
The provincial governments of Newfoundland and Nova Scotia have each signed an accord with the Government of Canada to manage and share revenues from the development of their respective offshore oil and gas fields. Negotiated provisions for offsetting equalization payments were an important component of each of these accords. This paper analyzes how effective these offset provisions might be in sheltering offshore oil revenue derived from the Hibernia project under various oil price scenarios. Both mathematical and simulation analyses demonstrate that the provisions negotiated by Nova Scotia shelter significantly more revenue than those of Newfoundland.

Les gouvernements provinciaux de Terre-Neuve et de la Nouvelle-Écosse ont chacun signé un accord avec le gouvernement du Canada prévoyant la gestion et le partage des recettes provenant de la mise en valeur de leurs sites pétroliers et gaziers off-shore. Des dispositions négociées, portant compensation pour les paiements de péréquation, constituent un des éléments importants de ces accords. Cet article analyse, selon divers scénarios des cours du pétrole, l'efficacité de ces dispositions visant à mettre à l'abri les recettes pétrolières provenant du projet Hibernia. Tant les analyses mathématiques que les analyses de simulation montrent que les dispositions négociées par la Nouvelle-Écosse permettent de mettre à l'abri considérablement plus de recettes que celles négociées par Terre-Neuve.

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The Offshore Accords and Hibernia's Impact on the Newfoundland Treasury

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1. Introduction

The province of Newfoundland is one of the more economically depressed areas in Canada. As a result, it has been and continues to be the recipient of substantial amounts of equalization aid.¹ This aid is inversely related to the fiscal capacity of the province relative to the fiscal capacity of the representative five-province equalization standard used in Canada. Thus, any economic activity that improves the province's relative fiscal capacity will reduce its equalization entitlements.

Offshore exploration activity has been taking place on the Grand Banks of Newfoundland since 1965. It was not until a consortium, headed by Mobil Oil Canada, discovered the Hibernia oil field in 1979 that the potential of the oil industry to improve the Newfoundland economy was seen as a realistic possibil-

1/ The provincial treasury is highly dependent upon intergovernmental transfers. Almost 50% of its current account revenue comes from federal transfers with equalization being the largest source of federal funds.

ity. Overnight the future economic prospects for the province improved.

The Hibernia oil field, with estimated recoverable reserves of approximately 525 million barrels, is scheduled to begin production six years after the start of construction and will achieve a plateau production rate of approximately 110,000 barrels of oil per day. Besides the oil produced, the provincial economy can expect to benefit directly, through the goods and services purchased by the project operators, and indirectly, through, for example, enhanced tax and royalty revenues that flow to the provincial treasury.

The focus of this paper is on the latter effect. The first step in examining this issue is to calculate the impact that offshore oil revenue will have upon provincial equalization entitlements. This is followed by a description and analysis of the equalization offset grants available under the Atlantic Accord: Memorandum of Agreement Between the Government of Canada and the Government of Newfoundland and Labrador on Offshore Oil and Gas Resource Management and Revenue Sharing, 1985 and the Canada-Nova Scotia Offshore Petroleum Accord, 1986 (hereafter the Atlantic Accord and the Nova Scotia Accord). For different assumptions about nominal oil prices and nominal equalization growth, the properties of each of these grants are analyzed to determine which shelters more offshore oil revenue from offsetting equalization losses. Also, the relative attractiveness of each accord is assessed in the presence of other oil and non-oil projects. The final section presents the summary and conclusions.

2. Impacts on the Provincial Treasury

To appreciate fully the impact that offshore oil and gas revenues have upon the treasury of a "have-not" province, it is necessary to consider how these revenues affect intergovernmental transfers such as equalization grants. Specifically, equalization entitlements vary inversely, *ceteris paribus*, with a province's relative per capita fiscal capacity.² Offshore oil and gas revenues flowing to the provincial treasury

increase the fiscal capacity of the province and, as such, reduce provincial equalization entitlements. In other words, the province's ability to alter the economic well being of its citizens by reducing existing taxes, expanding services or both as a result of the additional oil and gas revenues will be mitigated by the fall in equalization payments.

2.1 Calculating the Impacts on Equalization Entitlements

To understand how offshore oil revenue will reduce provincial equalization payments, it is necessary to examine the equalization entitlements formula.³ The equalization entitlements formula compares the amount of revenue that a province can generate, if it applied national average tax rates⁴ to its tax bases, with the corresponding revenue that could be generated by a representative five province standard (RFPS) consisting of British Columbia, Saskatchewan, Manitoba, Ontario and Quebec. That is, for any particular province, the following formula generates its equalization entitlements:⁵

$$(1) E = \text{POP} \sum_i t_{N,i} [B_{5,i}/\text{POP}_5 - B_i/\text{POP}]$$

2/ Fiscal capacity, as it is applied in the equalization formula, is a relative measure of a province's ability to derive revenue from its revenue base. More specifically, it is the sum of revenue that can be raised by applying the relevant national average tax rate to each of the province's per capita tax bases. This revenue is then compared to the revenue that can be raised by applying the national average tax rate to a representative five province standard per capita tax base.

3/ A similar and more detailed analysis of how equalization entitlements are calculated can be found in Courchene (1984).

4/ The national average tax rate for base B_i is calculated as the sum of revenue collected from that base ($\sum_i B_i$) divided by the aggregate value of the base in all provinces ($\sum B_i$). Essentially, it is a weighted average of the tax rates used in each province with the weights being the proportion of the total base located in each province.

5/ Equalization entitlements cannot be negative. For those provinces with a negative entitlement, the grant is set to zero.

where:

- E \equiv total value of equalization payments received in a given year;
- POP \equiv population of the province;
- $t_{N,i}$ \equiv national average tax rate for revenue source i ;
- $B_{S,i}$ \equiv the RFPS tax base for revenue source i ;
- B_i \equiv the province's tax base for revenue source i ; and
- POP₅ \equiv the RFPS population.

The own-source revenue collected by the provincial treasury can be represented by:

$$(2) R = \sum_i t_{p,i} B_i$$

where:

- R \equiv total own-source revenue collected by the province; and
- $t_{p,i}$ \equiv the provincial tax rate for revenue source i .

The total revenue going to the provincial treasury, derived by summing equations (1) and (2), is:

$$(3) T = E + R = \sum_i t_{N,i} B_{S,i} \text{POP} / \text{POP}_5 + \sum_i (t_{p,i} - t_{N,i}) B_i$$

where:

- T \equiv sum of total own-source revenue and equalization entitlements.

To see how a new revenue source such as offshore oil will affect the provincial treasury, differentiate equation (3) with respect to the relevant tax base (B_i).^{6,7} This differentiation yields:

$$(4) \partial T / \partial B_i = t_{p,i} - t_{N,i}$$

Equation (4) demonstrates that the provincial treasury forgoes equalization entitlements more than, less than, or exactly dollar for dollar with an increase in oil and gas revenue as the provincial tax rate ($t_{p,i}$) is less than, greater than, or equal to the national tax rate ($t_{N,i}$). Therefore, the relevant question is whether the

provincial tax rate on this new revenue source exceeds, falls short of or equals the national average tax rate.

2.2 Incorporating the Offshore Accords

Since direct offshore oil revenue is to be considered as a separate revenue category⁸ and there is currently no other base elsewhere in Canada, the provincial tax rate and the national average tax rate for offshore oil and gas revenues will be equivalent.⁹ This, in turn, implies that the increased offshore revenue going to the provincial treasury will be completely offset by reductions in equalization entitlements. Both the Atlantic Accord and the Nova Scotia Accord acknowledged this possibility and stated that it should not occur.¹⁰ To prevent offshore revenues from being completely equalized away, both Accords require the federal government to pay the province an

6/ Direct oil revenue, such as royalties, consumption taxes and corporation income taxes, are paid into an offshore revenue fund. This offshore revenue, for the purposes of calculating equalization entitlements, is included the shared federal revenues category under the Federal Provincial Fiscal Arrangements and Federal Post-Secondary Education and Health Contributions Act, 1977.

7/ In addition to the direct oil revenue collected from the project, the provincial treasury will also gain as provincial factors of production receive and spend income earned from the project. The induced tax revenue is incorporated explicitly in the simulation results.

8/ Under the current 1987-92 equalization formula direct offshore oil revenue is to be included in the shared federal revenues category. This category is currently empty.

9/ An implicit assumption of this analysis is that the Hibernia offshore oil field is the first offshore oil field to be produced. Strictly speaking, this is not correct as the Panuke-Cohasset field off Nova Scotia is currently being developed. The Panuke-Cohasset field is so small in relation to the Hibernia field that the national average tax rate will, in effect, be determined by the fiscal regime associated with the Hibernia field. Also, the base for the five-province standard is currently zero.

10/ Each accord states that "there should not be a dollar-for-dollar loss of equalization payments as a result of offshore revenues flowing to the province."

"Equalization Offset Payments" grant that essentially depends on the amount of equalization payments lost during a specified period over which the offshore revenue flows to the province.

While both Accords allow for Equalization Offset Payments, the relevant formula under each accord differs significantly. The Atlantic Accord formula has two parts. Part I ensures that the floor provisions of the Federal-Provincial Fiscal Arrangements and Federal Post-Secondary Education and Health Contributions Act, 1977 (Fiscal Arrangement Act), independent of future legislative changes, will continue to apply to the phase-out of equalization entitlements. This provision, guaranteed for 12 years from the commencement of production, ensures that equalization payments plus grants received under Part I of the Equalization Offset Provisions of the Atlantic Accord cannot fall from one year to the next by more than a given percentage. The specific percentage by which this base is permitted to fall is contingent upon the per capita fiscal capacity of the province relative to the national average per capita fiscal capacity.^{11,12} Essentially, this provision entitles the provincial treasury to some minimum equalization payment. If actual payments fall below this minimum, the Part I grant equals the shortfall.

Part II equalization offset payments partially compensate the province if a defined base decreases from one year to the next. The base used for this calculation is the sum of actual equalization payments and Part I offset payments received by the province in each year. For the first four years, the province receives payments equal to 90% of any decrease and, beginning in the fifth year, this rate of protection drops by 10 percentage points each year. Thus, after 12 years there is no longer any protection.

Under the Nova Scotia Accord, as long as the province does not invoke a clause that permits it to specify within a three-year period when the first fiscal year of production begins, the offset payment is to be calculated by taking the difference between equalization entitlements calculated using 100% of offshore oil

revenue and the equalization entitlements that would be calculated using a predetermined proportion of oil revenue. Specifically, 10% of the oil revenue is to be counted in the first year of commercial production and the year preceding the first year of commercial production. For each subsequent year the proportion increases by 10 percentage points, so that in the tenth year there is no further equalization protection. In addition, if there is no future legislative changes to the floor provisions of the Fiscal Arrangements Act, then the protection afforded by the Part I offset grants is also available under the Nova Scotia Accord.

If the government wishes to specify some year other than commencement of production as the first fiscal year for the calculation of the offset payments, then the method of calculating the Offset grant is identical to the procedure described above with the exception that offset payments cannot raise the province above the national average per capita fiscal capacity.¹³ That is, there is a reduction in per capita equalization offset payments by the amount that the sum of provincial per capita fiscal capacity, per capita equalization payments and per capita offset payments exceeds the national average per capita fiscal capacity.

2.3 A Comparison of the Accords

Essentially, the Atlantic Accord protects the provincial treasury against excessive falls in equalization payments from one year to the

11/ For example, if the province's per capita fiscal capacity is less than or equal to 70% of the national average per capita fiscal capacity, then the sum of actual equalization payments and Part I offset grants in each year must be equal to 95% of the previous years' figure. On the other hand, the level of protection reduces to 90% if the province's per capita fiscal capacity is between 70 and 75% of the national average per capita fiscal capacity. Finally, as provincial per capita fiscal capacity moves above 75% of the national average per capita fiscal capacity, the level of protection falls to 85%.

12/ The national average per capita fiscal capacity means the per capita fiscal capacity of all provinces.

13/ Also, revenue received in the year preceding the first year of commercial production is no longer protected.

next for 12 years. In other words, the protection, ostensibly, is after the oil revenue has passed through the equalization calculation, while the Nova Scotia Accord protects the revenue before it goes through the calculation. This is a significant difference that, as the results of the simulation exercises presented below demonstrate, causes the level of protection provided under each accord to vary dramatically. Although the simulation results show clearly, for the scenarios considered, which accord dominates in terms of the equalization protection provided, a mathematical model of the Equalization Offset provisions of both accords is better for explaining why the level of protection differs.

First, Part I Offset protection, available under both accords, requires that actual equalization payments in the current period be less than a specified floor percentage¹⁴ times the sum of the previous period's equalization payments and Part I Offset payment (P_{t-1}). Since direct offshore revenue, without offset protection, will be lost dollar-for-dollar, actual equalization payments can be calculated by subtracting the provincial treasury's share of offshore revenue (R_t) from the level of equalization entitlements that the provincial treasury expects to receive if oil and gas development does not take place (E_t). The inequality that must be satisfied to qualify for Part I Offset payments is:

$$(5) E_t - R_t < 0.9 * (E_{t-1} + P_{t-1} - R_{t-1}).$$

If equation (5) holds, then the Part I Offset grant is given by:

$$(6) P_t = [0.9 * (E_{t-1} + P_{t-1} - R_{t-1})] - [E_t - R_t],$$

otherwise,

$$(7) P_t = 0.$$

For realistic scenarios, the inequality in equation (5) almost never holds. While this may surprise some people, the reason for this result becomes obvious once the constraint, equation (5), is rewritten in a more convenient

form. The first step is to note that equalization payments, in the absence of offshore revenue, grow at some rate λ_t . Or,

$$(8) E_t = (1 + \lambda_t) * E_{t-1}.$$

Next, substitute equation (8) for E_t in equation (5) and rearrange to yield:

$$(9) R_t - 0.9 * R_{t-1} > (0.1 + \lambda_t) * E_{t-1} - 0.9 * P_{t-1}.$$

This equation, derived from equation (5) and equation (8), represents another way of describing the constraint that must be satisfied to qualify for Part I offset protection.

Equation (9) has a convenient interpretation that illustrates clearly why Part I protection may not be large. First, the left-hand-side of equation (9) shows that the absolute dollar value of offshore-related equalization loss is not protected; rather, the protection is incremental in that it responds to the amount by which the current period's offshore-related equalization losses (R_t) exceed 90% of the previous period's offshore-related equalization losses (R_{t-1}). In other words, the protection afforded to current period offshore revenues is partially offset by offshore revenues received in the previous period.

Second, the first term on the right-hand-side of equation (9) indicates that the growth in offshore revenue must, in general, be sufficiently large so as to exceed 10% of the previous period's equalization entitlement that would be received in the absence of oil and gas developments ($0.1 E_{t-1}$) plus growth in nominal equalization payments ($\lambda_t E_{t-1}$) that occurs. The first of these two terms ($0.1 E_{t-1}$) defines some threshold increase in offshore revenue that is necessary to receive any protection. There is a dollar-for-dollar loss for any increase in offshore revenue that is at or below this threshold.

The final term shows that the level of Part I offset payments received in the previous period, to the extent that they exist, enhances

14/ For this analysis it is assumed that the 90% floor provision is relevant for calculating Part I Offset protection.

the probability that the province will qualify for Part I grants in the current period. For the scenarios considered in this analysis, this term plays a very small role in determining Part I payments.

Another source of offset protection under the Atlantic Accord is available through the Part II Offset grants (P_2). To qualify for Part II grants, the sum of actual equalization payments ($E_t - R_t$) and Part I grants (P_t) must fall from one year to the next during a predetermined period. In other words, to qualify for Part II grants, the following inequality must hold:

$$(10) E_t - R_t + P_t < E_{t-1} - R_{t-1} + P_{t-1}.$$

If equation (10) holds, then the Part II Offset grant is:

$$(11) P_2 = \text{PER}_t * [(E_{t-1} - R_{t-1} + P_{t-1}) - (E_t - R_t + P_t)]$$

where:

$\text{PER}_t \equiv$
the phase-out percentage as defined in the Atlantic Accord,

otherwise,

$$(12) P_2 = 0.$$

To understand why not much additional protection results from Part II grants, rewrite equation (10) as:

$$(13) (R_t - R_{t-1}) > (E_t - E_{t-1}) + (P_t - P_{t-1})$$

This equation shows that, to qualify for Part II offset payments, the increase in offshore revenue ($R_t - R_{t-1}$) has to be larger than the sum of the increases in equalization payments in the absence of oil and gas development ($E_t - E_{t-1}$) and Part I offset payments ($P_t - P_{t-1}$). Therefore, it is not the size of oil revenue, but its size relative to previous period's revenue and relative to the size of the change in equalization entitlements and any grants received under Part I of the Atlantic Accord.

The protection provided under the Atlantic

Accord is lessened because the formula protects the increments, rather than the absolute dollar value, in offshore revenues that flow to the provincial treasury. In addition, this incremental protection is reduced further by nominal increases in equalization entitlements. As demonstrated by the simulation results presented below, the combined effects of both reduce the attractiveness of the Atlantic Accord's Equalization Offset Protection provisions.

The equalization offset payments available under the Nova Scotia Accord (P_{Nt}) equals the difference in equalization payments calculated based on a specified percentage of offshore revenue and that which is calculated based on 100% of revenue. Mathematically, this can be written as:

$$(14) P_{Nt} = (E_t - \text{PER}_{Nt} * R_t) - (E_t - R_t)$$

where:

$\text{PER}_{Nt} \equiv$
the phase-in percentage as defined under the Nova Scotia Accord.

Rearranging yields:

$$(15) P_{Nt} = (1 - \text{PER}_{Nt}) * R_t.$$

Note that the equalization protection provided under the Nova Scotia Accord responds directly to the absolute amount of offshore revenue going to the provincial treasury. It is neither incremental nor does it respond to the assumed growth in equalization entitlements. Each of these three factors reduces the protection provided under the Atlantic Accord, but are absent from the Nova Scotia Accord.

Although the mathematical treatment clearly shows that the equalization protection provided under the Nova Scotia Accord is qualitatively superior to that offered by the Atlantic Accord, the difference may not be quantitatively significant. To address this issue, a simulation exercise was performed on the net treasury impacts associated with the Hibernia project under the Atlantic and Nova Scotia Accords.

3. Simulation of Equalization Protection

This simulation exercise deals with the equalization offset protection provided by each accord under various scenarios involving different assumptions about the price of oil and nominal equalization entitlements growth. Specifically, oil prices start with a 1990 value of either \$15, \$20, \$25, or \$30 US/b^{15,16} and escalate at a rate of 5% per annum¹⁷ and nominal equalization entitlements have a 1992 value of \$945 million¹⁸ and grow at either 1, 2, 3, 4 or 5% per annum.¹⁹ Combining both sets of assumptions generates 20 separate scenarios for each accord. Table 1, summarizing the results, is presented below.²⁰

3.1 *Offset Payments Relative to Direct Oil Revenue*

Table 1 shows, for each scenario, the percentage of each dollar of direct offshore revenue that the Atlantic and Nova Scotia Accords protect against equalization losses. For example, the first element of Table 1 indicates that if oil prices start in 1990 at \$15 US/b and escalate at 5% per annum while nominal equalization entitlements start at \$945 million in 1992 and escalate at 1%, then each dollar of direct offshore revenue flowing to the provincial treasury from the Hibernia project will, after adjusting for equalization losses and equalization offset grants, enhance the provincial government's budgetary position by approximately 3.5¢. In other words, the provincial government loses 96.5¢ of each dollar through reduced transfers from the federal government.

Following along the first row of Table 1, one observes that the equalization protection provided under the Atlantic Accord falls steadily from 3.5% with 1% growth in nominal equalization entitlements to no protection for nominal equalization growth in excess of 3%. The corresponding protection provided under the Nova Scotia Accord, given in row 5 of Table 1, is 21.4%. There is a noticeable increase in the level of protection afforded under the Atlantic Accord for the higher price scenarios.

Again, equalization growth quickly erodes the protective ability of the Atlantic Accord. The protection provided under the Nova Scotia Accord is essentially unchanged for each of the scenarios.

Clearly, even modest growth in nominal equalization entitlements significantly reduces the protection provided under the Atlantic Accord, but has little or no effect upon the protection provided by the Nova Scotia Accord. Although the level of protection provided under the Atlantic Accord increases with the higher price scenarios, the increase in protection is not sufficient to dominate the Nova Scotia Accord.

15/ All oil prices are expressed in US dollars per barrel.

16/ These oil price scenarios are considered "reasonable" given the performance of oil prices in the recent past. For example, the Saudi Light Spot price for 1991 averaged US \$17.08 1990/b and, from 1986-91, it averaged \$17.81/b. The West Texas Intermediate price averaged \$21.11/b in 1991, and \$20.36/b over the period 1986-91. The corresponding figures for the Brent price is \$19.70/b and \$19.35/b. Also, the average 1990 price of oil from 1974 to 1990, using the Saudi bench price to 1984 and the Saudi Light spot price thereafter, is \$29.54/b. While other price and rate of increase scenarios are conceivable, past and current conditions suggest that they have a lower probability of occurrence.

17/ The direct, indirect and induced tax revenue estimates used to calculate the equalization losses associated with each of the scenarios is based on cash flow analyses provided by the Department of Mines and Energy, Government of Newfoundland and Labrador. In conducting these cash flow analyses, inflation was assumed to be 5% per annum and the exchange rate employed was US\$0.825/\$Cdn. Therefore, for each of the oil price scenarios, no real increase in the price of oil was assumed.

18/ The \$945 million estimate for the provincial treasury's 1992-93 equalization entitlements is taken from the 1992 Government of Newfoundland and Labrador's budget and is indicative of the size of Newfoundland's entitlement.

19/ These growth rates assumed for equalization payments should be interpreted as those that would prevail after adjustments have been made to reflect the GNP ceiling restriction.

20/ The detailed simulation results are available upon request.

Table 1: Equalization Offset Protection as a Percentage of the Provincial Treasury's Direct Oil Revenue for the Hibernia Project

		Atlantic Accord				
Oil Price Assumption	Growth in Equalization (%)					
	1	2	3	4	5	
\$15/b	3.5	0.6	0.2	0.0	0.0	
\$20/b	4.4	2.4	1.5	0.9	0.2	
\$25/b	5.5	3.5	2.4	2.0	1.5	
\$30/b	6.9	4.9	3.2	2.5	1.9	

		Nova Scotia Accord				
Oil Price Assumption	Growth in Equalization (%)					
	1	2	3	4	5	
\$15/b	21.4	21.4	21.4	21.4	21.4	
\$20/b	21.0	21.0	21.0	21.0	21.0	
\$25/b	21.3	21.2	21.2	21.2	21.2	
\$30/b	23.2	22.8	22.3	22.1	22.1	

This simulation exercise demonstrates that the Nova Scotia Accord shelters a sufficiently higher percentage of offshore oil revenue to make it the more attractive arrangement. While these results are valid, they do not tell the whole story. There is another important distinction between both Accords. The Atlantic Accord protects against falls in provincial equalization entitlements, independent of how they occur while, on the other hand, the Nova Scotia Accord shelters only direct offshore revenue.

It is possible that this difference may outweigh the lower level of protection shown above; especially given the possible hydroelectric developments that exists in Labrador. Additional hydroelectric rents will increase the province's fiscal capacity and, as such, will lower provincial equalization entitlements. To the extent that this occurs during the 12 years of equalization offset protection provided under the Atlantic Accord, part of these losses will be offset by Part I and Part II grants.

Under the Nova Scotia Accord, only Part I type losses will be sheltered.

3.2 Other Sources of Equalization Loss

To examine the sensitivity of the equalization protection to some other source of equalization loss, assume that a particular non-oil project will cause equalization entitlements to fall by \$100 million in 1996 and an additional 3% per annum thereafter. The next simulation combines the treasury impacts of the non-oil project with those of the Hibernia project. The results of this simulation exercise are presented in Table 2.

A quick perusal of this table indicates that the overall protection provided under the Nova Scotia Accord falls dramatically. The reason for the fall is that an additional \$3 billion in non-oil equalization losses fall outside the protective umbrella of the Nova Scotia Accord.²¹ The percent protection under the Atlantic Accord has fallen slightly.²² The key conclusion to be drawn is that, while the protection provided under the Nova Scotia Accord falls in the presence of other revenue sources, the fall is not sufficient for the Atlantic Accord to be preferred to its Nova Scotia counterpart.

Another area of concern is that the analysis so far has not considered the simultaneous occurrence of other offshore oil projects. Since this omission biases downward the estimated protection provided under the Atlantic Accord, the concern is now addressed.

The reader should note that the protection provided under each accord occurs only for a given period after the commencement of com-

21/ To put this in perspective, one should note that the direct oil revenue for the four scenarios considered are: \$0.9 billion for the \$15 scenario, \$1.9 billion for the \$20 scenario, \$3.0 billion for the \$25 scenario and \$3.9 billion for the \$30 scenario.

22/ The fall in protection under the Atlantic Accord results from the fact that the non-oil equalization loss tends to smooth out the total equalization loss that is used to calculate the offset grants. The Atlantic Accord offset formula is such that discrete changes in equalization losses generate higher offset payments than a smooth series.

Table 2: Equalization Offset Protection as a Percentage of the Provincial Treasury's Equalization Loss due to the Simultaneous Occurrence of Hibernia and a Non-oil Project

Oil Price Assumption	Atlantic Accord				
	Growth in Equalization (%)				
	1	2	3	4	5
\$15/b	1.8	0.5	0.1	0.0	0.0
\$20/b	2.6	1.4	0.6	0.4	0.1
\$25/b	3.7	2.2	1.3	1.0	0.8
\$30/b	4.9	3.6	2.3	1.5	1.1

Oil Price Assumption	Nova Scotia Accord				
	Growth in Equalization (%)				
	1	2	3	4	5
\$15/b	5.7	5.6	5.5	5.4	5.3
\$20/b	8.7	8.7	8.6	8.5	8.4
\$25/b	11.3	11.0	10.9	10.8	10.8
\$30/b	13.9	13.5	13.2	12.9	12.8

mercial production; 12 years for the Atlantic Accord and nine years for the Nova Scotia Accord. Any offshore revenue accruing to the province after this time will not be protected. Thus, the development of additional fields, in themselves, does not necessarily enhance the protection provided under either accord.

To present this argument so that it has its maximum effect upon the previous analysis, suppose that two Hibernia projects occur simultaneously. These simulation results are presented in Table 3. Under this set of scenarios, the Nova Scotia Accord protection is essentially unchanged but the protection under the Atlantic Accord has increased. Even so, the relative ranking of each accord is unaltered.

4. Summary and Conclusions

The above analysis demonstrates, for the scenarios considered, that even though the Equalization Offset Provisions of the Atlantic

Table 3: Equalization Offset Protection as a Percentage of the Provincial Treasury's Direct Oil Revenue for two Oil Projects Occurring Simultaneously

Oil Price Assumption	Atlantic Accord				
	Growth in Equalization (%)				
	1	2	3	4	5
\$15/b	6.0	3.2	1.1	0.4	0.1
\$20/b	6.6	4.6	3.0	2.0	1.6
\$25/b	8.7	6.9	5.4	4.1	3.1
\$30/b	15.4	9.0	7.0	5.6	4.6

Oil Price Assumption	Nova Scotia Accord				
	Growth in Equalization (%)				
	1	2	3	4	5
\$15/b	21.3	21.3	21.3	21.3	21.3
\$20/b	21.7	21.3	21.0	21.0	21.0
\$25/b	23.5	23.1	22.7	22.3	22.0
\$30/b	31.2	25.7	24.7	24.1	23.7

Accord are more complex than those contained in the Nova Scotia Accord, the latter shelters a larger share of offshore revenue that flows to the provincial treasury. In this case, the increased complexity does not translate into increased protection. For what are considered realistic scenarios, the Atlantic Accord shelters about two to three cents on the dollar while the Nova Scotia Accord protects approximately 21¢ on the dollar. These findings are consistent with the results presented in Dean and Watkins (1991). That study found that for the particular circumstances associated with the Yukon, the Nova Scotia Accord was preferred to the Atlantic Accord.

One disadvantage of the Atlantic Accord is that even modest growth in nominal equalization entitlements erodes its protection. The Nova Scotia Accord does not suffer from this problem. A more serious problem with the Atlantic Accord is that it protects only increments in offshore revenue. This characteristic removes much of the benefit that would accrue to the provincial treasury if oil revenues

exceed current expectations. That is, high revenue will not necessarily increase the protection provided under the Atlantic Accord; rather, enhanced protection requires a higher growth rate for offshore oil revenue. Other oil and gas fields and other sources of equalization losses improve the attractiveness of the Atlantic Accord, but, for the scenarios considered above, the improvement is not sufficient to change the relative attractiveness of each accord.

What do these findings suggest for future negotiations concerning resource developments? Responding from the viewpoint of the resource-developing province, one conclusion is that the negotiated formula should be constructed to avoid the erosion of equalization offset protection that results from the growth in nominal equalization entitlements under the Atlantic Accord. The second conclusion is that where possible, the incremental characteristic of the Atlantic Accord should be avoided. More specifically, the offset provision should be designed to protect the absolute dollar

value of equalization loss rather than the incremental falls in equalization payments from one period to the next. Incorporating these elements into future negotiations will enhance the benefits that "have-not" provinces can expect to receive from offshore oil and gas and other energy resources.

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