RESEARCH NOTE/NOTE DE RECHERCHE

INCOME AND EMPLOYMENT MULTIPLIERS FOR A SMALL B.C. COASTAL REGION

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In the early 1970s the Canadian Department of the Environment initiated a Salmon Enhancement Program designed to double the 1973 Canadian salmon catch. This paper proposes a multiplier methodology which will be of use in the construction of estimates of the economic impacts of increased fish landings upon small coastal regions. Specifically, the exercise is that of constructing regional income and employment multipliers to estimate the economic impact of a short term doubling of the catch of the adjacent off-shore salmon fishing in the Tofino/Ucluelet region on the west coast of British Columbia's Vancouver Island. The population of the two towns, approximately 15 miles apart, and the immediately surrounding area is roughly 3,000.

Income Multipliers

In attempting to trace the flows of expenditures within a small region that result from the stimulus of an increase in locally harvested and processed fish, it was considered essential to recognize that there are different rates of savings, taxation, non-local consumption, transfer payment reductions, and patterns of local purchases associated with different population groups in the region. The cohorts or groups identified for purposes of this study are: local residents employed prior to the increased fish landings resulting from the enhancement program; local residents unemployed prior to the stimulus; and temporary immigrants to the local region because of the program.

In distinguishing between the region's employed and unemployed, it is assumed that individuals in the latter category are recipients of government assistance (unemployment compensation and/or welfare payments). Given such an assumption, it is com-

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government assistance payments. In such cases the ratio of local to non-local expenditures will be higher for the unemployed if an unemployed individual's income will likely be allocated to saving and related sectors by a local resident who was previously employed. This difference will depend on the nature and conditions of his work. For example, local supplying activities, trades, and services which result from the indirect and induced impacts of the stimulus. To the extent that these latter jobs are also taken by in migrants and new labour force entrants, there is little reason to anticipate a decrease in the flow of unemployment benefits to the region.

Alternatively, if the newly created jobs are taken primarily by the region's unemployed, the estimation of the relevant leakages by determining only unemployment benefits and average regional earnings may prove to be overly simplistic. For example, the impacts upon community income of a newly created job taken in the fishing and related sectors by a local resident who was previously employed and by one who was unemployed and receiving government assistance are likely to differ substantially. First, the savings rates for the employed individual and the person on public assistance are likely to vary. It may reasonably be expected that the savings rate of the latter approaches zero.

Second, depending on the circumstances of the local community, the local/non-local expenditure ratios of the two individuals are also likely to differ. This difference will depend on the size of the community of residence in relation to neighbouring communities and the cost of journeying to the latter. In the majority of cases the ratio of local to non-local expenditures will be higher for the unemployed.

Third, it can be expected that the individual on public assistance will have a pattern of consumption expenditures which differs from that of the employed resident. Greater percentages of the unemployed individual's income will likely be allocated to rent/mortgage, food, and clothing, and a smaller percentage to expenditure categories such as travel, entertainment, and personal services. This difference is, however, less important than are the former two factors in accounting for variations in the multipliers between the previously employed and unemployed.

Finally, and most important, upon taking the newly created job the previously unemployed individual must relinquish his government assistance payments. In such cases the community must forego the multiplier impact of the consumption expenditures resulting from the public assistance payments. It is thus the results of the net consumption expenditures which must be determined.

In sum, the lower savings rate of the unemployed cohort will result in a propensity to consume locally which exceeds that of the previously employed. This result may be reinforced by the relative reluctance or inability of the unemployed to travel to larger nearby cities for consumption purposes. The differences in impacts resulting from the consumption patterns of the two groups will depend on the relative import content of the commodities purchased by each. For the unemployed cohort the loss of unemployment benefits will, of course, generally exceed in magnitude the net effect of the other factors. Thus the multiplier impact of a newly created job taken by an unemployed individual can be expected to be significantly less than that resulting from the same job being taken by one who was previously employed.

In addition to distinguishing between the employed and unemployed, it may also prove useful to distinguish between permanent and temporary in migrants [5; 8; 9; 10; 11; 12]. The former are those newcomers to the community who migrate with intentions of settling in the community. Such in migrants may be presumed to adopt savings rates and expenditure patterns similar to those of the long-time residents; hence the multiplier of the "previously employed" locals may be used in estimating their income impact.

The temporary in migrant (typically a construction worker or a seasonal labourer) is one who comes to the community with the intention of remaining, say, less than two years. In the present case, the influx of seasonal workers to crew the fishing fleets and to work in the processing plants would likely be substantial. Compared with local residents, the temporary in migrant can generally be expected to have a lower marginal propensity to spend locally, since he will tend to save more and, moreover, spend a greater portion of his income non-locally (e.g., expenditures on trips home and to the nearest large town). Additionally, the income multiplier associated with the temporary in migrant will differ from that of the permanent in migrant because of the different expenditure patterns. The temporary in migrant's pattern of local expenditure will, of course, depend on the nature and conditions of his work. If the in migrant is a construction worker, for example, his expenditure pattern will depend in part on whether he will be housed in a construction camp or must find housing in the local community, whether his meals will be furnished by the project management or must be purchased locally, and so forth. Generally, however, experience has shown that the temporary in migrant allocates greater portions of his local spending to the service sector, specifically to entertainment services, than does the typical permanent in migrant (and local resident).
In the fishing region studied, it is held that the first round expenditures of the recipients of the directly and indirectly generated factor earnings will vary over the three recipient groups identified. It can thus be expected that the proportion of income retained after the first round of spending will differ from that of subsequent rounds [10; 16; 18; 19; 24; 25]. If we designate the proportion of income retained after the first round of consumer expenditures as \( r' \) to distinguish it from subsequent proportions \( r \), the multiplier process now takes the form: 
\[
r' + r'r' + r''r'' + \ldots + r''''r'''' = \frac{r'}{1-r}.
\]
As formulated below, the numerator of the multiplier, \( k \), determines the portion of first round expenditures by cohort or population subgroup \( j \) that remains as local income, while the denominator serves to determine local income generated by subsequent rounds of spending in the region.

\[
k_j = \frac{(1-u_j) c_j s_j}{1 - c_j s_j},
\]
where:
- for cohort \( j \), \( u_j = \) the average dollar of public assistance lost per dollar of wage/salary gained;
- \( c_j = \) the marginal propensity to consume locally for local residents and the average propensity for in migrants;
- \( s_j = \) the local income generated per dollar of consumption spending.

The subscript 1 refers to the local residents employed in the consumer commodity sector prior to the stimulus.

In conjunction with the Enhancement Program, the Department of the Environment undertook an expenditure survey of residents in the region. From the resulting data, and from secondary sources, the author has arrived at estimates of the values for the income multipliers for the region's three population groups; these are shown in Table 1. The values for the three income multipliers are shown in the last column of the table. Thus, for example, for every new dollar of income accruing directly or indirectly to local residents employed prior to the stimulus, an additional eight cents of income is estimated to be generated within the community via the consumption expenditures of this group.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>( c_j )</th>
<th>( b_j )</th>
<th>( c_1 )</th>
<th>( b_1 )</th>
<th>( u_j )</th>
<th>( k_j )</th>
</tr>
</thead>
<tbody>
<tr>
<td>previously employed</td>
<td>.70</td>
<td>.10</td>
<td>.825</td>
<td>.12</td>
<td>—</td>
<td>.078</td>
</tr>
<tr>
<td>previously unemployed</td>
<td>.85</td>
<td>.14</td>
<td>.825</td>
<td>.12</td>
<td>.67</td>
<td>.044</td>
</tr>
<tr>
<td>in migrant</td>
<td>.88</td>
<td>.12</td>
<td>.825</td>
<td>.12</td>
<td>—</td>
<td>.117</td>
</tr>
</tbody>
</table>

Although all the multipliers are quite low due to the substantial leakages from the economy, particularly in terms of intermediate goods purchases (see \( s \), column 2 of the table), the multiplier associated with the previously unemployed cohort is the smallest of the three, a little more than half that of the previously employed cohort and approximately a third of that of the in migrants. This is due primarily, of course, to the estimate that on the average for every dollar of income accruing to the previously unemployed cohort, sixty-seven cents of government assistance is lost.

Although no attempt was made to construct quantitative estimates of a multiplicand to be associated with the above multiplier, four principal multiplicand components\(^2\) might readily be formulated for a coastal region associated with the Salmon Enhancement Program. The first component is the local value added (LVA) directly resulting from increased sales, outside and within the region, of the local fishermen. In estimating the local income or LVA generated, one would have to consider the partial allocation of the increase in gross income of the fishermen to local chandleries and marine maintenance and repair services. The second component is the LVA directly derived from the increased sales of the local fish processing plants. Purchases by the plants from local fishermen would have to be netted out from this second component in order to avoid double counting the impact of the first. The third and fourth components are, respectively, the direct contribution

\(^2\)For discussion of the adoption of the average rather than the marginal propensity to consume for in migrants, see [5; 8; 9; 10; 11; 12; 23; 26]. Data difficulties often preclude, however, a distinction between average and marginal propensities [1; 2; 8; 10; 11; 14; 15; 17; 20; 24; 26].
to LVA resulting from the increases in construction expenditures due to expansion in the fishery industry and that associated with net population in migration.

It is implicitly assumed that the sales of local chandleries and marine services to non-local fishermen are insignificant. Similarly, it is assumed that any increase in local sales of fish have a negligible displacement impact upon the value added generated by local supplies of fish substitutes. Given the high probability that the increased sales will be almost entirely to the export market, this latter assumption is of minor importance.4

It should also be noted that no attempt was made to incorporate into the above multiplier the effects of induced investment or of interregional feedback. Because of induced investment's temporary nature, it is generally more appropriately incorporated into impact analyses via the multiplicand, as was done above, rather than by introducing a marginal propensity to invest term into the multiplier. Significant induced investment spending is most likely to be associated with in migration. Although induced investment expenditure is not considered here, the treatment of in migrants as a distinct population subgroup within the economy substantially facilitates the empirical estimation of the effects of such expenditure.

Due to data deficiencies there is a dearth of empirical studies of interregional income feedback effects. From the work that has been done [4; 6; 9; 17; 20; 21], it can be tentatively concluded that the magnitude of the interregional feedback effects for a particular region will depend on the region's share of national income and its degree of economic self-sufficiency. For small, geographically isolated regions such as the Tofino/Ucluelet region considered here, feedback effects are not likely to be significant.

Employment Multipliers

The employment multipliers, \( K_i \), may be readily derived from the previously constructed income multipliers, \( k_j \), as

\[
K_i = k_j p w_i / w
\]

Employment multipliers associated with a particular cohort is here defined as the man-hours of employment induced within the local economy per man-hour of cohort employment created directly and indirectly by the economic stimulus.

Employment multipliers for the three cohorts identified in this paper are seen from the above equation to depend not only on the appropriate income multipliers but also upon the wages paid to the cohorts via the jobs created by the stimulus. The employment multipliers will thus vary from stimulus to stimulus within a given region as the wages accruing to the different cohorts vary. The multiplier values will also change, of course, if the weighted average wage paid in the local service sector is altered.

From Department of Environment survey information related to jobs created for fishermen, fishboat crews, marine maintenance and repair, chandleries, and in the fish processing plants, it was estimated that the associated annual wage bill per person, \( w_j \), which might be expected to result from the program would be $30,000 for the previously employed cohort, $10,000 for the previously unemployed, and $9,000 for the in migrant. Calculating a weighted average wage bill \( w \) for the service sector of the region of $6,500 and a value for \( p \) of 0.8, the employment multipliers of equation (2) were estimated as

\[
K_1 = .288 \quad K_2 = .054 \quad K_3 = .130.
\]

The employment multiplier of the previously unemployed is only approximately one-fifth that of the previously employed and roughly two-fifths that of the in migrant. This considerably lower value is due to the lower income multiplier of the unemployed cohort and, relative to the employed local cohort, the lower estimated direct and indirect wage bill.

Summary and Conclusions

In constructing the preceding multiplier methodology, three groups within the local economy were distinguished: residents employed

\[
P = \text{the proportion of local income generated as wages;}
\]

\[
w_j = \text{the average wage accruing to a member of cohort } j \text{ employed directly or indirectly by the developmental initiative; and}
\]

\[
\bar{w} = \text{the average wage per employee in the local service sector.}^5
\]

where:

Examples of employment multipliers directly derived from income multipliers can be found in [5; 7; 8; 10; 24; 26].
prior to the economic stimulus, residents previously unemployed,
and in migrants to the region. Income and employment multipliers
were formulated and empirically estimated for each of the three
groups. The magnitudes of both multipliers varied significantly
between the three groups. It is thus tentatively concluded that the
approach of distinguishing population subgroups in the process of
multiplier formulation may well improve the accuracy of the
overall impact assessment, particularly for relatively small-scale
economies in which an economic stimulus results in the absorption
of a considerable segment of the region’s unemployed and induces
substantial in migration. Additionally, the explicit distinction of
population subgroups within the economy is likely to an aid to
any assessment of the distribution within the community of a par-
ticular economic impact.

References


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20. Steele, D.B. “A Numbers Game (or The Return of Regional Multipliers)”, Regional Studies, VI, 2 (1972), 115-130.