Is There a Roemer's Law for Physicians?

Physician Numbers As a Driver of Provincial Government Health Spending

Livio Di Matteo

Lakehead University

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Rising Health Expenditures

Figure 1: Real Per Capita Provincial Government Health Expenditures, 1975-2009 (Data source: CIHI)

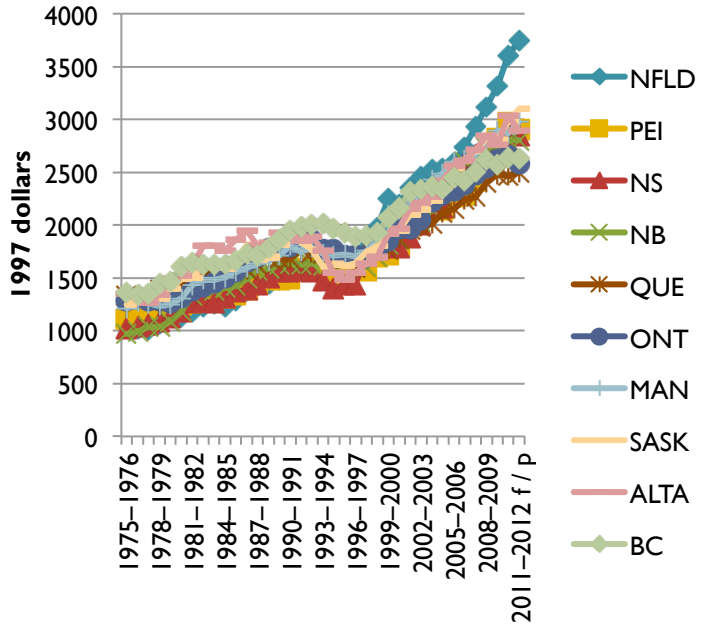
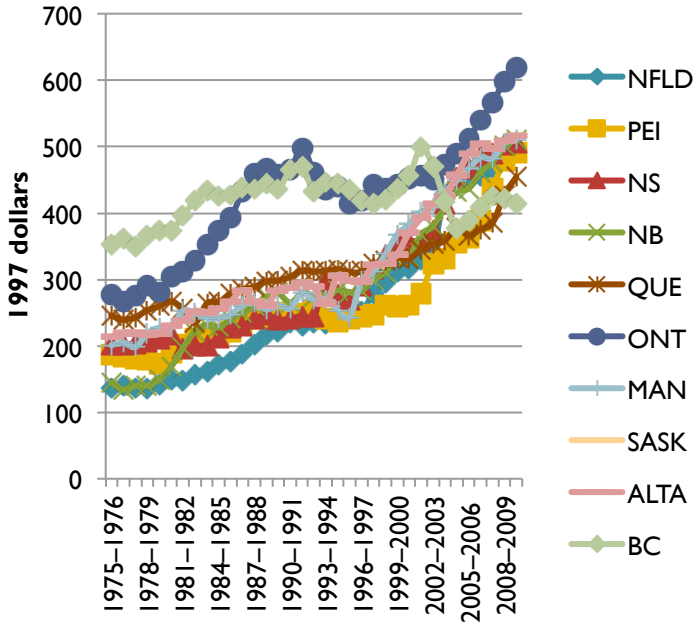


Figure 2: Real Per Capita Provincial Government Physician Spending: 1975-2009 (Data source: CIHI)



Physician Spending in Canada

- Physician spending the second largest component of provincial government health spending after hospitals.
- In 2009, the share of provincial government health spending occupied by physicians ranged from a low of 15 percent in Newfoundland and Labrador to a high of 24 percent in Ontario.
- In 1997 dollars, real per capita provincial government spending on physicians averaged 374 dollars in 1975 and reached 637 dollars in 2009.

Physician Numbers as A Cost Driver

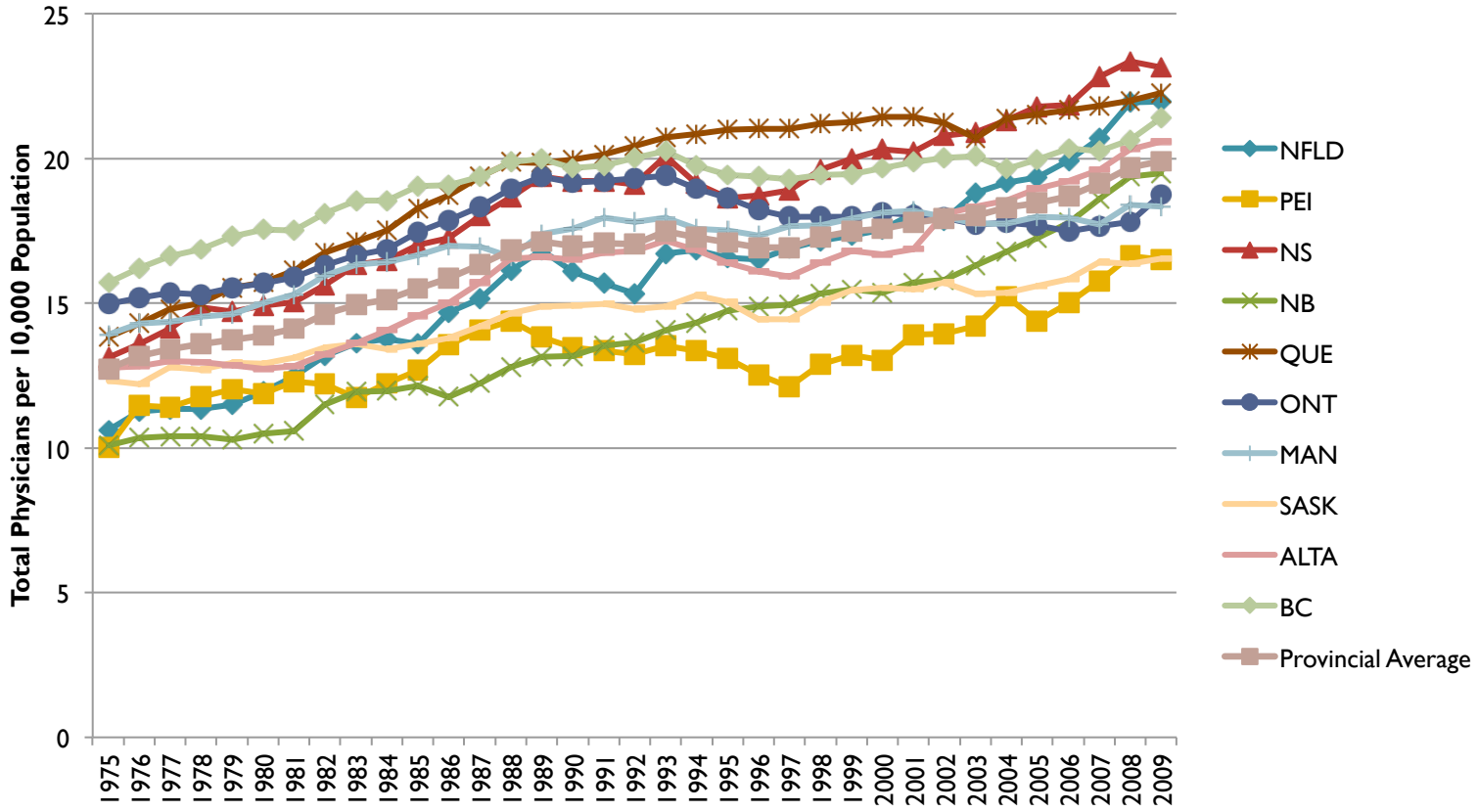
- Roemer's Law: Is generally expressed as "A built bed is a filled bed",
- There is a direct correlation between health system capacity and utilization and by extension expenditures.
- While Roemer's Law was applied to hospital expenditures, it can by extension be applied to physician expenditures. One can argue that a licensed physician is a billing physician.

Factors Driving Spending on Physicians

- The increase in supply of physicians,
- Increases in Fee-for-Service (FFS),
- Alternative Payment Programs (APPs) expenditures
- Increasing utilization of health care per capita

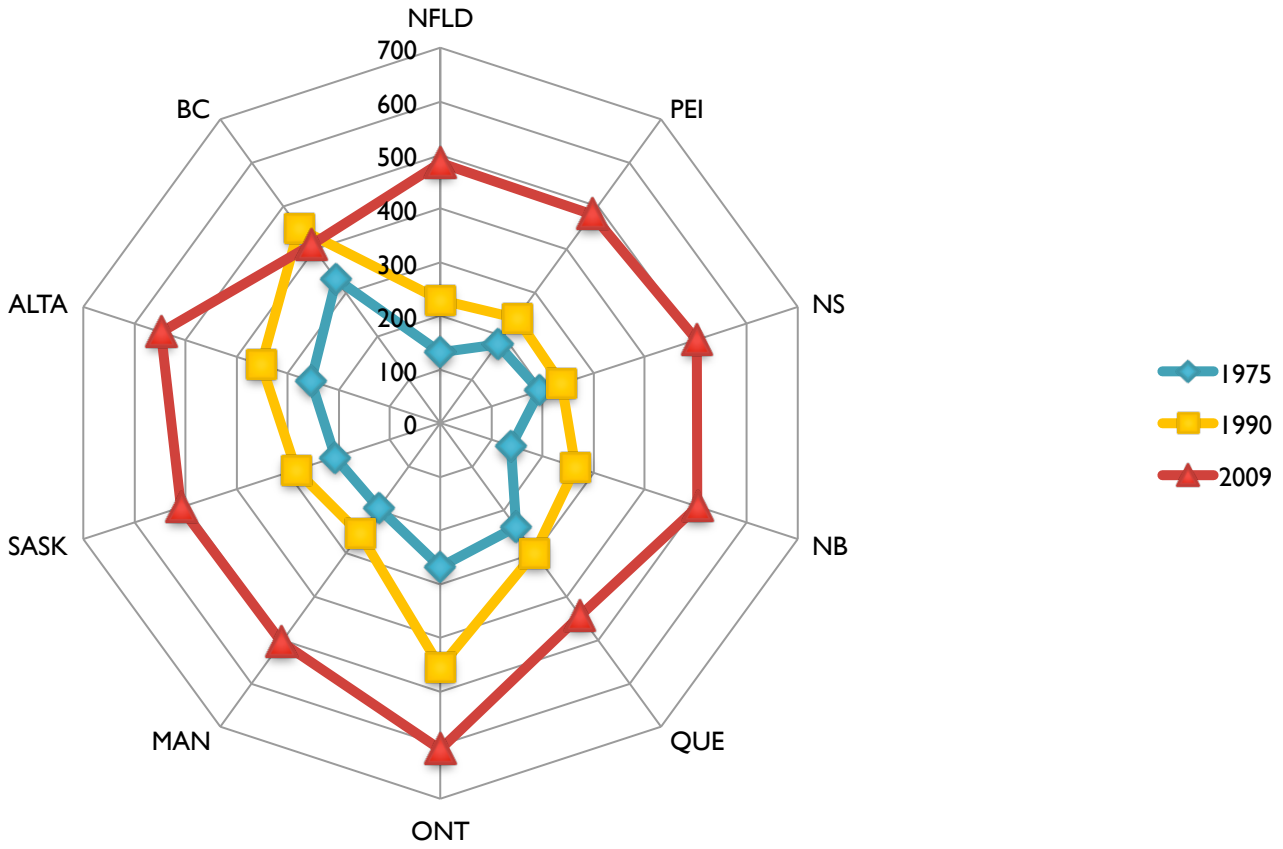
Physician Numbers Have Begun to Grow Since the Restraint of the 1990s

Figure 3: Total Physicians Per 10,000 Population for Canadian Provinces, 1975-2009 (Data Source: CIHI)



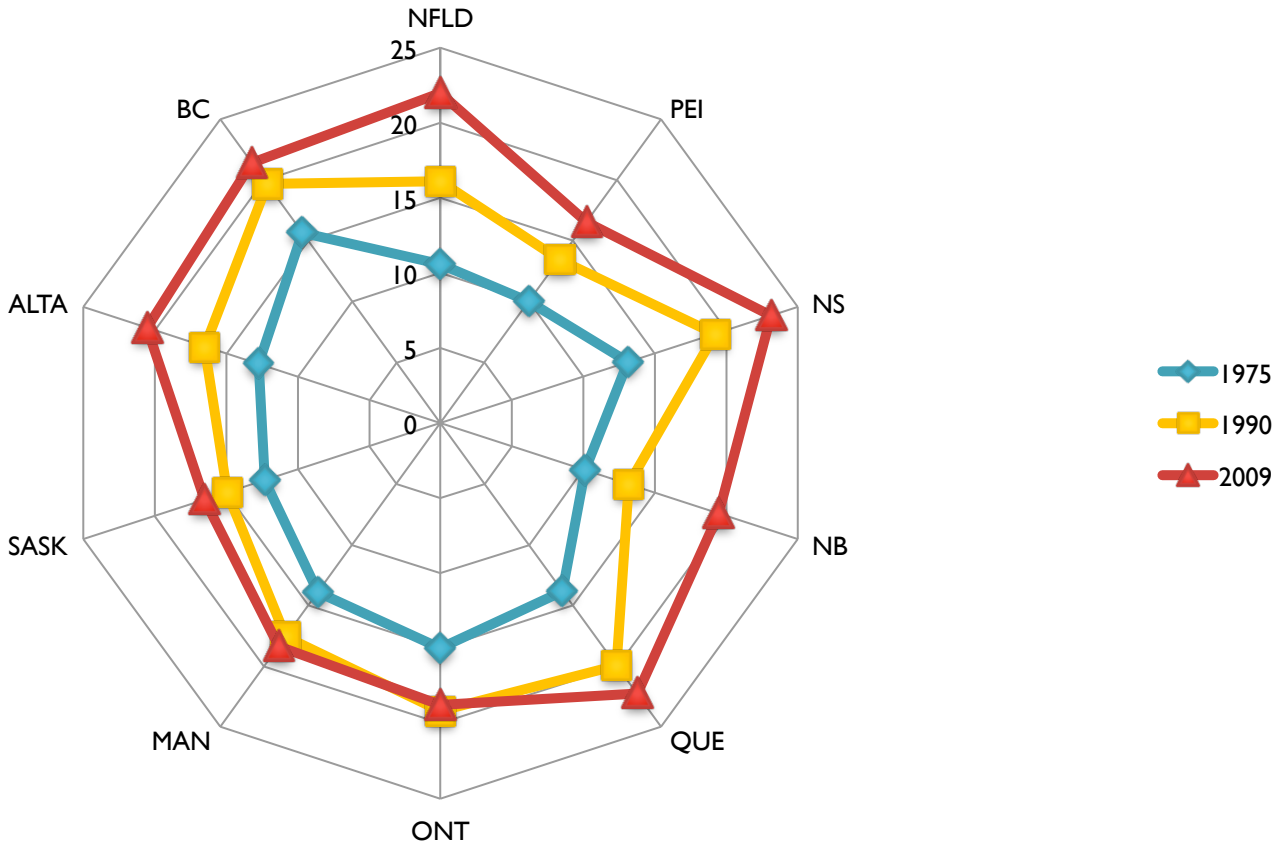
Ontario in particular has seen pronounced growth: Ontario spends the most per capita

Figure 4: Real Per Capita Physician Expenditures by Canadian Province: 1975-2009 (Data Source: CIHI)



Per capita physician number growth more pronounced in the east

Figure 5: Total Physicians Per 10,000 Population: Canadian Provinces 1975-2009



Theory: How do Physician Numbers Affect Spending?

- Supplier induced demand
- Hypothesis that health care providers have and use their superior knowledge to take advantage of the information gap between health care professionals and their patients and thereby influence demand for the purposes of self-interest.
- An agency problem in that reliance of the patient on a physician gives the physician a degree of discretionary influence.

Evidence?

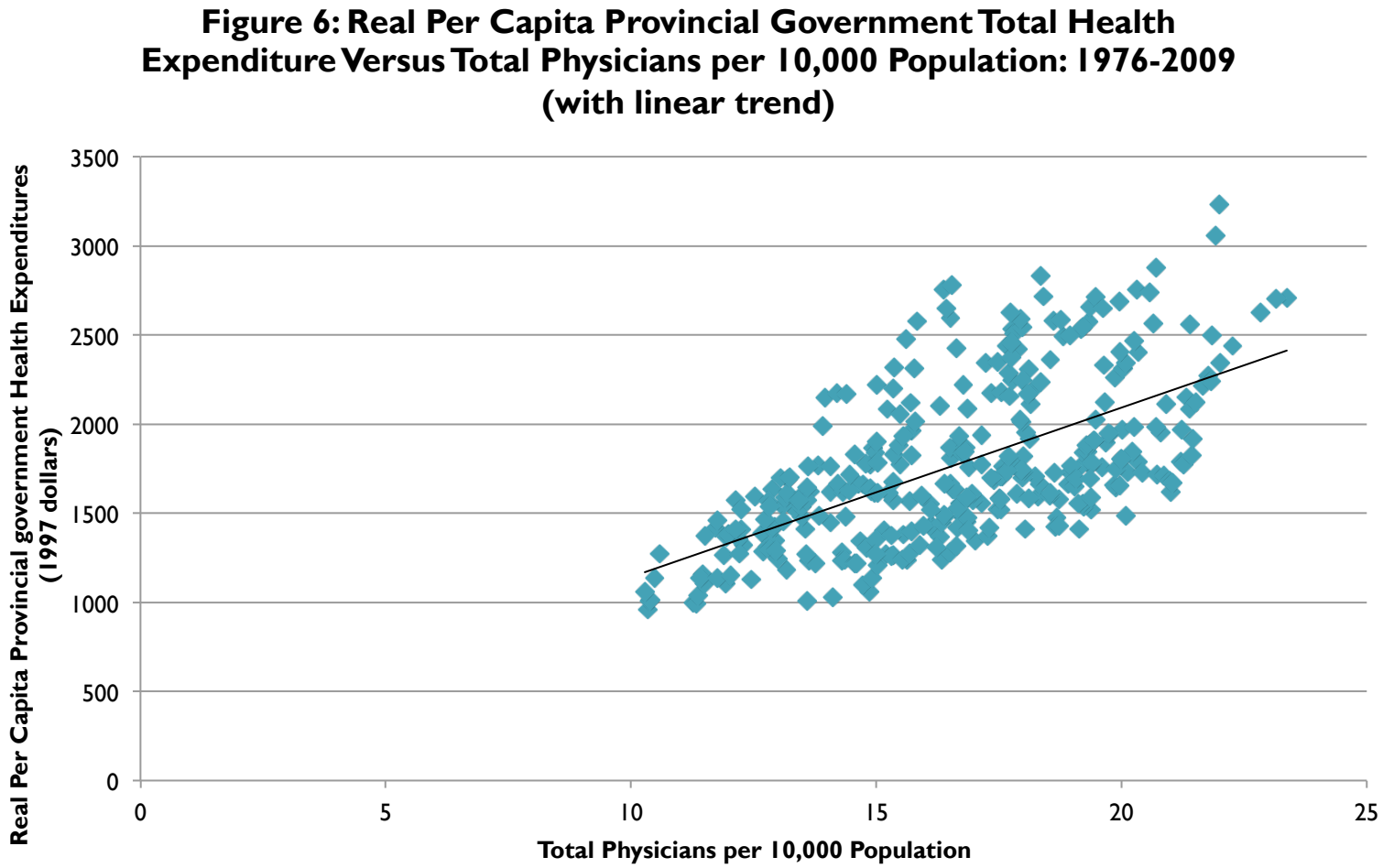


Figure 6: Real Per Capita Provincial Government Total Health Expenditure Versus Total Physicians per 10,000 Population: 1976-2009 (with linear trend)
Real Per Capita Provincial government Health Expenditures (1997 dollars)
3500
3000
2500
2000
1500
1000
500
0
0
5
10
15
20
25
Total Physicians per 10,000 Population

Econometric Model

- A pooled time-series cross-section regression model is estimated for each provincial government health expenditure category of the form:

- (1) $H_{it} = f(PHY_{it}, Y_{it}, z_{1it}, z_{2it}, \ldots z_{nit})$

- Variables:
  - H_{it} is real per capita government health expenditures of the i-th province at period t,
  - PHYit is the number of physicians of the i-th province at time t,
  - Y_{it} is the per capita income of the i-th province at time t,
  - z_1 to z_n represent a vector of social, demographic, economic and policy variables of the i-th province/territory at time t which are determinants of H_{it}.

Dependent Variables

- Real per capita provincial government health expenditures in 1997 dollars deflated using the Government current Expenditure implicit Price Index.
  - Rpgtothltc Total
  - Rpghospc Hospitals.
  - Rpgothinstc Other institutions.
  - Rpgphysc Physicians
  - Rpgothprofc Other professionals.
  - Rpgdrugsc Drugs.
  - Rpgcapitalc Capital.
  - Rpgpubhltc Public health.
  - Rpgadminc Administration.
  - Rpgothltc All other health.

Independent Variables-I

rgdpc	Real per capita gross domestic product in 1997 dollars. Deflated using the Government Current Expenditure Implicit Price Index.
rpgfedtransc	Real per capita federal cash transfer revenues. In 1997 dollars, deflated using the Government Current Expenditure Implicit Price Index.
nfld	1 if Newfoundland, 0 otherwise.
pei	1 if PEI, 0 otherwise
ns	1 if Nova Scotia, 0 otherwise.
nb	1 if New Brunswick, 0 otherwise.
que	1 if Quebec, 0 otherwise.
ont	1 if Ontario, 0 otherwise.
man	1 if Manitoba, 0 otherwise.
sask	1 if Saskatchewan, 0 otherwise.
alta	1 if Alberta, 0 otherwise.
bc	1 if British Columbia, 0 otherwise.
prop6569	Proportion of population aged 65 to 69
prop7074	Proportion of population aged 70 to 74
Prop7579	Proportion of population aged 75 to 79
prop8084	Proportion of population aged 80 to 84
Prop85plus	Proportion of population aged 85 or greater.

Independent Variables-II

Totphysc10000	Number of physicians per 10,000 population.
Famphysc10000	Number of family physicians per 10,000 population.
Specphysc10000	Number of specialist physicians per 10,000 population.
Rprovdebtintc	Real per capita provincial government debt interest. (1997 dollars)
Rpgownrevc	Real per capita provincial government own source revenue (1997 dollars)
Pop	Total provincial population.
year	Year
privshare	Private share of total health expenditure.
epf	1 if Established Program Financing in effect (1977-1995), 0 otherwise.
cha	1 if Canada Health Act in effect (1984-2009), 0 otherwise.
chst	1 if Canada Health and Social Transfer in effect (1996-2004), 0 otherwise.
chtcst	1 if separate Canada Health Transfer and Canada Social Transfer in effect (2005-2009), 0 otherwise.

Estimation

- Data for these regression variables were obtained from the National Health Expenditure database constructed by the Canadian Institute for Health Information, CANSIM-Statistics Canada and the Federal Fiscal Reference Tables.
- Estimations are pooled time series cross sections using GLS, assuming heteroskedastic panels with cross-sectional correlation and panel specific ar(1)

Results

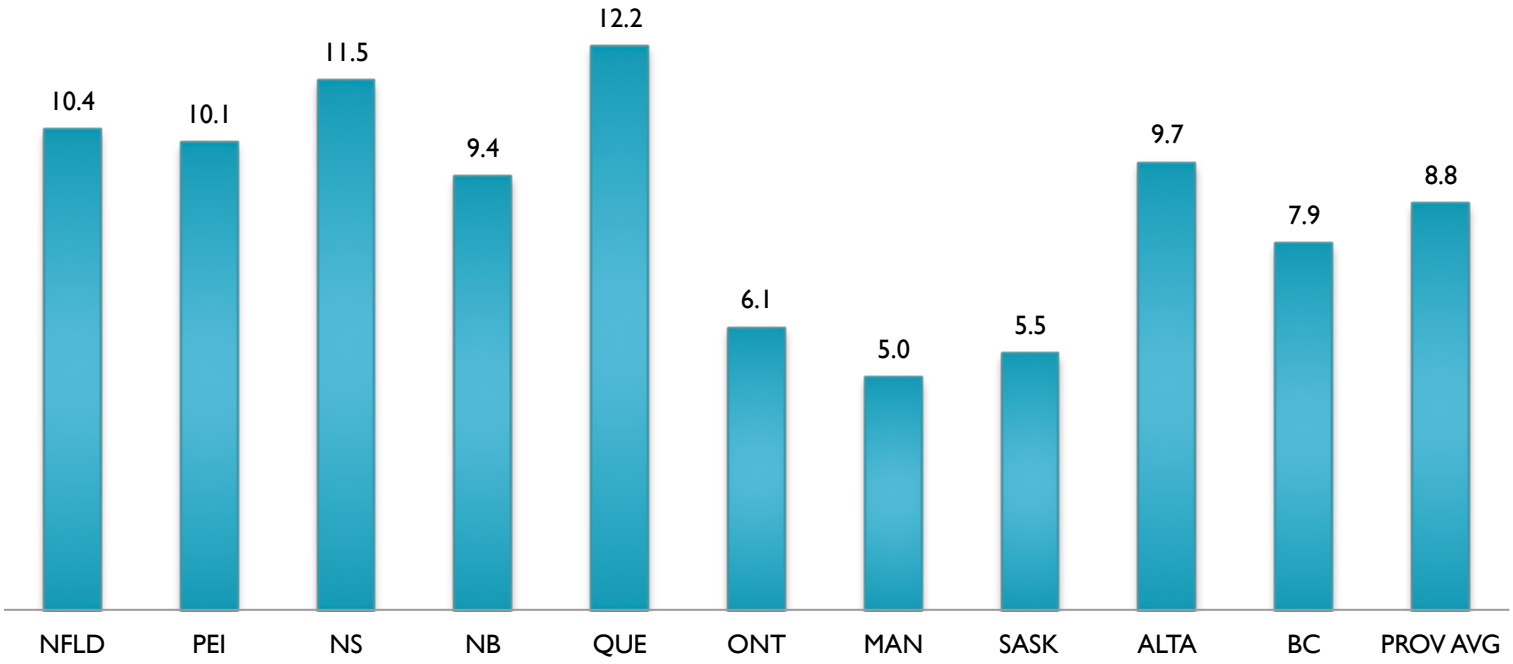
- The number of family and specialist physicians per 10,000 of population is a positive and significant determinant of provincial government health spending for total spending, hospital and physician spending. It is not a positive and significant factor for the other categories of spending.

Results for Total, Hospitals and Physician Spending

	rpgtothltc	z	rpghospc	z	rpgphysc	z
famphysc10000	12.20719	1.54	6.275947	1.44	**6.212573**	**3.75**
specphysc10000	**25.91908**	**2.57**	9.376133	1.63	**9.935124**	**4.52**
rgdpc	0.0058218	2.5	0.0019025	1.5	0.0004652	1.03
rpgfedtransc	-0.001814	-0.13	-0.0048199	-0.67	0.0014489	0.54
rpgownrevc	0.0024688	0.29	0.0053668	1.22	-0.0017173	-0.97
rprovdebtintc	**-0.1715454**	**-4.24**	**-0.0793284**	**-3.92**	**-0.0635455**	**-7.73**
prop6569	**17720.1**	**4.94**	**13326.86**	**7.35**	**1776.671**	**2.38**
prop7074	-8879.959	-1.8	1215.461	0.46	-1072.958	-1.04
prop7579	-4061.057	-0.64	-6366.398	-1.89	-933.5926	-0.72
prop8084	**23709.84**	**3.07**	**9298.548**	**2.22**	1965.187	1.23
prop85plus	**-0.0019014**	**-2.16**	**-0.0022535**	**-3.79**	-0.0005131	-1.95
nfld	151.6284	0.79	123.0445	0.84	-114.1589	-1.35
pei	-64.86203	-0.32	-44.9893	-0.3	-114.4053	-1.31
ns	-113.7725	-0.63	-10.41818	-0.07	-110.346	-1.36
nb	-53.36114	-0.28	26.86586	0.19	-90.17531	-1.09
que	-84.96083	-1.18	-21.02423	-0.38	**-114.8838**	**-3.66**
man	43.89874	0.25	-1.017713	-0.01	-82.41469	-1.04
sask	23.37069	0.13	-97.2511	-0.7	-54.91774	-0.69
alta	96.26117	0.58	53.22935	0.44	-71.69546	-1.02
bc	-12.42532	-0.09	-78.32506	-0.72	168.7081	1.78
pop	0.0183798	0.67	0.0159858	0.78	0.0055583	0.5
privshare	**-816.7248**	**-4.71**	-157.1413	-1.77	-33.46852	-1.04
cha	-4.610675	-0.19	6.124449	0.53	-4.072887	-0.93
epf	-32.84952	-1.35	-20.56304	-1.83	**-11.92591**	**-2.84**
chst	**-103.5143**	**-2.9**	**-60.27225**	**-3.74**	**-13.63236**	**-2.25**
chtcst	-52.69109	-1.17	**-49.59837**	**-2.42**	-4.747737	-0.61
year	**36.04347**	**11.65**	**11.38669**	**7.26**	**7.237475**	**11.17**
_cons	**-70737.93**	**-11.77**	**-22384.81**	**-7.36**	**-14127.28**	**-11.13**
Wald chi2(27)	1577.27		1226.69		3102.9	

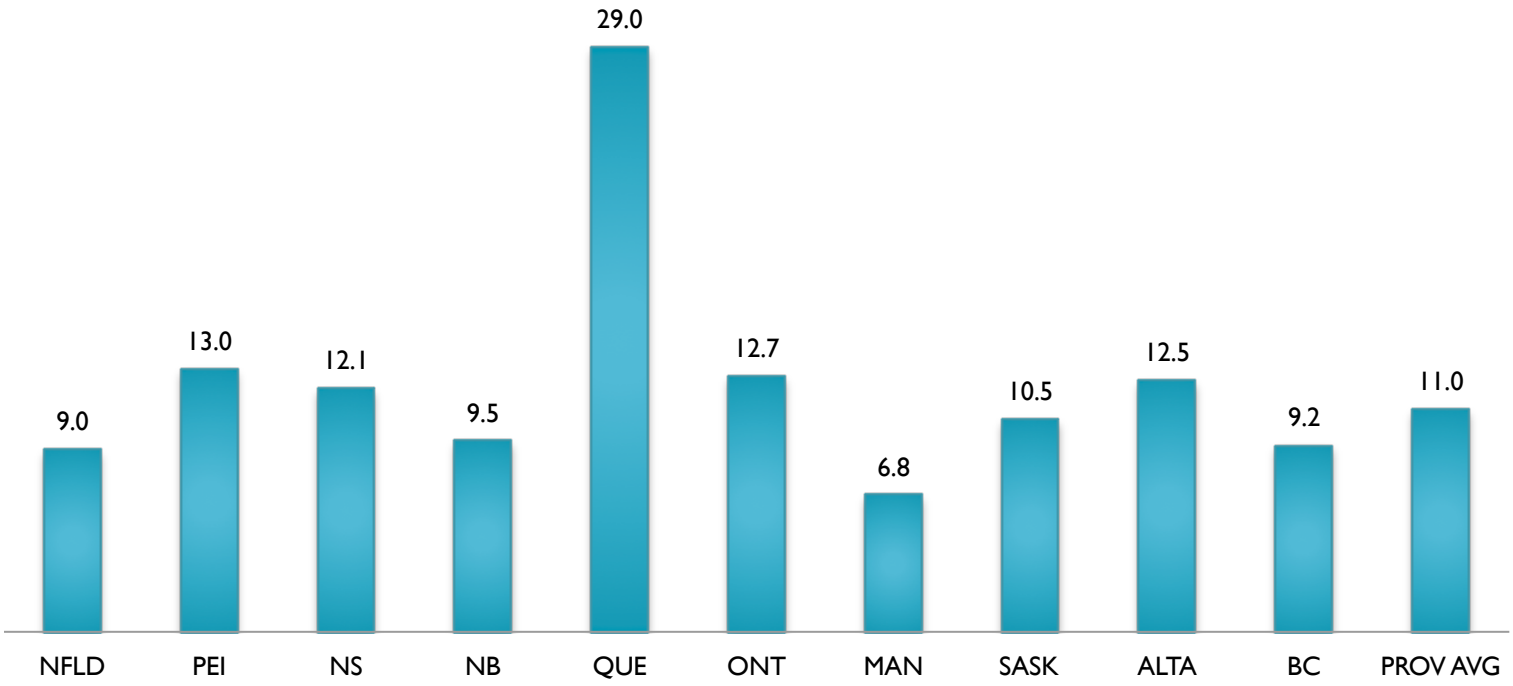
Calculating Physician Number Contribution to Total Provincial Government Health Spending

Figure 8: Percent Contribution of Physician Numbers to Real Per Capita Provincal Government Total Health Expenditures: 1975-2009



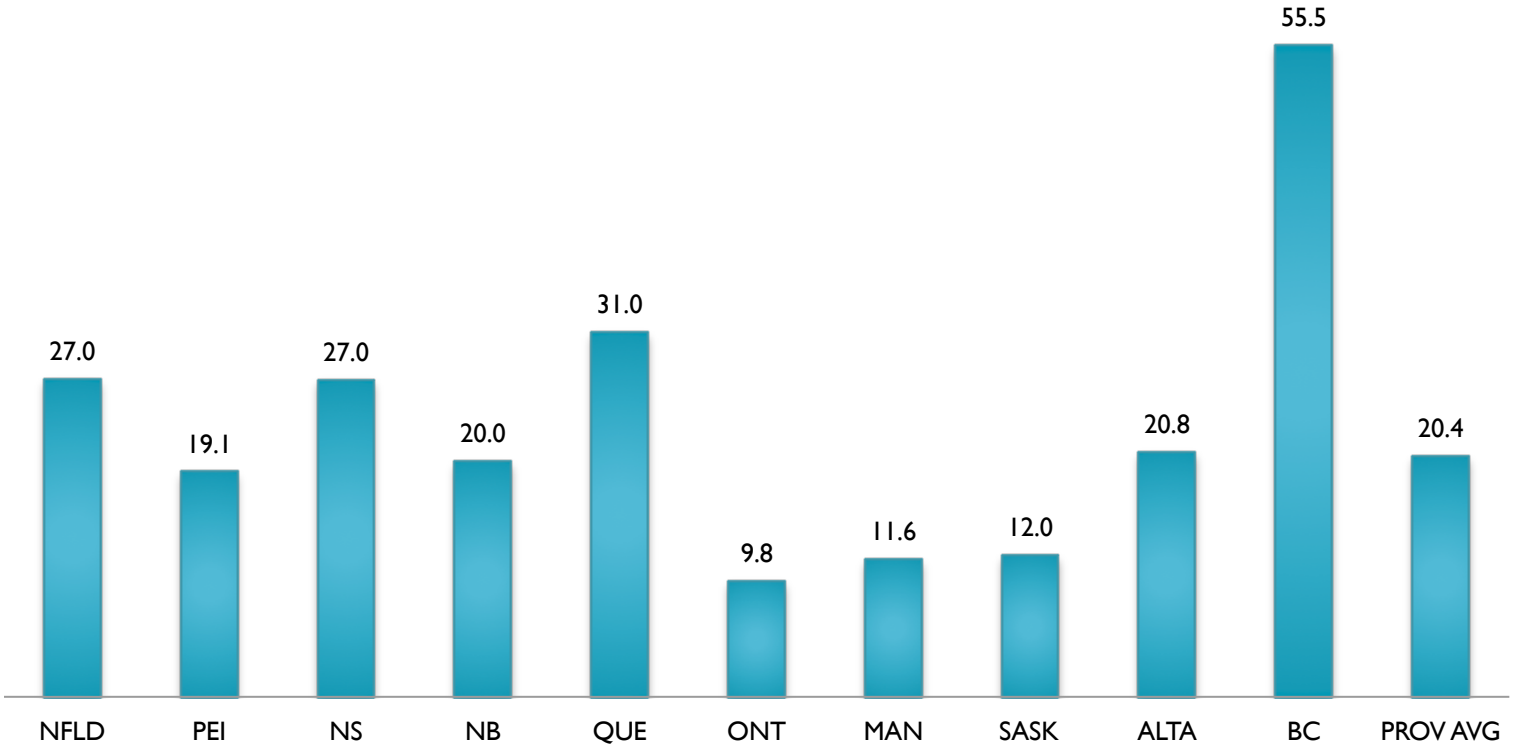
Contribution to Hospital Spending

Figure 9:Percent Contribution of Physician Numbers to Real Per Capita Provincial Government Hospital Expenditures: 1975-2009



Contribution to Physician Spending

Figure 10: Percent Contribution of Physician Numbers to Real Per Capita Provincial Government Physician Expenditures: 1975-2009



Conclusion

- After other confounding factors such as income, time trend, and aging, the deepening of physician supply – that is an increase in the number of physicians per 10,000 of population – is indeed positively correlated with increases in real per capita health expenditures.
- This provides support for a physician version of Roemer's Law – expansions in the supply of physicians and physician capacity can in of itself be a driver of health system expenditures.

However…

- However, the contribution of physician numbers and by extension, induced demand to the increase in overall real per capita health spending is relatively modest at 8.8 percent of the increase. This means that factors other than physician numbers account for 91.2 percent of the increase in spending.

Concluding Thoughts…

- While physician numbers per se may not be as significant a driver, the fact remains that physicians are still a substantial share of government health spending and therefore represent a source of savings.
- This share is a combination of both physician numbers, the number of services provided and fees for the services provided – a mixture of both price and quantity.
- Given the recent increases in physician numbers, the focus for savings has shifted to the fees and payment methods and ultimately may spread to the services provided.

QUESTIONS