
Fruit, oil, cereal, and other food product manufacturing	211
Beverage manufacturing	112
Total downstream industries	42,374

Source: Derived from tables 1 ,2 and 3

The Districts with the largest shares of their total employment in the main vulnerable industries are shown in Table 5, and it will be noted that they tend to be the same Districts where sheep, beef and dairy farming are important. It should also be noted that the vulnerable employment shown in the table is over and above vulnerable on-farm employment in sheep, beef and dairy farming.

What the table implies is that some District economies could be devasted by a reduction in upstream and downstream activity, following the introduction of agricultural emissions pricing. Even worse, the devastation is likely to be concentrated on certain communities within the Districts, especially where local meat works and/or dairy plants are closed. Rationalisation of capacity is likely, if farm output is reduced.

There are also likely to be job losses and business closures within the Agriculture, forestry and fishing support services. Businesses in this industry are generally SMEs, because they include operations such as fencing, fertilising and shearing contractors.

Table 5 Districts where there is **most vulnerable upstream and downstream employment**

(20 Districts where the share of total employment in vulnerable industries is at least 10%)

Territorial Authority area	Total employment count	Employment count in the key vulnerable industries	Share of total employment in vulnerable industries, %
South Taranaki	12,400	3,550	28.6
Southland	16,500	4,190	25.4
Clutha	8,800	2,130	24.2
Wairoa	3,250	770	23.7
Central Hawke's Bay	6,300	1,400	22.2
Matamata-Piako	15,500	3,320	21.4
Rangitikei	6,000	1,180	19.7
Waimate	2,700	530	19.6
Waitomo	4,800	920	19.2
Tararua	6,000	1,090	18.2
Western Bay of Plenty	17,300	3,116	18.0
Hurunui	5,300	840	15.8
Gore	6,600	1,030	15.6
Westland	4,400	685	15.6
Opotiki	3,400	520	15.3
Waitaki	10,400	1,580	15.2
Carterton	3,100	455	14.7
Manawatu	9,500	1,183	12.5
Ashburton	17,300	2,112	12.2
Waikato	20,200	2,220	11.0

Adding the on-farm impacts

The employment numbers shown in Table 3-5 are only for the key upstream and downstream industries.

Table 6 adds direct employment in sheep, beef and dairy farming to vulnerable employment in the upstream and downstream industries to provide a broader account of vulnerable employment. The table shows that there are 5 Districts where broader vulnerable employment is more that 40% of total employment in those Districts. It also identifies a further 6 Districts where broader vulnerable employment is greater than 30% of the District total, and a further 10 Districts where broader vulnerable employments is more than 20% of the District total. Many of the Districts shown are remote from large population centres, where there are alternative employment and business opportunities.

Table 6 Districts where there is **most vulnerable direct, upstream and downstream employment**

(21 Districts where the share of total employment in vulnerable industries is at least 20%)

Territorial Authority area	Total employment count	Employment count in the key vulnerable industries	Share of total employment in vulnerable industries, %
Southland	16,500	8,290	50.2
Waimate	2,700	1,320	48.9
Clutha	8,800	4,130	46.9
Wairoa	3,250	1,425	43.8
South Taranaki	12,400	5,250	42.3
Rangitikei	6,000	2,380	39.7
Central Hawke's Bay	6,300	2,360	37.5
Tararua	6,000	2,230	37.2
Waitomo	4,800	1,650	34.4
Hurunui	5,300	1,820	34.3
Matamata-Piako	15,500	4,750	30.6
Ashburton	17,300	4,780	27.6
Gore	6,600	1,720	26.1
Otorohanga	3,450	880	25.5
Waitaki	10,400	2,600	25.0
Carterton	3,100	735	23.7
Manawatu	9,500	2,133	22.5
Westland	4,400	980	22.3
Opotiki	3,400	735	21.6
Western Bay of Plenty	17,300	3,616	20.9
Kaipara	6,800	1,360	20.0

How large, and where, will the negative impacts actually be?

The magnitude of the negative impacts described above will depend on the effects that the introduction of agricultural emission pricing will have on activity levels and revenues within sheep, beef and dairy farming. Modelling results shown in the consultation document on pricing agricultural emissions indicate that net revenues in the dairy farming sector could drop by 6-7%, while net revenues in the sheep and beef sector could drop by between 18% and 24%.

These results imply that the negative impacts will be concentrated in the upstream and downstream industries that are more orientated towards sheep and beef farming, than towards dairy farming. They also imply that harms at community level will be felt much more in the Districts where meat product and meat manufacturing is located. The actual geographical distribution of the likely harms is, however, unpredictable. There are currently 40 or so meat works in New Zealand, and it seems inevitable that some will closed, if sheep and beef farming contracts to the extent indicated in the consultation document.

On top of all this, reductions in on-farm employment and in the important upstream and downstream industries are likely to be multiplied throughout the communities, as aggregate incomes drop. Important community service activities, such as schooling, healthcare and retailing, could become unsustainable, and it is not hyperbole to claim that whole communities could become unviable though employment and population loss.

Put bluntly, some communities will be devasted by the introduction of pricing agricultural emissions.

It is also unlikely that the magnitude of the negative impacts on the upstream and downstream industries will be directly proportional to the reduction in net farm revenues, following the introduction of agricultural emissions pricing. If the surviving farms were to reduce their purchases from upstream industries, the negative upstream impacts would be more-than-proportional. However, they could conceivably be less-than-proportional, if it were possible for the surviving farms to reduce their costs by outsourcing more on-farm tasks.

Offsetting impacts

Lastly, it is appropriate to acknowledge that there would be some offsetting gains, following the introduction of emissions pricing. The consultation document suggests that these gains would arise from the adoption of alternative new land uses, such as forestry, arable farming and horticulture, which would have their own upstream and downstream effects. Of the possible alternative land uses, forestry seems the most likely, given that farm net revenue losses consequent to emissions pricing are more likely to occur in sheep and beef farming than in dairy farming.

However, whether the alternative land uses will fully compensate for the economic losses from a reduction in sheep, beef and dairy farming activity is uncertain. What is less uncertain is that changes is land use will, at best, be highly disruptive to the affected communities.

Conclusions

Noting that some communities will be devastated by the introduction of pricing agricultural emissions, it will be important to ensure that there is a strong policy response to mitigate the harms that will be experienced. Relying on offsetting impacts associated with alternative land uses, and the hope that remaining sheep and beef exports will attract premium prices on world markets, is unlikely to secure a just transition for the communities affected.

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