QUANTITATIVE ESTIMATION OF A DYNAMIC MODEL FOR STUDYING SECTORAL LINKAGES ACCORDING TO THE SABLE ISLAND GAS PROJECT OFF THE PROVINCE OF NOVA SCOTIA, CANADA

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Abstract

A two-tier model is estimated and economic analysis conducted. The two-tier model comprising firstly a system of circular causation recursive regression equations explaining inter-sectoral linkages and its implication on economic diversification, and secondly, the distribution of the effects of changes in GDP, Employment and Capital Formation by sectors in the Province of Nova Scotia. The focus of the study is on the petroleum-led development in the areas of GDP, Employment and Capital Formation by inter-sectoral composition that are expected from the Sable Island Gas and Oil Project off the Province of Nova Scotia in Canada. The economic implications of the study and the model investigated have a much wider use for development planning.

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Published data from the Nova Scotia Government and Statistics Canada on Petroleum/Gas, Manufacturing and Construction GDP and sectoral employment are used. for estimating a two-tier model system. First a system of structural regression model in the log-linear form is estimated from a basic model explaining how sectoral complementarities have been accounted for. Secondly, the coefficient estimates of this log-linear system are used to determine an innovative way for distributing the incremental output, employment and capital formation across sectors. These estimates explain the dynamic form of the matrix model of sectoral linkages.

The following model was used in order to show linkages by the compound nature of the function and circular causality between the variables, GDP in constant 1992 dollars and employment for the sectors, Mining, Quarrying and Oil Wells, Manufacturing and Construction:

First Functional Relation

$$Q_s = A.\Pi_{s'}Q_{s'}^{as,\, s'}.\Pi_{s'}E_{s'}^{bs,s'}; \quad (1)$$

Q_s, $Q_{s'}$ denote GDP in constant 1992 dollars;
E_s, $E_{s'}$ denote employment;
$a_{s.s'}$ are elasticity coefficients of Q_s with respect the prescribed variables for s', as in the *form* shown;
similarly bs,s' are the employment elasticity coefficients, for the expression in the *form*,

$$E_s = A.\Pi_{s'}Q_{s'}^{as,s'}.\Pi_{s'}E_{s'}^{bs,s'}; \quad (2)$$

s,s' (s≠s') = G (mining, quarrying, oil wells) , M (manufacturing), C (construction).

We estimate the expression (1) in log-linear form in two cases. First, we take all the variables to be circularly related in the compound function (1). Next we estimate separately the two compound functions,

Second Functional Relation

$$Q_s = A.\Pi_{s'}Q_{s'}^{as,s'} \quad (3)$$

$$E_s = B.\Pi_{s'}E_{s'}^{as,s'} \quad (4)$$

First Functional Estimated Relations

The estimated log-linear forms are,

Sectoral Output

$$Qg = 1141.690 - .481\ Qma - .191\ Qc - 3.197\ Eg + 2.712\ Ema + 5.313Ec.$$
$$(3.019) \quad (-2.539) \quad (-1.634) \quad (-.319) \quad (.620) \quad (.735) \qquad (5)$$

R Square: 0.5297
Durbin-Watson: 1.7891

$$Qma = 2118.897 - .927\ Qg - .372\ Qc - 18.366\ Eg + 6.583\ Ema + 10.993Ec.$$
$$(12.626) \quad (-2.539) \quad (-2.778) \quad (-1.481) \quad (1.142) \quad (1.145) \qquad (6)$$

R Square: 0.8559
Durbin-Watson: 2.4125

$$Qc = 3057.319 - 1.308\ Qg - 1.319\ Qma + 5.600\ Eg + .137\ Ema + 21.274Ec.$$
$$(3.185) \quad (-1.634) \quad (-2.778) \quad (.213) \quad (.012) \quad (1.182) \qquad (7)$$

R Square: 0.7429
Durbin-Watson: 1.7130

Sectoral Employment

$$Eg = 23.646 - .0004\ Qg - .001Qma + .0001\ Qc + .187\ Ema + .202Ec.$$
$$(1.352) \quad (-.319) \quad (-1.481) \quad (-.213) \quad (1.314) \quad (.804)$$

R Square: 0.7404
Durbin-Watson: 2.1594

(8)

$$Ema = -34.687 + .002Qg + .003Qma + .00001\ Qc + .948\ Eg + .875Ec.$$
$$(-.828) \quad (.620) \quad (1.142) \quad (.012) \quad (1.134) \quad (1.746)$$

R Square: 0.7979
Durbin-Watson: 2.8072

(9)

$$Ec = -28.771 + .001\ Qg + .001Qma + .0007\ Qc + .369\ Eg + .315Ema.$$
$$(-1.192) \quad (.735) \quad (1.145) \quad (1.182) \quad (.804) \quad (1.746)$$

R Square: 0.7938
Durbin-Watson: 1.8658

(10)

Second Functional Estimated Relations

Qg= 535.042- .132 Qma+. 011 Qc. (11)
(4.384) (-2.818) (.113)

R Square: 0.3622
Durbin-Watson: 1.0643

Qma= 2574.944- 2.744 Qo+. 003 Qc.
(5.035) (-2.818) (.068)

R Square: 0.3619 (12)
Durbin-Watson: 0.7508

Qc= 980.092+ .002 Qma +. 012 Qo.
(1.932) (.068) (.113)
R Square: 0.0009
Durbin-Watson: 0.47
(13)

Eg = 6.843+. 004 Lma+. 344Lc.
(1.174) (.233) (1.158)

R Square: 0.3767 (14)
Durbin-Watson: 0.8384

Ema = 8.330 + .119 Lo+1. 381 Lc.
(1.173) (.233) (4.090)
R Square: 0.7226
Durbin-Watson:1.9211
(15)

Ec= -.682+. 315 Lo+. 437 Lma
(-.161) (1.158) (4.090)

R Square: 0.7515
Durbin-Watson: 1.977 (16)

Construction of the Impact Matrices

A novel method has been adopted to generate the input-output table of linkages between sectoral output and employment using the elasticity coefficients. The following formula explains how the inter-sectoral GDPs were estimated.

We use the expression (17) on the elasticity coefficient, $a_{ss'}$, which explains the percentage change in the output of s'-sector resulting from a unit percentage change of output in the s-sector. $a_{ss'}$ is then multiplied by the change in log-output, $\Delta logQ_{s'}$, in the s'-sector between two most recent years (1999-2000). This result is then converted by antilog to the find the estimate of the change in output in the s'-sector caused by a change in output in the s-sector that impacts upon the s'-sector. Thus,

$$a_{s's} = [dQs/dQs'].\Delta Q_{s'},\ s,s'\ (s\neq s) = G, M, C. \qquad (17)$$

The input-output output matrix is estimated for the general and simple case of outputs:

In general therefore, for any variable (output, employment, capital formation) the formula used for matrix construction is,

Ai,j = (ΔVar i/ ΔVar j) * Δ Var J
(ΔVar i/ ΔVar j)= b= (Var i = a + b.Var j)
Ai,j.Var J ; means what changes in (j) sector contribute to a percentage of the change in (i) sector, when j sector change by (ΔVar j)

Generalized case of circular causation relations (sectoral GDP): Matrix construction

Output Matrices (Tables 1)

Example (1984-85):

1984-1985	OIL/GAS	MAN	CON
OIL/GAS	-24.6	-2.744*-24.6=67.5024	0.012*-24.6=-0.2952
MAN	-0.132*-5.40000000000009=0.7128	-5.4	0.002*-5.40000000000009=-0.0108
CON	0.011*78.2=0.8602	0.003*78.2=0.2346	78.2

1999-2000	OIL/GAS	MAN	CON
OIL/GAS	81.4	-223.3616	0.9768
MAN	-32.3136	244.8	0.4896
CON	-0.1177	-0.0321	-10.7

In the same way, we generate the input-output linkages between sectoral employments.

Employment Matrices (Tables 2)

1987-1988	OIL/GAS	MAN	CON
OIL/GAS	1.3	0.1547	0.4095
MAN	0.0136	3.4	1.4858
CON	0.9976	4.0049	2.9

1999-2000	OIL/GAS	MAN	CON
OIL/GAS	0	0	0
MAN	-0.006	-1.5	-0.6555
CON	0.9632	3.8668	2.8

Technological Induction of the Elasticity Coefficients on Matrices

In this section we will investigate the induction of technological change occurring in the petroleum/gas sector on manufacturing and construction. We will also investigate the reverse effect of technological change in manufacturing and construction sectors on the gas/oil sector. We need first to identify the expansion in the petroleum/gas sector, which if implemented would affect technological change in the manufacturing and construction sectors. Next under the circular causation scenario of inter-sectoral linkages we are to identify the nature of technological change that if implemented in the manufacturing and construction sectors would cause expansion in the petroleum/gas sector.

Technological effect transmitted from petroleum/gas sector to manufacturing and construction sectors

Table 3 in statistical appendix shows the capital expenditure by sectors in Nova Scotia. We note that the impact of the SOEP development boom of 1999 declined by the year 2000 with expenditure declining from 1.2958 billion dollars in 1999 to 605.5 million dollars in 2000. By 2001 this decline stabilized at 683.6 million dollars by 2001. Yet the GDP at factor cost increased from 219.4 million dollars in 1999 to 300.8 million dollars in 2000. But employment declined from 15 thousand in 1999 to 12.6 thousand by February of 2002. The implication is that the petroleum/gas sector was becoming economically efficient by resource saving but labour saving as well. Technological change in the petroleum/gas sector can therefore be characterized as a labour saving one and a neoclassical type of tradeoff is found to be taking place between capital and labour in this sector.

Empirical Estimation

Between the years 1999 and 2000, capital expenditure (investment) declined by 53.23 per cent in the petroleum/gas sector. GDP increased by 37.10 per cent. Employment remained unchanged (with some degree of corrections required between the forestry and fishing sector and mining, oil and gas sector). This points to the need for a substantive increase in capital expenditure -- up to 90.33 per cent over the 2000-level. The result would then be felt on a simultaneous increase in employment and output.

Table 3 in statistical appendix points out that between the years 2000 and 2001, much of the decline in capital expenditure in the petroleum/gas sector is caused by a decline in machinery and equipment, which is subsumed in the manufacturing sector, within the petroleum/gas sector. Conversely, a decline in capital expenditures in the manufacturing sector is caused by decline in activity in both construction activity and in machinery and equipment taking place within the manufacturing sector. There is a small increase in capital expenditure in the construction sector, which is caused by activity in both the construction sector and the machinery and equipment sector. This interlinked picture in capital expenditure points out that the output and employment effects are also adversely affected according to our direct relationship that we have formalized above between capital expenditure, output and employment.

Accordingly, to establish complementary interrelationship between capital expenditure, output and employment, capital expenditure in manufacturing will have to increase by 11.72 per cent in tandem with the increase in GDP in manufacturing. This would then improve the employment picture in manufacturing over all. The effect of the construction and machinery and equipment sectors on the manufacturing sector can be determined by a weighted average of expenditure in the two sectors. That is,

$$11.72 = \alpha.g(\text{machinery \& equip for manufacturing}) + (1-\alpha).g(\text{C for manufacturing}) \quad (18)$$

The determination of the growth rates g(.) is a matter of technology-policy choice. From that will automatically follow the value for α as the weight.

Empirical Estimation on Capital Expenditure by Interlinked Sectors (G,M,C)

The available data in Table 3 of the Statistical Appendix yield the following estimated equations as the meaningful ones:

$$KGC= 201.900+ 14.812\ KGM \qquad (19)$$
$$(1.684) \quad (2.780)$$

R Square: 0.4619
Durbin-Watson: 1.7178

$$KGM= .005+. 003\ KGC \qquad (20)$$
$$(.007) \quad (2.780)$$

R Square: 0.4619
Durbin-Watson: 1.7890

$$KMC= -15.981+ .345\ KMM \qquad (21)$$
$$(-.319) \quad (1.859)$$

R Square: 0.2775
Durbin-Watson: 0.8455

$$KMM= 196.780+ .804\ KMC \qquad (22)$$
$$(4.931) \quad (1.859)$$

R Square: 0.2775
Durbin-Watson: 0.8326

$$KCC= 6.344+ .003\ KCM \qquad (23)$$
$$(13.097) \quad (4.142)$$

R Square: 0.6559
Durbin-Watson: 2.4964

$$KCM = -128.046+ 23.992\ KCC \qquad (24)$$
$$(-2.665) \quad (4.142)$$

R Square: 0.6559
Durbin-Watson: 1.8735

The input-output output matrix is estimated for the general and simple case of Capital Expenditure of interrelated sectors (G,MC):

Capital formation matrices (Tables 3)

A)

1991-1992	K(G,C)	K(G,M)
K(G,C)	**-127.2**	-0.3816
K(G,M)	-2.962	**-0.2**

2000-2001	K(G,C)	K(G,M)
K(G,C)	**98.3**	0.2949
K(G,M)	-297.681	**-20.1**

B)

1991-1992	K(M,C)	K(M,M)
K(M,C)	**34**	27.336
K(M,M)	-8.694	**-25.2**

2000-2001	K(M,C)	K(M,M)
K(M,C)	**-2.6**	-2.0904
K(M,M)	-15.5595	**-45.1**

C)

1991-1992	K(C,C)	K(C,M)
K(C,C)	**1.2**	28.788
K(C,M)	0.0279	**9.3**

2000-2001	K(C,C)	K(C,M)
K(C,C)	**0.4**	9.596
K(C,M)	0.0027	**0.9**

Conclusion: inferences

In this paper we note that economic developments in the petroleum/gas, manufacturing and construction sectors do not bring out prospects for strong inter-sectoral linkages, complementarities and technological diversification in the Province of Nova Scotia. Consequently, by and large the output, capital expenditure and thereby the employment in these sectors are found to evolve independently with little inter-sectoral linkages.

In every structural forms of the regression equations that have been estimated we find that the elasticity coefficients are below a value of one, implying thus a weak relationship between the output and employment variables in the three sectors. Between the petroleum/gas and the manufacturing and construction sectors taken separately, the elasticity coefficients are negative in value. The empirical results are though not uniform in signs. In the generalized case, which explains our theory of circular causation more completely than the regression system for output and employment taken separately, the elasticity coefficients are weaker in value.

Our empirical results showed that the better expenditure linkages between manufacturing and construction remain independent of the effect of petroleum/gas capital expenditure in construction and manufacturing sectors. This too implies that capital expenditure denoting the investment in the petroleum/gas sector remains independent of the linkages between manufacturing and construction sectors. The implication is that technological change in these sectors is evolving independently of the choices of techniques in the petroleum/gas sector.

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TECHNICAL APPENDIX: MODEL SELECTION AND GRANGER CAUSALITY TEST FOR ESTIMATED MODEL

Six desirable properties that would be considered in an estimated model are, relevance, simplicity, theoretical plausibility, explanatory ability, accuracy of coefficients and forecasting ability. Up to some extent a ‘good’ model can display all of these properties. However, the existence of a potentially large number of theoretically plausible models, which also satisfy some, or all of the criteria, makes the model choice problem a nontrivial one in practice.

Instead of going through all these complex approaches to model selection process, we based our inter sectoral models selection approach based on

- high coefficient of determination (R^2),
- ‘significant’ student-t ratio for the parameters estimation,
- consequently significant F-values for the goodness of fit and
- possibly a Durbin Watson (DW) statistics closer to 2.

Looking into regression results estimated by regression equations (26 to 31) one can note that the best model is based on regression equation (28) and then followed by (30), (31), (29), (27) and lastly (26), respectively. The results of these are summarized in a table given below.

Table 1: Model Selection for Nova Scotia Data

GDP Regression

Models	R^2	**DW-statistic**	**F-Values**
1. based on Equation-26	44.7%	1.363	1.295
2. based on Equation-27	64.8%	1.588	2.944
3. based on Equation -28*	87.2%	2.263	10.903
4 based on Equation-29	69.8%	1.641	3.401
5. based on Equation-30	86.5%	2.392	10.289
6 based on Equation-31	83.0%	2.094	7.792

- Seems one of the best models, followed by (30) and (31)

Causality Inference

The notion of causality (and also causal relations and causal ordering) is essentially a philosophical rather than an empirical matter. Philosophers do not agree on their under standing and definition of cause and outcome. However, the meaning of ‘causation’ is close to ‘force’ or ‘produce’. In empirical economics, one would like to know whether an increase of prices results in wages to increase or it causes an opposite effect (means wages decrease). The formal definition of causality is due to Granger can be formulated as follows.

Definition

> x is a Granger cause of y (denoted as $x \rightarrow y$), if present y can be predicted with better accuracy by using past values of x rather than by not doing so, other information being identical.

There are two possible ways to test for pair-wise Granger Causality. The first test does not take an extra variable into consideration where as the second does. The results of these tests are given for lag 1 and lag 2 in Tables 1 and 2, respectively. The alternative method for testing pair-wise Granger Causality is within Vector Auto regressive (VAR) System.

Table 2: showing Pairwise Granger Causality Tests for lag 1

Null Hypothesis:	Obs	F-Statistic	Probability
QM does not Granger Cause QG	13	0.12155	0.73459
QG does not Granger Cause QM		0.63505	0.44402
QC does not Granger Cause QG	13	2.08375	0.17946
QG does not Granger Cause QC		5.15416	0.04655
EG does not Granger Cause QG	13	0.37911	0.55184
QG does not Granger Cause EG		0.00227	0.96292
EM does not Granger Cause QG	13	0.71421	0.41781
QG does not Granger Cause EM		0.83723	0.38173
EC does not Granger Cause QG	13	0.49948	0.49587
QG does not Granger Cause EC		1.24270	0.29102
QC does not Granger Cause QM	13	0.14875	0.70781
QM does not Granger Cause QC		2.00705	0.18696
EG does not Granger Cause QM	13	0.12199	0.73413
QM does not Granger Cause EG		0.14896	0.70761
EM does not Granger Cause QM	13	0.02822	0.86995
QM does not Granger Cause EM		0.34317	0.57099
EC does not Granger Cause QM	13	0.26307	0.61916
QM does not Granger Cause EC		2.08920	0.17894
EG does not Granger Cause QC	13	0.84509	0.37959
QC does not Granger Cause EG		4.49291	0.06006
EM does not Granger Cause QC	13	6.48439	0.02904
QC does not Granger Cause EM		0.00486	0.94580
EC does not Granger Cause QC	13	0.51393	0.48985
QC does not Granger Cause EC		1.32888	0.27582
EM does not Granger Cause EG	13	1.83901	0.20490
EG does not Granger Cause EM		0.13780	0.71822
EC does not Granger Cause EG	13	4.99288	0.04947
EG does not Granger Cause EC		0.64302	0.44126
EC does not Granger Cause EM	13	0.31301	0.58815

EM does not Granger Cause EC		2.87684	0.12072

Table 3: showing Pairwise Granger Causality Tests for lag 1

Null Hypothesis:	Obs	F-Statistic	Probability
QM does not Granger Cause QG	12	0.63783	0.55659
QG does not Granger Cause QM		1.91956	0.21645
QC does not Granger Cause QG	12	0.63328	0.55873
QG does not Granger Cause QC		1.46679	0.29375
QG does not Granger Cause QG	12	2.28212	0.17256
QG does not Granger Cause EG		0.10924	0.89801
EM does not Granger Cause QG	12	0.43955	0.66096
QG does not Granger Cause EM		0.55614	0.59682
EC does not Granger Cause QG	12	0.19726	0.82539
QG does not Granger Cause EC		1.40777	0.30630
QC does not Granger Cause QM	12	0.88990	0.45253
QM does not Granger Cause QC		0.12808	0.88180
EG does not Granger Cause QM	12	0.78178	0.49380
QM does not Granger Cause EG		0.41645	0.67471
EM does not Granger Cause QM	12	0.13714	0.87414
QM does not Granger Cause EM		1.23650	0.34685
EC does not Granger Cause QM	12	0.35723	0.71166
QM does not Granger Cause EC		2.13600	0.18873
EG does not Granger Cause QC	12	0.54020	0.60510
QC does not Granger Cause EG		2.45390	0.15575
EM does not Granger Cause QC	12	3.33673	0.09600
QC does not Granger Cause EM		0.54120	0.60458
EC does not Granger Cause QC	12	0.86663	0.46102
QC does not Granger Cause EC		1.94184	0.21337
EM does not Granger Cause EG	12	4.01855	0.06883
EG does not Granger Cause EM		0.73345	0.51382
EC does not Granger Cause EG	12	13.7401	0.00377
EG does not Granger Cause EC		0.91260	0.44443
EC does not Granger Cause EM	12	2.20178	0.18122

EM does not Granger Cause EC	10.4777	0.00786

Sample(adjusted): 1988 2000
Included observations: 13 after adjusting endpoints
Standard errors & t-statistics in parentheses

	QG	QM	QC	EG	EM	EC
QG(-1)	0.377281	-0.032074	-0.346469	0.098576	0.131769	-0.095332
SE	(0.69127)	(0.23179)	(0.31043)	(0.30731)	(0.39511)	(0.39997)
t-statistics	(0.54578)	(-0.13838)	(-1.11610)	(0.32077)	(0.33350)	(-0.23835)
QM(-1)	-0.997983	1.492376	-0.366511	0.088607	1.016188	-0.336982
SE	(1.90247)	(0.63792)	(0.85434)	(0.84575)	(1.08739)	(1.10077)
t-statistics	(-0.52457)	(2.33946)	(-0.42900)	(0.10477)	(0.93452)	(-0.30613)
QC(-1)	1.577688	0.327579	0.043719	0.436980	-0.177723	0.222467
SE	(0.97874)	(0.32818)	(0.43952)	(0.43510)	(0.55942)	(0.56630)
t-statistics	(1.61196)	(0.99817)	(0.09947)	(1.00432)	(-0.31769)	(0.39284)
EG(-1)	-0.502049	-0.099912	-0.187716	0.295806	0.218453	-0.390272
SE	(0.83324)	(0.27939)	(0.37418)	(0.37042)	(0.47626)	(0.48212)
t-statistics	(-0.60252)	(-0.35760)	(-0.50167)	(0.79857)	(0.45869)	(-0.80950)
EM(-1)	-0.205759	-0.751716	0.835533	-0.317972	-0.203722	0.670619
SE	(1.43238)	(0.48029)	(0.64324)	(0.63677)	(0.81870)	(0.82878)
t-statistics	(-0.14365)	(-1.56513)	(1.29895)	(-0.49935)	(-0.24884)	(0.80917)
EC(-1)	-1.214174	0.513898	0.164901	0.417462	1.308525	0.117868
SE	(1.69245)	(0.56749)	(0.76003)	(0.75238)	(0.96735)	(0.97926)
t-statistics	(-0.71741)	(0.90556)	(0.21697)	(0.55485)	(1.35269)	(0.12037)
C	2.608133	-1.841783	3.572677	-1.043232	-3.165624	1.241379
SE	(8.07223)	(2.70669)	(3.62500)	(3.58854)	(4.61384)	(4.67061)
t-statistics	(0.32310)	(-0.68046)	(0.98557)	(-0.29071)	(-0.68611)	(0.26579)
R-squared	0.624211	0.934974	0.862717	0.795489	0.687347	0.699767
Adj. R-squared	0.248421	0.869949	0.725434	0.590979	0.374693	0.399535
Sum sq. resids	0.020171	0.002268	0.004068	0.003986	0.006590	0.006753
S.E. equation	0.057982	0.019442	0.026038	0.025776	0.033141	0.033548
F-statistic	1.661066	14.37857	6.284216	3.889722	2.198431	2.330749
Log likelihood	23.59871	37.80385	34.00621	34.13763	30.87051	30.71154
Akaike AIC	-2.553648	-4.739054	-4.154801	-4.175020	-3.672386	-3.647929
Schwarz SC	-2.249445	-4.434851	-3.850598	-3.870817	-3.368183	-3.343725
Mean dependent	2.476923	3.243077	3.002308	1.209231	1.613077	1.350769
S.D. dependent	0.066881	0.053911	0.049691	0.040303	0.041910	0.043294
Determinant Residual Covariance		4.13E-23				
Log Likelihood		224.3361				
Akaike Information Criteria		-28.05170				
Schwarz Criteria		-26.22648				

STATISTICAL APPENDIX

Table 1: Gross Domestic Product at Factor Cost for Oil/Gas, Manufacturing and Construction Sectors, Nova Scotia 1984-2001 (est.) (Dollars x 1M, 1992 Constant Dollars)

	All industries	Oil/Gas*	Manufacturing	Construction
1984	13,679.3	375.0	1,632.2	1,003.8
1985	14,264.6	350.4	1,626.8	1,082.0
1986	14,690.3	363.1	1,634.2	1,165.2
1987	14,964.5	348.2	1,632.7	1,110.7
1988	15,356.4	325.4	1,560.4	1,116.0
1989	15,513.4	299.0	1,596.7	1,149.4
1990	15,660.7	320.1	1,536.6	1,204.1
1991	15,618.1	334.7	1,663.6	1,022.9
1992	15,672.3	331.5	1,652.4	957.5
1993	15,702.2	319.4	1,637.1	897.1
1994	15,862.0	358.7	1,629.9	892.6
1995	16,161.5	347.5	1,746.5	913.8
1996	16,174.5	310.6	1,748.9	883.4
1997	16,564.4	243.5	1,859.1	888.4
1998	17,049.9	233.4	1,906.3	979.6
1999	17,923.7	219.4	2,089.5	1,127.4
2000	20,333.9	300.8	2334.3	1,116.7

Source: Statistics Canada, CANSIM II.
* includes mining.

Table 2: Employment in Gas/Oil, Manufacturing, Construction and All Goods-Producing Sectors, Nova Scotia 1987-2001 (Persons x 1000)

	Total	All Goods Producing	Gas/Oil*	Manufacturing	Construction
1987	358.1	96.7	17.8	43.8	23.6
1988	373.3	104.2	19.1	47.2	26.5
1989	382.1	101.1	16.9	47.7	26.4
1990	386.5	98.0	18.0	43.7	25.9
1991	381.0	92.9	18.5	42.1	22.3
1992	370.4	87.6	17.1	38.9	20.6
1993	367.9	81.7	15.9	36.2	20.2
1994	373.3	80.1	14.7	35.6	20.7
1995	377.1	84.7	14.7	40.2	20.8
1996	378.1	81.2	14.7	37.0	20.2
1997	384.3	83.8	15.2	37.7	21.3
1998	398.9	88.0	16.0	42.0	21.3
1999	408.6	90.7	15.0	45.0	21.8
2000	419.5	92.8	15.0	43.5	24.6

Source: Statistics Canada, CANSIM II.
* includes employment in mining, fishing and forestry industry

Table 3: Capital Expenditure by Sectors, Nova Scotia, 1991-2001 ($ millions)

	Construction	Machinery & Equipment	Total Capital Expenditure
Oil & Gas Extraction	K(G,C)	K(G,M)	K(G)
1991	280.4	0.2	280.6
1992	153.2	0	153.2
1993	51.3	0.2	51.5
1994	7.0	0	7.0
1995	11.7	0	11.7
1996	37.0	2.9	39.9
1997	106.7	2.0	108.7
1998	1034.3	0	1034.3
1999	1242.9	52.9	1295.8
2000	559.6	45.8	605.5
2001	657.9	25.7	683.6
Manufacturing	K(M,C)	K(M,M)	K(M)
1991	4.0	185.1	225.1
1992	38.0	159.9	197.9
1993	21.5	147.2	168.7
1994	31.9	136.5	168.4
1995	102.7	229.6	332.3
1996	201.8	324.1	525.9
1997	155.6	287.6	443.2
1998	91.5	433.6	525.1
1999	51.1	324.4	375.5
2000	47.8	308.6	356.4
2001	45.2	263.5	308.7
Construction	K(C,C)	K(C,M)	K(C)
1991	7.4	39.4	46.8
1992	8.6	48.7	56.3
1993	7.4	56.1	63.5
1994	7.4	54.3	61.7
1995	8.5	90.5	99.0
1996	9.6	99.3	108.9
1997	9.0	96.3	105.3
1998	8.9	101.5	110.5
1999	8.5	66.4	74.9
2000	7.6	59.5	67.1
2001	8.0	60.4	68.4

Source: Statistics Canada, *Private and Public Investment in Canada*, Cat. No. 61-206; Statistics Canada, *CANSIM II*, Table 029-0005.