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We're Not Out of the Woods Yet!

Introduction

There has been much speculation in the last few years about the increasing employment and GDP associated with the service industries and the general decline in manufacturing and the traditional resource sectors, forestry in particular. While this is true to some extent and a long-term transition may be underway, it is far too soon to write off the forestry sector as a vital contributor to the provincial economy. It is the intention of this article to examine the provincial economy from an input-output (IO) perspective that takes into account the purchases that industries make from each other. For example, changes in lumber sales will have immediate (direct) effects on the sawmill industry, but also less immediate (indirect) effects on the logging industry, the transportation industry, and any other industries which provide inputs to the sawmill industry.

The Traditional Way

The standard way of looking at the economy is to assign GDP, employment or some other measure of activity to each industry as it occurs. This is the perspective taken by the BC Economic Accounts, and it is from this perspective that the observation is generally made that dependence on services is increasing while resource-based industries are in decline.

The IO Way

The IO way of looking at the economy is to assume that final demands are what drive the economy, and that industries that make the goods and services purchased to satisfy those final demands should be allocated to the industry meeting the final demand. (In economics, the term "final demand" normally includes exports of both goods and services, personal expenditures by tourists, capital expenditures by business and government, and personal expenditures by residents.) When this is done in a consistent way, the results still add up to 100% but they are, in a sense, more meaningful because they take into account the dependence which industries have on each other. In simple terms, these results reveal that many of the service sector jobs would not exist without the resource industries.

It should be evident that the IO way of looking at the economy is very much "demand driven" – that is, we assume that demands are paramount and that all economic activity occurs in order to meet those demands. However, in recent times we have become more aware of "supply constraints" – there may be demands which cannot be met because there are not enough unharvested trees, or not enough fish in the sea. From our demand-based perspective logging is dependent on demand for logs, either as exports or from the wood-processing industries. The alternate supply-side view would be that sawmills are dependent on logging for the supply of raw materials. However, whichever way this dependence is viewed, the fact remains that these industries depend on each other and neither can exist independently. Perhaps more to the point, the transportation activities that move raw

materials to factories and manufactured products to markets cannot occur without those products, and we are certainly nowhere near the point where manufacturing activity is constrained by "shortages" of transportation services.

Some Results

The table below shows the 1996 percent share of provincial GDP and jobs attributable to the integrated forest sector (logging, lumber, value-added, pulp and paper) depending on the attribution assumption made. 1996 was selected because that is the most recent year for which the required IO data is available.

	GDP	Jobs
Direct	**9.2**	**6.7**
Direct + Indirect	**10.9**	**8.5**
Direct + Indirect + Capital Expenditures	**11.2**	**8.8**
Direct + Indirect + Capital Expenditures + Spending of Incomes Earned	**17.1**	**14.6**

As noted earlier, the direct share is based simply on activity in the industry itself. The indirect share also counts those activities which supply goods and services to the direct activity; for example, the transportation services that move raw fibre to mills. The Capital Expenditures attribution allocates activities in manufacturing and construction resulting from capital spending by business to those industries doing the spending rather than the industries providing the services or equipment. With this re-allocation, manufacturers of logging equipment become part of the forest sector

Finally, the "Spending of Incomes Earned" allocates activities resulting from spending by residents to the industries in which they earned the income. One implication of this is that employment and GDP generated by millworkers who take their vacations in BC is allocated, not to the tourism sector, but to the forest sector. However, using the same reasoning, the employment and GDP generated by the hotel manager who buys lumber to build a deck is allocated not to the forest sector, but to tourism.

It is important to note that these re-allocations do not necessarily make the share increase for all industries given that the percent shares will always have to add up to 100 for the entire economy. For example, in going from Direct to Direct + Indirect, the forest sector gains some activity because of the purchases it makes from other industries (such as the chemicals bought by the pulp and paper mills), but it also loses some activity because of the goods and services which it provides to other industries (such as the lumber used for residential construction in BC) – it's just that the former outweighs the latter. The same kind of reasoning applies to the other reallocations – in each case something is gained and something is lost – it just happens that in the case of the forest sector what is gained through reallocation exceeds what is lost.

The figures in the final row of the table mean that one of out every 7 jobs in the province is strongly dependent on the forest sector, and one in every $6 of GDP is similarly dependent.

Some Historical Results

In 1990 a similar study was carried out by BC Stats, using the IO model available at that time. This model was based on data for the year 1984. It is interesting to compare the results from that study with the situation

in 1996, the most recent year for which we have data. Unfortunately, the earlier study did not reallocate Capital Expenditures, so the only comparison we can make excludes this re-allocation. The following table displays both 1996 and 1984 (in parentheses) percent shares for the forest sector under three different allocation assumptions.

Forest Sector Impacts	GDP	Jobs
Direct	**9.2 (8.2)**	**6.7 (7.6)**
Direct + Indirect	**10.9 (10.4)**	**8.5 (9.4)**
Direct + Indirect + Spending of Incomes Earned	**16.5 (16.2)**	**14.0 (15.4)**

The figures in the above table show that:

(1) Shares of employment have fallen from 1984 to 1996 for all reallocation assumptions whereas GDP shares have risen over the same period. This probably reflects the technological shifts in the industry which result in fewer jobs but relatively higher wages.

(2) Even though job shares have declined, the decrease is probably less than many people would have thought.

Other Industries

The research on which these results are based was carried out for all industries in the BC economy. There is not space in this brief article to present and discuss them all, but the following table may be of interest for comparison with the forest sector.

	GDP		Jobs	
Sector	**Direct**	**Total**	**Direct**	**Total**
Mining & Minerals	3.2	5.7	1.2	4.3
Tourism	4.8	4.8	6.8	5.5
High Tech	4.8	2.5	5.6	2.6
Forestry	9.2	17.1	6.7	14.6

In the above table, the Direct share is just a measure of the amount of in-industry activity. The Total share is estimated after all of the re-allocations suggested by the IO way of describing the economy. This can be confirmed by examining the numbers in the Forestry row and comparing with the figures in the table on Page 2.

It can be seen from the above table that the resource sectors increase significantly under this perspective; Tourism essentially holds its own with respect to GDP and loses some ground in the share of employment, and High Tech's shares are reduced because the services that it provides to other industries meeting final demands outweigh the purchases that it makes from other industries in order to deliver its own products to final users. In effect, this analysis views High Tech more as a process that supports other industries rather than a producer of final products itself.

Further Work

It may be thought that this research has considered all possible re-allocations of activity. However, in fact there are a least two more ways in which the economy can be "shared out" to the industries that comprise it.

The first of these is one that may not be evident from the foregoing discussion. The IO database and model value all commodities at "producers' prices" and one

implication of this is that the natural way of looking at the economy from an IO perspective allocates the trade and transportation margins associated with the delivery of final products to the trade and transportation industries. But it is certainly arguable that these "downstream marginal activities" should be allocated to the industries that produce the products in the first place.

The second of these is that the public sector, including government and public health and education, make up a significant share of the economy by any of the measures discussed. (Roughly, 16% of both employment and GDP directly, and approximately 37% when the total shares are evaluated as proposed in this article.) But these activities are funded at least partially by taxes paid on incomes earned in industries which meet final demands. It should be possible to allocate to those industries the public sector activities which are funded by them.

Further research will examine these issues.