Spending on Education *and* Wealth

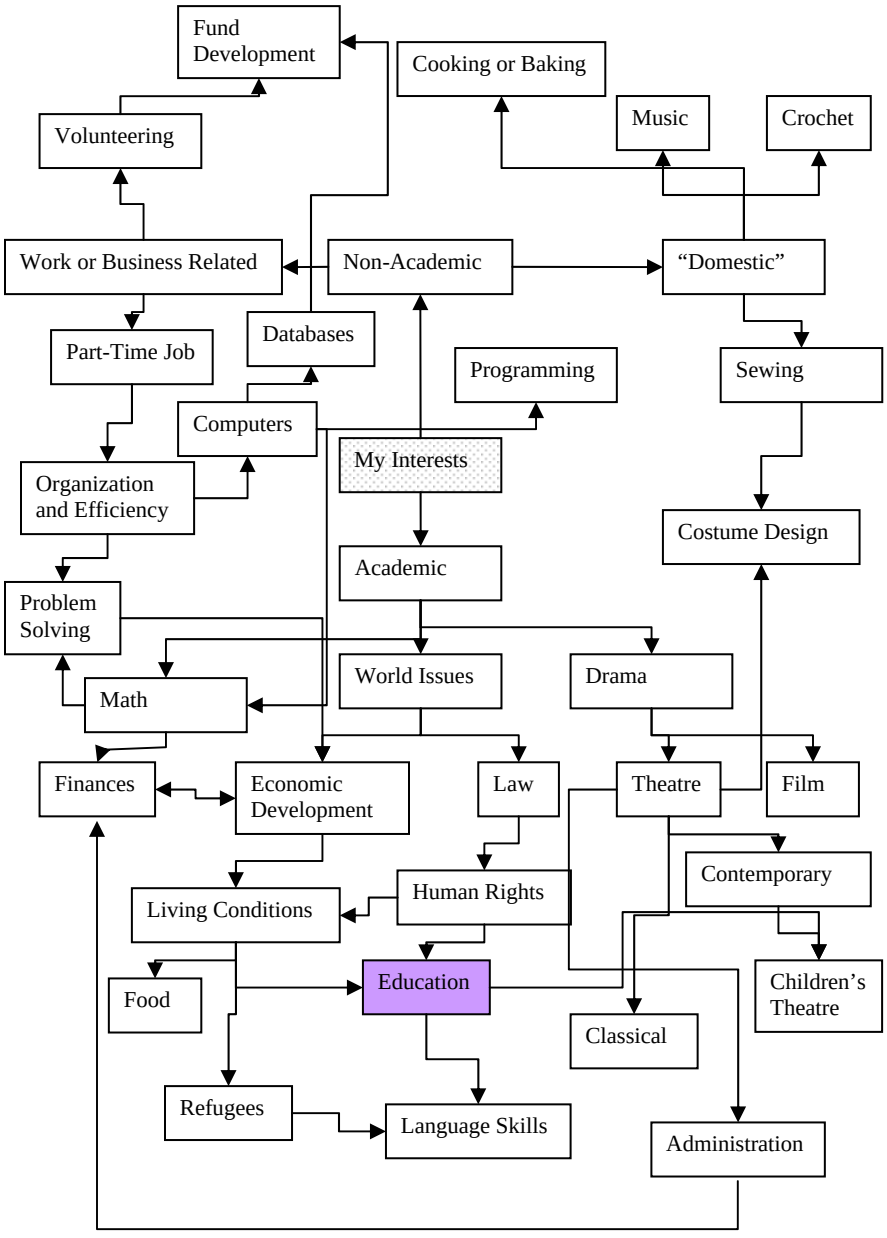
Table of Contents

1 Developing a Thesis and Finding Data 2
1.1 Early Thesis Questions 2
1.2 Defining Data Requirements and My Hypothesis 3
1.4 Further Development of Thesis 4
1.5 Continuing the Search for Data 4
2 Analysis of Data 5
2.1 Looking at Trends in Spending and GDP over Time 5
2.1.1 Finding and Adjusting SPSAC and GDP per person 6
2.1.2 Creating "Fair" Graphs and Trends in Each Province 7
2.1.3 Trends in Newfoundland and Labrador 8
2.1.4 Trends in Prince Edward Island 9
2.1.5 Trends in Nova Scotia 10
2.1.6 Trends in New Brunswick 11
2.1.7 Trends in Quebec 12
2.1.8 Trends in Ontario 13
2.1.9 Trends in Manitoba 14
2.1.10 Trends in Saskatchewan 15
2.1.11 Trends in Alberta 16
2.1.12 Trends in British Columbia 17
2.2 Re-evaluating my hypothesis 17
2.3 Trends in Provincial Spending as a percent of GDP 18
2.4 Looking at Differences in Provincial GDP per person 21
2.5 Probability and Independence 24
2.6 Using Normal Distribution to Analyse the Differences in SPSAC 25
3 Project Conclusions 27
3.1 Regarding My Original Hypothesis 27
3.2 Differences Between Provinces 28
3.3 What Should Be Done in the Future 28

1 Developing a Thesis and Finding Data

1.1 Early Thesis Questions

In order to begin my research I needed to define an area of interest and develop a thesis question. To facilitate the development of my topic and specific areas of interest I drew a mind



map. As I completed this exercise I noticed that many areas were linked to education and the developing world. I then came up with several questions including:

- How does issue-oriented children's theatre affect the likelihood of children consuming alcohol, drugs etc. later in life?
- How well are human rights and international law enforced?
- What is the best way to improve living conditions in the developing world?
- What is the best way to help refugees once they arrive in Canada?
- Do the hours spent volunteering as a youth have an impact on gifts to charities and income later in life?
- How does education affect the economic development and living conditions in a country?

I decided to focus on the last question because the main variables, money spent on education, and Gross Domestic Product (GDP), were quantitative and seemed like they would be easily obtainable. (For a more detailed look at my exploration of potential thesis questions, see Appendix A Developing a Thesis.)

1.2 Defining Data Requirements and My Hypothesis

I wanted to find a relationship between a country's spending on education and its economic wealth. I began to look for both written information and quantitative data on the Internet. I found the *United Nations Briefing Papers for Students* and read the *Education Briefing Paper*[1]. Common sense suggested to me that by spending more on education, a country would be making an investment in its future workers and thus, its wealth and productivity would increase. The *Education Briefing Paper* confirmed the reasonableness of my hypothesis by stating "Education is the key to the new global economy, from primary school on up to life-long learning. It is central to development, social progress and human freedom."[2] and:

> Education is an effective weapon to fight poverty. It saves lives and gives people the chance to improve their lives. It gives people a voice. And it increases a nations' productivity and competitiveness, and is instrumental for social and political progress.[3]

[1] "Education," Briefing Papers for Students, n.d., UNESCO, April 28 2003 <http://www.un.org/cyberschoolbus/briefing/education/index.htm>.
[2] "Education".
[3] "Education".

I would need to decide how long it takes the spending to affect wealth, so I would need data for both education spending per student and GDP per person that would span a period of years and be available for many countries. I would need to adjust for inflation using a Consumer Price Index (CPI) in order to compare from year to year and in order to compare different nations, I would need to adjust each country's spending to international dollars using purchasing power parity (PPP).

1.3 Finding Data

Through searching on the Internet I was able to find some data from the United Nations Statistics Division using the millennium indicators and social indicators http://unstats.un.org/unsd/databases.htm.I was able to find the GDP per person for many countries using the income and economic activity social indicators. Although there were some indicators of school attendance and literacy, there seemed to be no measure of how much each country spent on education per child. I was able to find PPP in 2001 at the World Bank from the World Development Indicators Database http://www.worldbank.org/data/ but this only seemed to be available for selected countries.

1.4 Further Development of Thesis

Due to the lack of data available I decided to take another look at my topic. It seemed that the same sort of relationship with spending and wealth would be true at home in Canada. As more was spent on education, wealth and productivity would increase. Since education is a provincial responsibility I would need data for provincial spending per student and provincial GDP per person that would span many years. I would also need the CPI in order to adjust for inflation.

1.5 Continuing the Search for Data

I found the provincial ministry of education (or equivalent) spending, GDP by province, provincial revenues and federal transfer payments on the Canadian Taxpayers Federation http://www.taxpayer.com/Facts/ . This data only covered a period of about 10 years. The Canadian Taxpayers Federation cited Statistics Canada as the source for its education data so I went to EStat to locate data over a wider range of years. I was able to find the following tables:

- Table 478-0001 Total Expenditures on Education by Direct Source of Funds and Type of Education
    - I selected each province's total funds spent on elementary-secondary; this data was available for the years 1954-1995.

Since the table I found for educational expenditures gave a total, I needed to find data related to the number of students in order to find spending per student. I was unable to locate this data specifically, however population estimates by age were relatively easy to find. I chose to define school age as ages six to eighteen inclusive, since not everyone does kindergarten and most provinces have four year high school programs. I found two tables that together covered the years 1954-1995:

- Table 051-0026 Estimates of Population by Age Group and Sex, Canada, Provinces and Territories, Annual.
    - I selected each province's total for both sexes from each age category for ages 6-18; this data was available for the years 1921-1971.
- Table 051-0001 Estimates of Population by Age Group and Sex, Canada, Provinces and Territories, Annual.
    - I selected each province's total for both sexes from each age category for ages 6-18; this data was available for the years 1971-2001.
- Table 384-0035 Selected Economic Indicators
    - I selected each province's GDP per person; this data was available for the years 1961-1991.
- Table 326-0002 CPI, 1996 Basket Content, annual 1992=100.
    - Unfortunately province-specific CPIs are not available until 1979 data so I selected the national indicator for all items with 1986=100; this data was available from 1914-2001.

2 Analysis of Data

2.1 Looking at Trends in Spending and GDP over Time

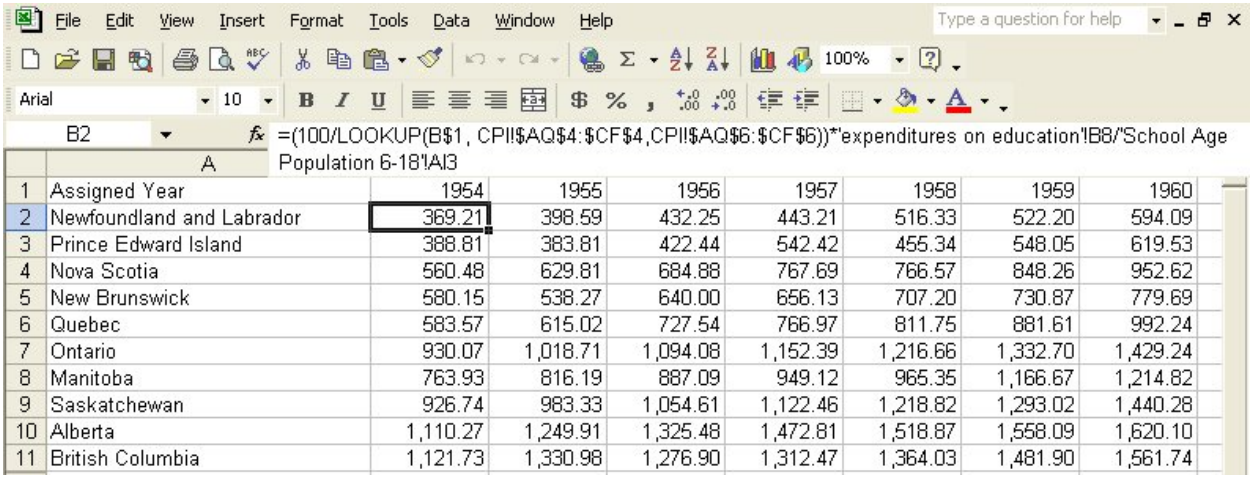
Since I needed to determine how long it would take for an increase in education spending to prompt an increase in GDP, I graphed spending per school age child (SPSAC) and GDP per

person on the same time axis. In order to do this I would first have to calculate the SPSAC and adjust both this value and that of the GDP per person to 1986 dollars.

2.1.1 Finding and Adjusting SPSAC and GDP per person

Using Table 051-0026, for years up to and including 1971, and Table 051-0001, for years 1972 and onwards, I was able to find the population of school age children by adding all the populations from ages six to eighteen. Although I used two different tables to compile this data there did not seem to be any large jump from 051-0026 in 1971 to 051-001 in 1972 so they seem to work together well. Data for Newfoundland and Labrador was not available until it entered Confederation in 1949 however the data in Table 478-0001 does not begin until 1954 so this did not become an issue. The population of the territories was zero for some years, either due to data not being collected or the population being less than 1000, since the data was in persons x1000, so I chose not to include the territories in my analysis.

I then divided the expenditures on education by the population of school age children for each year and each province. However I still needed to adjust these values to 1986 dollars using the CPI. So I used the LOOKUP function in Excel to look for the value of year in the top row of the current column in the SPSAC sheet in the CPI sheet and return the value of CPI in the same column of the found year. I then divided 100 by this value and multiplied by the spending per student for that years. I used a similar procedure to adjust the GDP per person using the CPI.



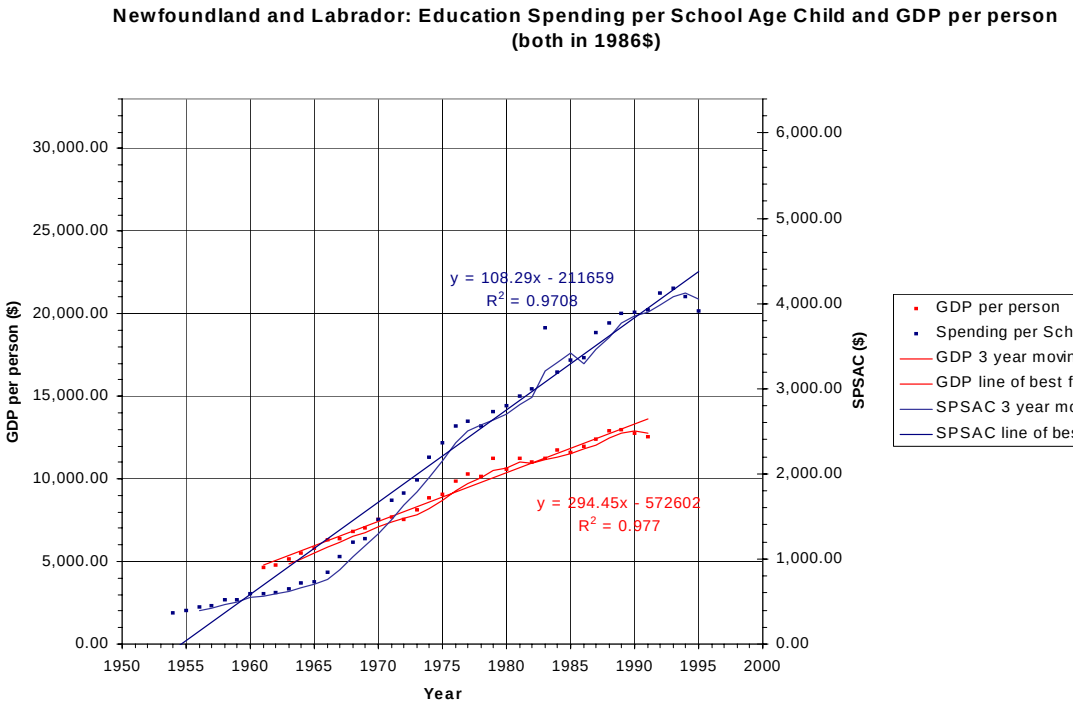
	A	1954	1955	1956	1957	1958	1959	1960
1	Assigned Year							
2	Newfoundland and Labrador	369.21	398.59	432.25	443.21	516.33	522.20	594.09
3	Prince Edward Island	388.81	383.81	422.44	542.42	455.34	548.05	619.53
4	Nova Scotia	560.48	629.81	684.88	767.69	766.57	848.26	952.62
5	New Brunswick	580.15	538.27	640.00	656.13	707.20	730.87	779.69
6	Quebec	583.57	615.02	727.54	766.97	811.75	881.61	992.24
7	Ontario	930.07	1,018.71	1,094.08	1,152.39	1,216.66	1,332.70	1,429.24
8	Manitoba	763.93	816.19	887.09	949.12	965.35	1,166.67	1,214.82
9	Saskatchewan	926.74	983.33	1,054.61	1,122.46	1,218.82	1,293.02	1,440.28
10	Alberta	1,110.27	1,249.91	1,325.48	1,472.81	1,518.87	1,558.09	1,620.10
11	British Columbia	1,121.73	1,330.98	1,276.90	1,312.47	1,364.03	1,481.90	1,561.74

View of screen and formula used to find SPSAC: The $ is used to make the row or column number an absolute reference. B$1 has the reference to the row 1 as absolute while column B is not: when the formula is dragged down a column the computer will always look at the first row, and when dragged across the row, the column reference will be incremented. The LOOKUP function says “find the value of B1 (the year 1954) in the CPI sheet between AQ4 and CF4, then return the value that is in the same column as the found value from AQ6 to CF6”. 100 is divided by this value, then the result is multiplied by the corresponding spending per school age child.

2.1.2 Creating "Fair" Graphs and Trends in Each Province

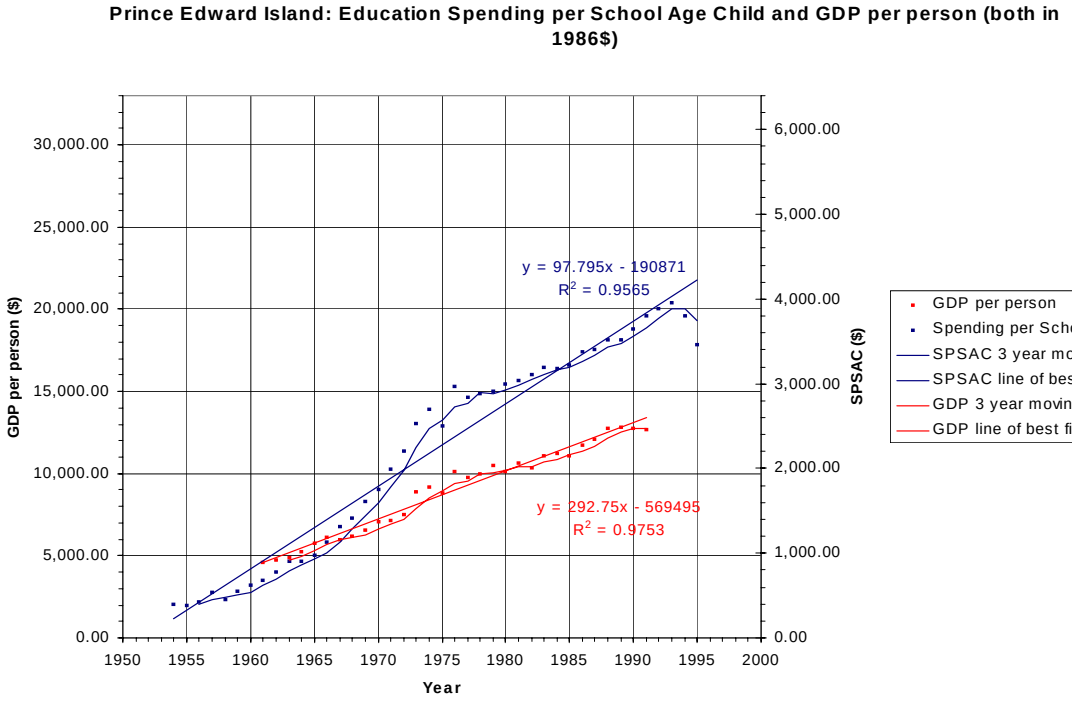
For each province I graphed both GDP per person and SPSAC with the same x-axis for time. Since SPSAC is substantially lower than GDP I graphed it on a secondary y-axis to make the trends more visible. I made the scale of each axis the same for all provinces to offer a fair comparison. To make the trends easier to see and analyse, I created a three year moving average and a line of best fit for both the GDP and SPSAC.

2.1.3 Trends in Newfoundland and Labrador



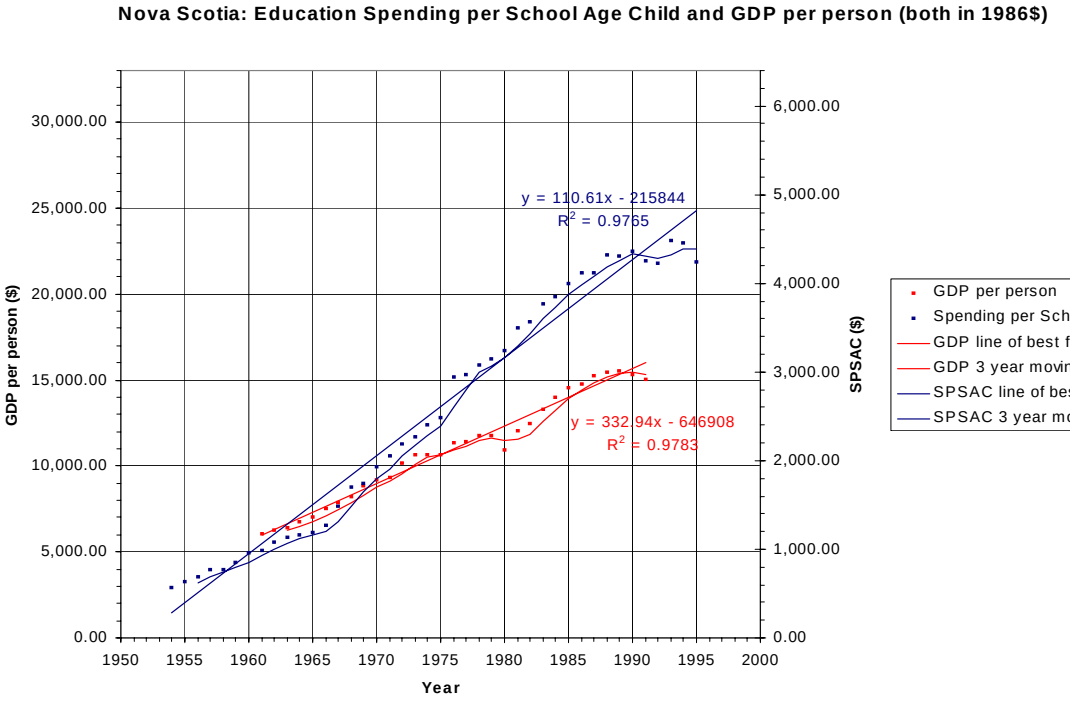
The moving averages of GDP and SPSAC in Newfoundland and Labrador seem relatively parallel. It looks as if instead of more education spending prompting an increase in GDP, as soon as the GDP starts to decrease, SPSAC is cut. Since R^2 is quite close to 1 for both sets of data, these lines of best fit are fairly accurate for my data and there is a strong positive correlation between time and increases in SPSAC and GDP. However, there are clusters of data above and below the SPSAC line up until about 1975 indicating that for these years a linear model may not be the best choice. From the slopes of the lines of best fit we can see that GDP increases at a much faster rate ($294.45/year) than SPSAC ($109.29/year).

2.1.4 Trends in Prince Edward Island



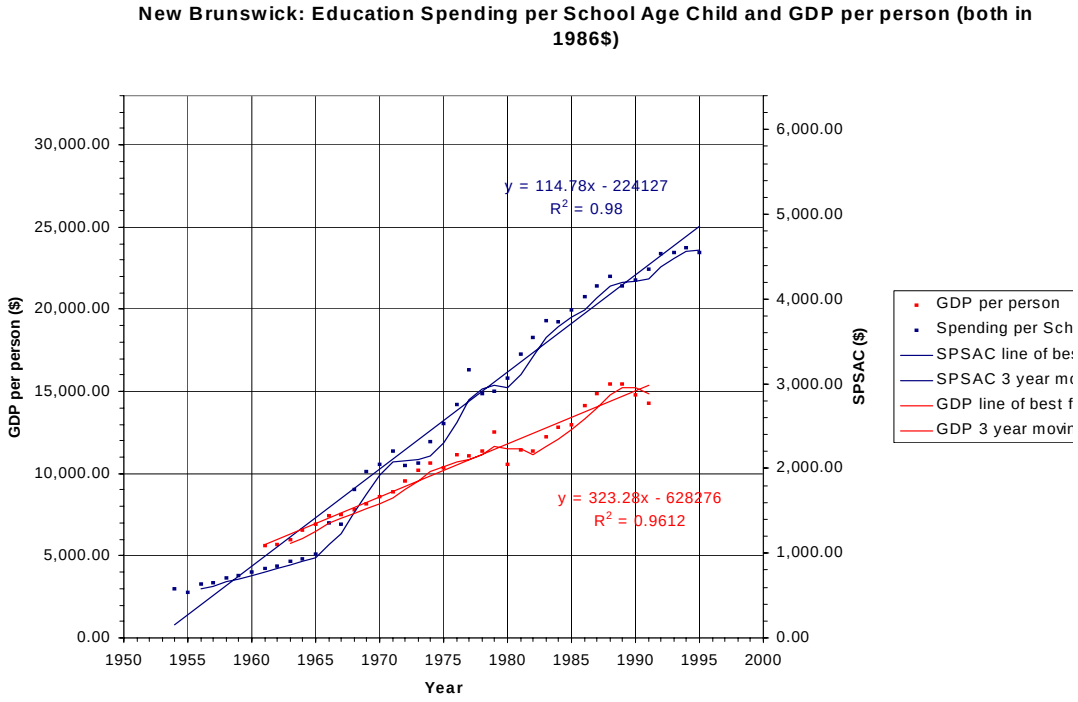
Similar to Newfoundland and Labrador, the PEI data seems to be relatively parallel; if the GDP is low, SPSAC is also low. For the lines of best fit R^2 is again close to 1, for both GDP and SPSAC, although it is slightly lower for the SPSAC. Since there are large clusters of data above and below the line, it may not be the best model for the data. However, it gives a good idea of the general trend over time and the average rate of change with respect to time. Again, from the lines of best fit the GDP growth rate is faster ($292.25/year) than that of SPSAC ($97.80/year). These rates are also slower than they were for Newfoundland, despite relatively close "initial" values in the GDP and SPSAC.

2.1.5 Trends in Nova Scotia



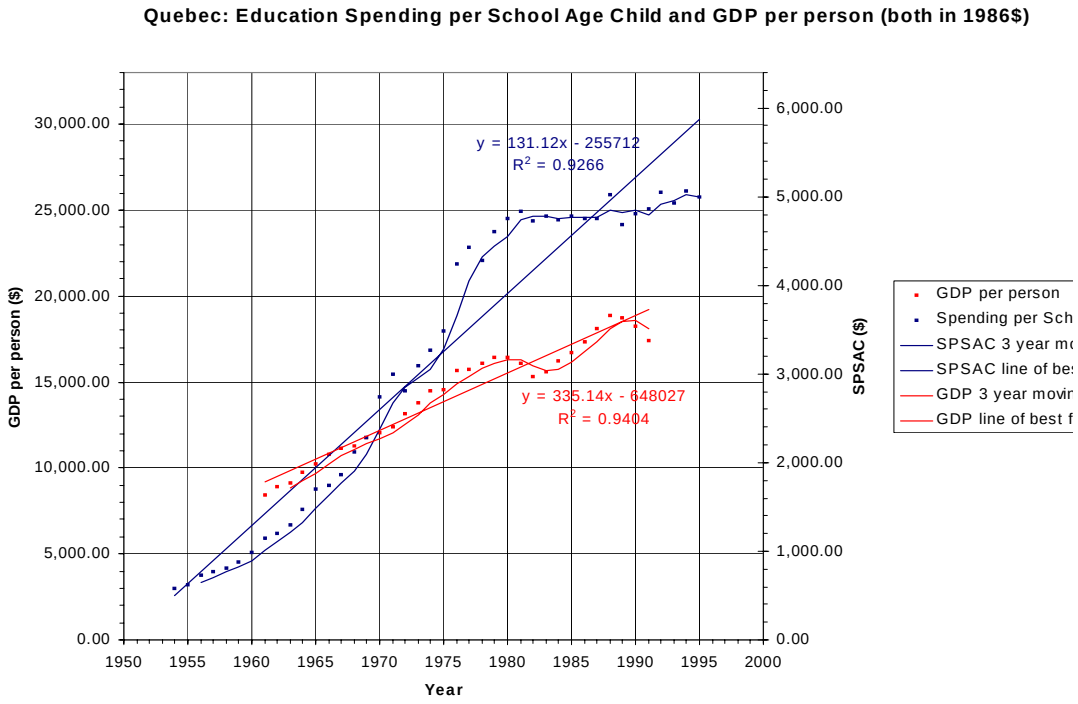
The moving averages in Nova Scotia seem to show that SPSAC and GDP are somewhat parallel as in PEI and Newfoundland and Labrador, however, it appears that there may be a one or two year lag in the change of SPSAC following a change in GDP. Perhaps a change in GDP prompts a change in government which further prompts a change in SPSAC in Nova Scotia. Again R^2 is quite close to 1 for both lines of best fit, indicating a good fit and strong positive correlation. The lines of best fit for both SPSAC and GDP have bigger slopes than in PEI or Newfoundland and Labrador.

2.1.6 Trends in New Brunswick



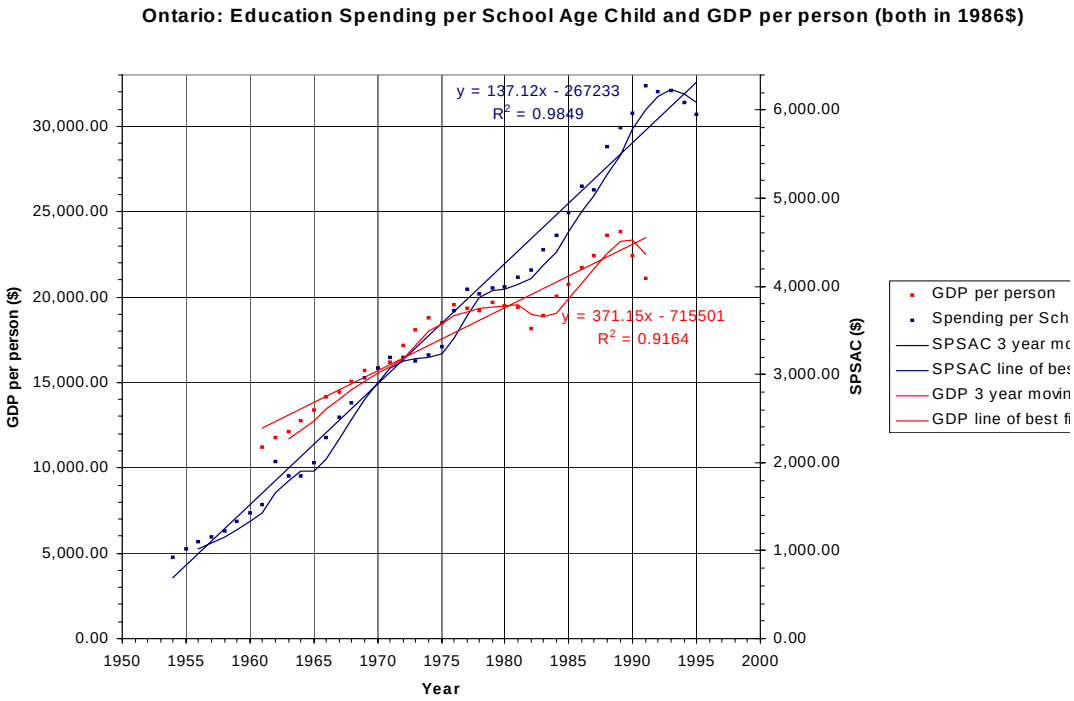
The moving average for SPSAC in New Brunswick seems to show many more fluctuations than any of the other Atlantic provinces. So far this looks like it may be the only province where a "local maximum" or "local minimum" in SPSAC seems to prompt an increase or decrease in GDP in several years. This sort of relationship is more like what I had expected but one or two years doesn't really seem like enough time for the change in SPSAC to have an effect, so there may be another factor which is having an impact on the relationship. The lines of best fit have R^2 is close to 1 indicating that a linear model is a good approximation of the data and a strong positive correlation. Nova Scotia has the biggest slope for GDP while New Brunswick has the biggest slope for SPSAC of the Atlantic provinces.

2.1.7 Trends in Quebec



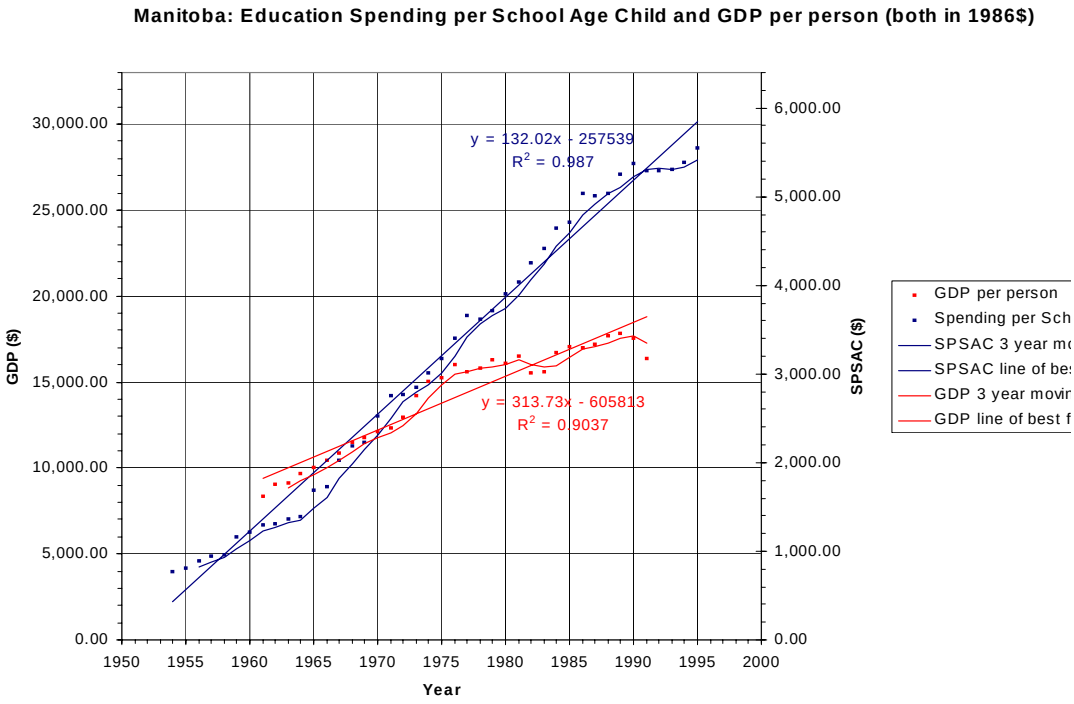
The GDP and SPSAC in Quebec are generally higher than in any of the Atlantic provinces. The moving averages seem parallel, similar to those of the Atlantic provinces until the SPSAC seems to stabilize and remain unchanged despite the dip in GDP in the 1980s. The lines of best fit have values of R^2 that are lower than those of the Atlantic provinces but are still relatively close to 1 so they give a general idea of trends over time. However, the clusters of data above and below the lines would make me cautious about using the lines of best fit to find values for a specific moment in time. The slopes of the lines of best fit are slightly higher than the Atlantic provinces.

2.1.8 Trends in Ontario



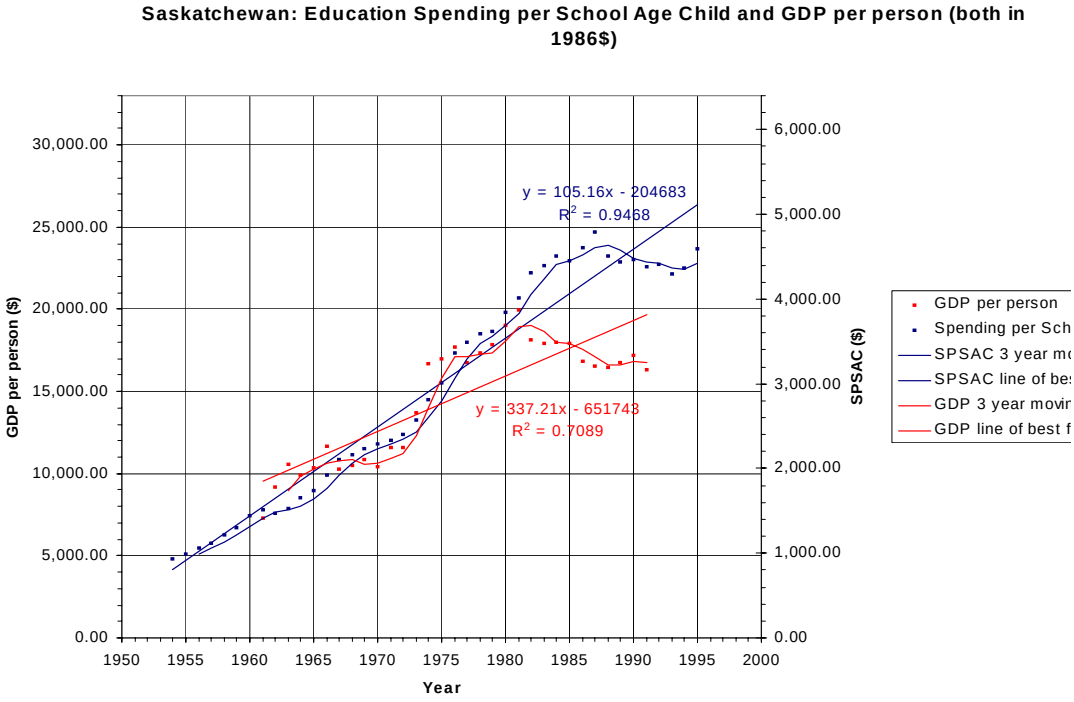
GDP and SPSAC are much higher in Ontario than in the other provinces I've looked at so far. A change in GDP seems to prompt an almost immediate change in SPSAC. Similar to Quebec the dip in GDP in the 1980s did not to slow the increase in SPSAC. The line of best fit for SPSAC has R^2 very close to 1 indicating that a linear model is a good approximation of the data and a strong positive correlation. This also shows that Ontario has increased its SPSAC steadily over time. However the line of best fit for GDP has R^2=0.9164, showing that the data doesn't fit the line perfectly but is still a useful model to show trends over time. Ontario has the biggest slope for the line of best fit for SPSAC, generally the highest SPSAC and the largest slope for the line of best fit for GDP with the exception of Alberta, whose line of best fit is not a very good model. It should be noted that Ontario had a five-year high school program and therefore school age might be more accurately defined as ages six to nineteen, rather than eighteen, which may be causing the funding to appear artificially high.

2.1.9 Trends in Manitoba



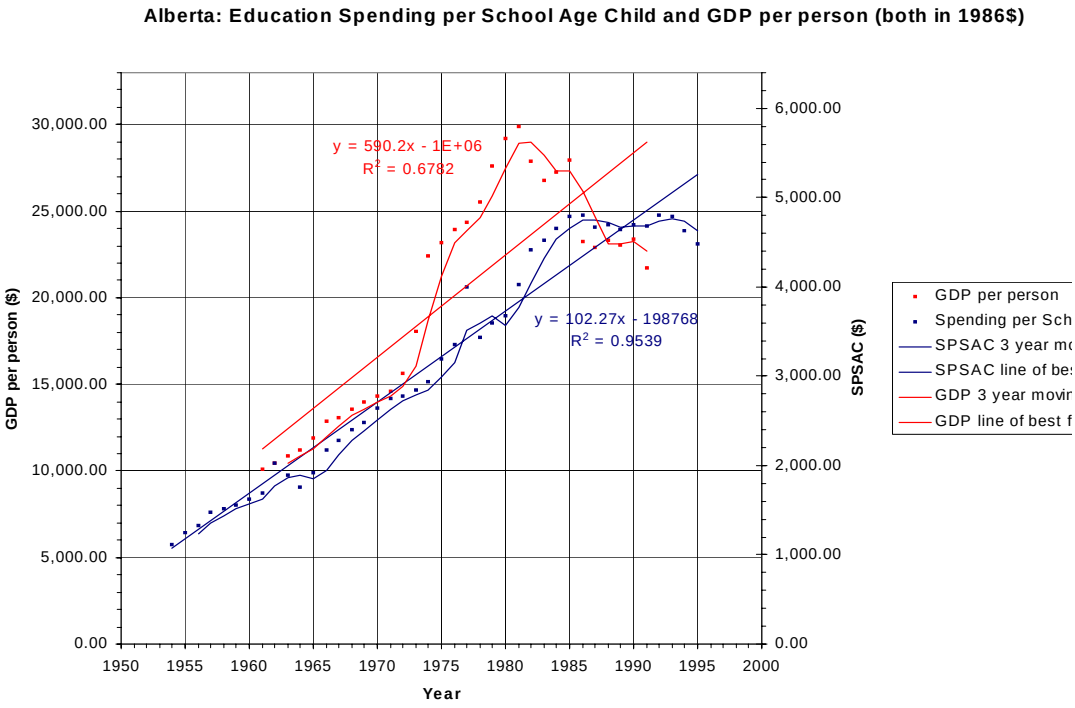
In Manitoba, once again the moving averages of GDP and SPSAC are nearly parallel. However similar to Ontario the dip in GDP (which appear less destructive) doesn't have much of an effect on SPSAC. SPSAC seems to increase fairly steadily as does GDP. The line of best fit for SPSAC has R^2 closer to 1 than does the line of best fit for GDP. However both give a good idea of the general trends.

2.1.10 Trends in Saskatchewan



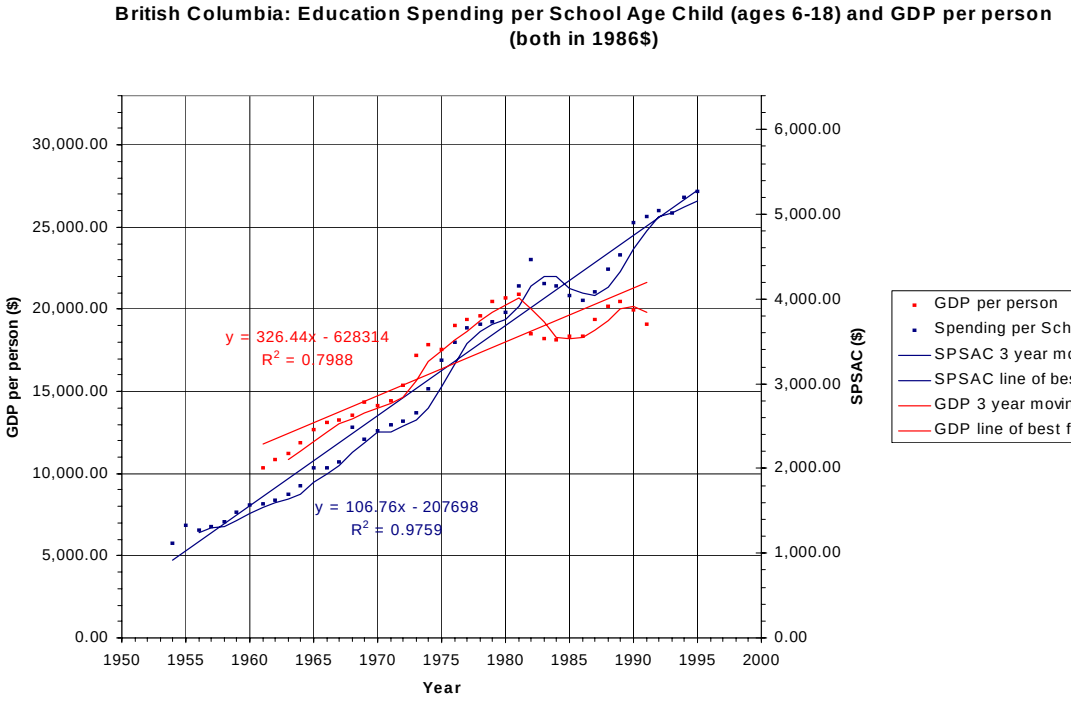
Saskatchewan seems similar to Nova Scotia in that there seems to be a lag in the time it takes for a change in SPSAC following a change in GDP. The lines of best fit do not seem to be as good models as they have in other provinces. Despite the more prevalent fluctuations in GDP, SPSAC seems to have increased fairly steadily over time. When it comes to GDP, there seems to be more fluctuations than in other provinces, this might be because Saskatchewan's economy depends more on farming and the sale of commodities whose prices can fluctuate easily.

2.1.11 Trends in Alberta



Alberta also seems to have a slight lag in the time it takes to cut SPSAC after a decrease in GDP. Both GDP and SPSAC seem to fluctuate more than the other provinces. The line of best fit for GDP is not very good, this is perhaps because Alberta's economy relies heavily on the price of oil, which fluctuates a lot. The line of best fit for SPSAC is not bad, with R^2=0.9539, but there are clusters of data above and below the line, and from the moving average we can tell that SPSAC fluctuates a lot and is not as linear as some other provinces. This is may be due to the fluctuations in GDP.

2.1.12 Trends in British Columbia



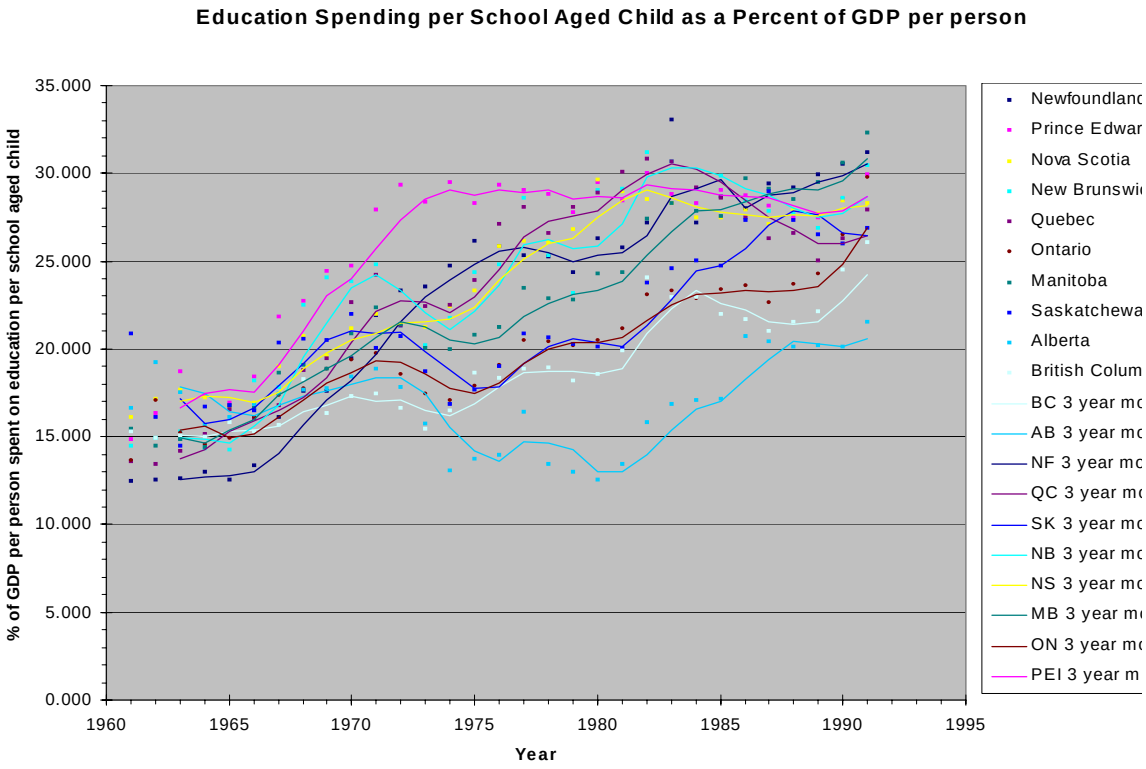
The moving averages show that there is a slight lag in the effect of GDP on SPSAC. This is the only province that shows a dramatic dip in SPSAC, which seems to happen one or two years after a dip in GDP. The line of best fit for GDP is not very good, as British Columbia's GDP seems to fluctuate similarly to Alberta's (although not as dramatically). SPSAC increases over time with a few fluctuations that seem to parallel those in GDP. The lines are a fairly good approximation of this data.

2.2 Re-evaluating my hypothesis

After graphing both SPSAC and GDP over time, it seemed that GDP had the impact on SPSAC rather than the opposite. Generally if GDP is decreasing, a province either leaves SPSAC the same, increases it at a very slow rate or decreases it. This seems counter-intuitive, as an increase in SPSAC when GDP is down would provide more skilled and productive workers in several years, not to mention create jobs for those in the education industry and in other industries used by the education industry. However increased spending requires either increased taxes or cutting money from other areas, and it seems that the short term relief of lower taxes appeals to the taxpayers and voters more than increasing spending on education.

2.3 Trends in Provincial Spending as a percent of GDP

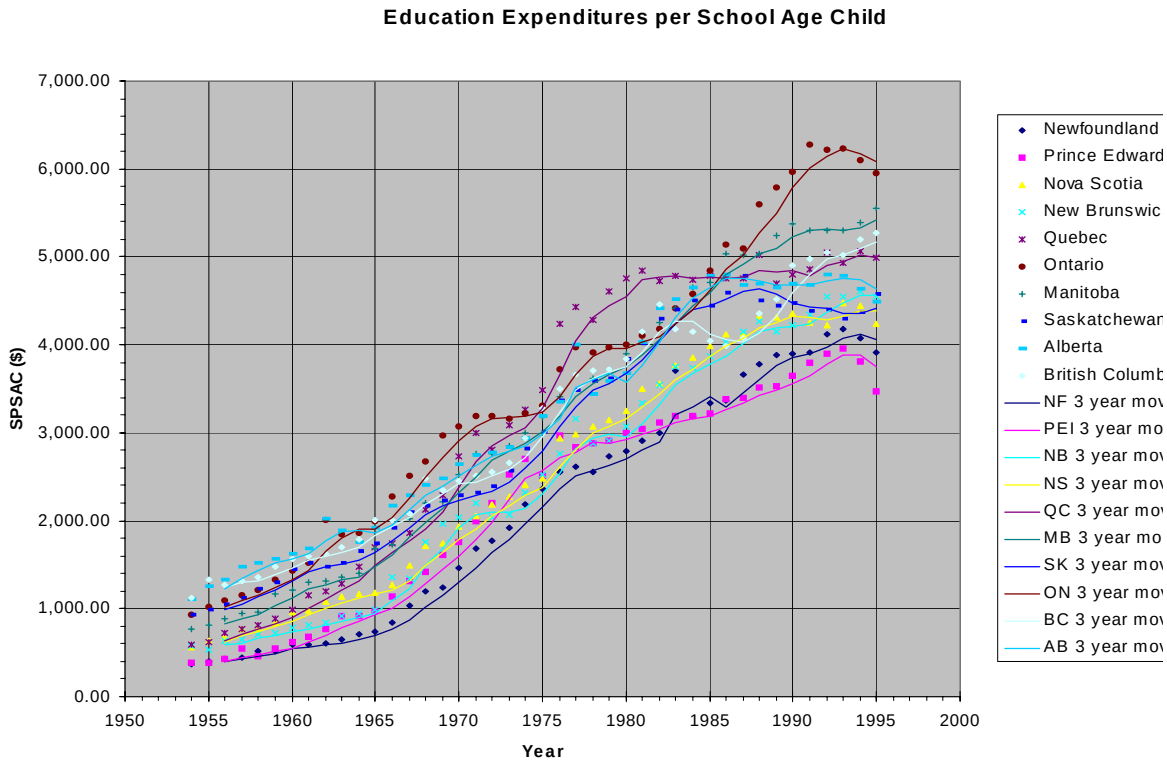
When graphing each province's SPSAC and GDP I noticed a wide disparity between the provinces in both areas. I was curious to see if all the provinces spent proportionally to their GDP. So I decided to graph SPSAC as a percent of GDP.



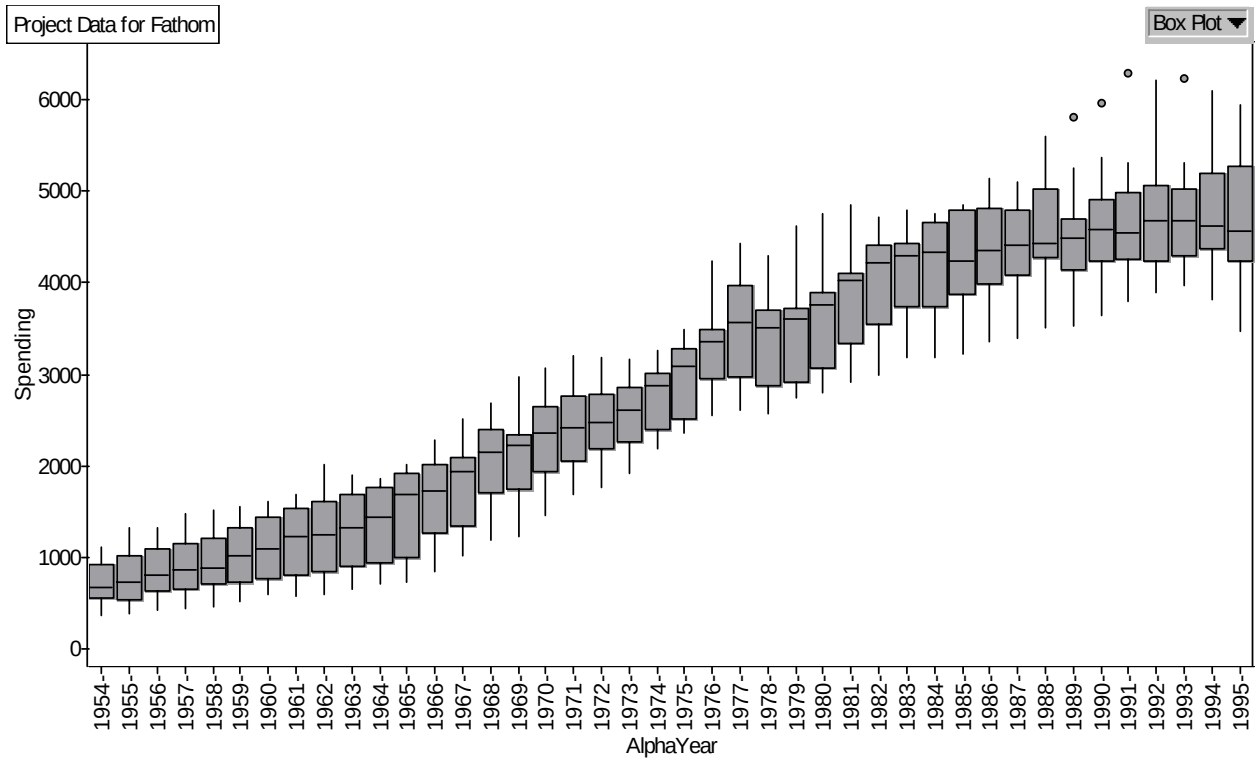
It seemed that the "poorer" provinces were spending a larger portion of their GDP on education. I then realized that since "poorer" provinces receive equalization payments to ensure that " . . . regardless of their ability to raise revenue, [they are able] to provide roughly comparable levels of services at roughly comparable levels of taxation . . ."[4] So it would be more accurate to find SPSAC as a percent of all a provinces expenditures. I was unable to easily locate this data. However, this statement on a federal government website made it sound like since equalization payments mean that a student in PEI should expect a "roughly comparable" amount of money to be spent on his or her elementary and secondary education as a student in Ontario.

[4] "equalization," Glossary of Frequently Used Terms, 28 Jan. 2003, Department of Finance Canada, 20 April 2003 < http://www.fin.gc.ca/gloss/gloss-e_e.html#equal >.

To see if the amounts were “roughly comparable” I graphed each province’s SPSAC over time on one graph.



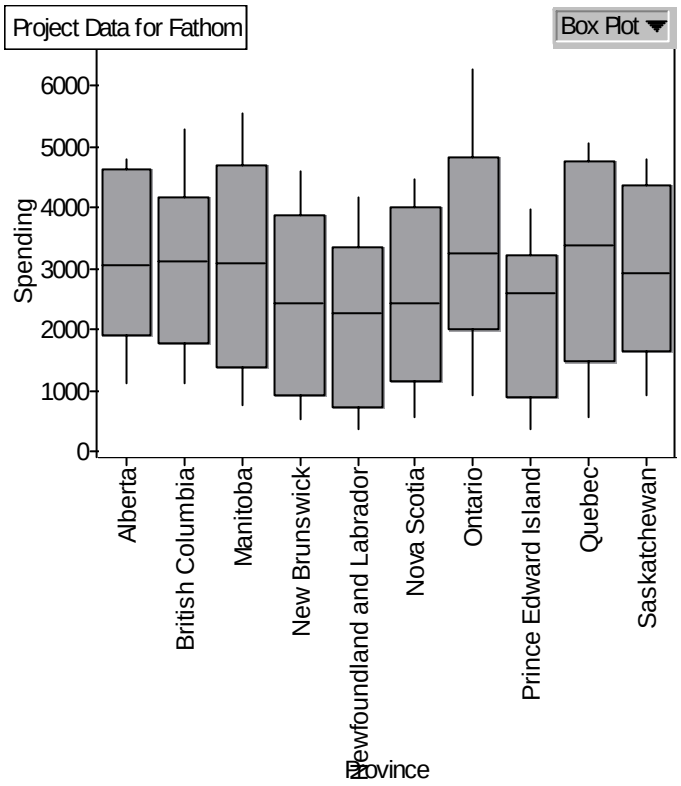
In any given year SPSAC does not look “roughly comparable”, in fact the spread across the provinces only seems to widen over time. In order to get a better idea of how the spread of spending changed over time I drew a box and whisker plot which shows the median as a horizontal line and the first and third quartile as the horizontal boundaries of the box with the whiskers extending to the top and bottom data point. This facilitates an easy gauge of the spread of data. A hyphen has been placed after each year to force Fathom to draw a box and whisker plot.



Generally, the size of both the box and the length of the whiskers increases over time. This indicates that the spread not only on the extremes but in the middle half of the data is increasing, and seems to support that in recent years the provinces do not spend "roughly comparable" amounts on education.

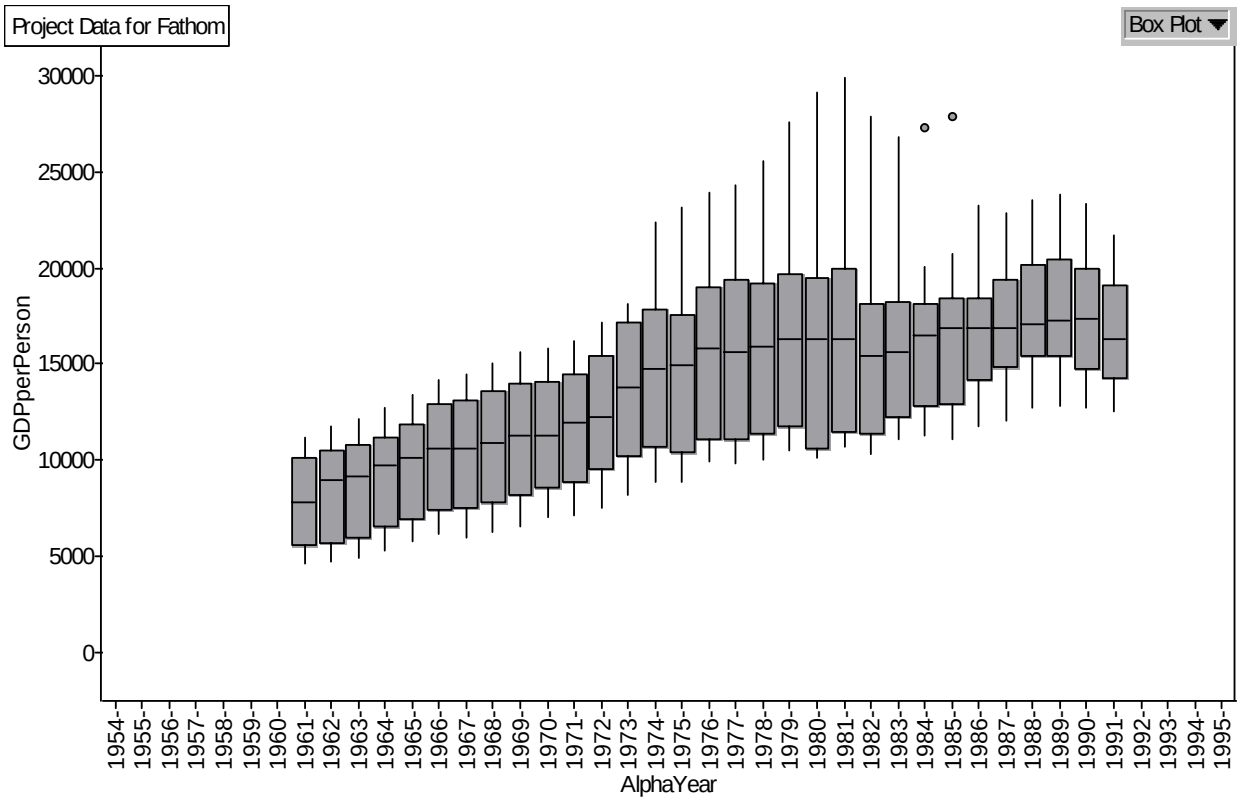
I also wanted to compare the spread of the SPSAC of each province on one graph, so using Fathom I drew another box and whisker plot with the provinces on the x-axis.

From this plot I could see that the median was quite comparable in Alberta, British Columbia, Manitoba, Ontario, and Quebec. Saskatchewan's median was slightly lower than these provinces and New Brunswick, Newfoundland and Labrador, Nova Scotia, and Price Edward Island had medians that were substantially lower. Astonishingly, Newfoundland and Labrador and the lower bound of PEI's third quartile was in about the same range as the medians of Alberta, British Columbia, Manitoba, Ontario, and Quebec and the ends of the whiskers of the Atlantic Provinces were below the lower bounds of these provinces' third quartiles. Ontario seemed to have the greatest range, and PEI the smallest. This confirmed my finding that the levels of funding are not "roughly comparable" across provinces. I would expect the actual cost of delivering education in each province, and at different time periods, to vary slightly due to transportation costs, rural and urban population differences, the capital cost of building more schools to support a changing population, etc. However, the dramatic differences seen here suggest that education spending and the relative ability to deliver a quality education vary substantially from province to province.

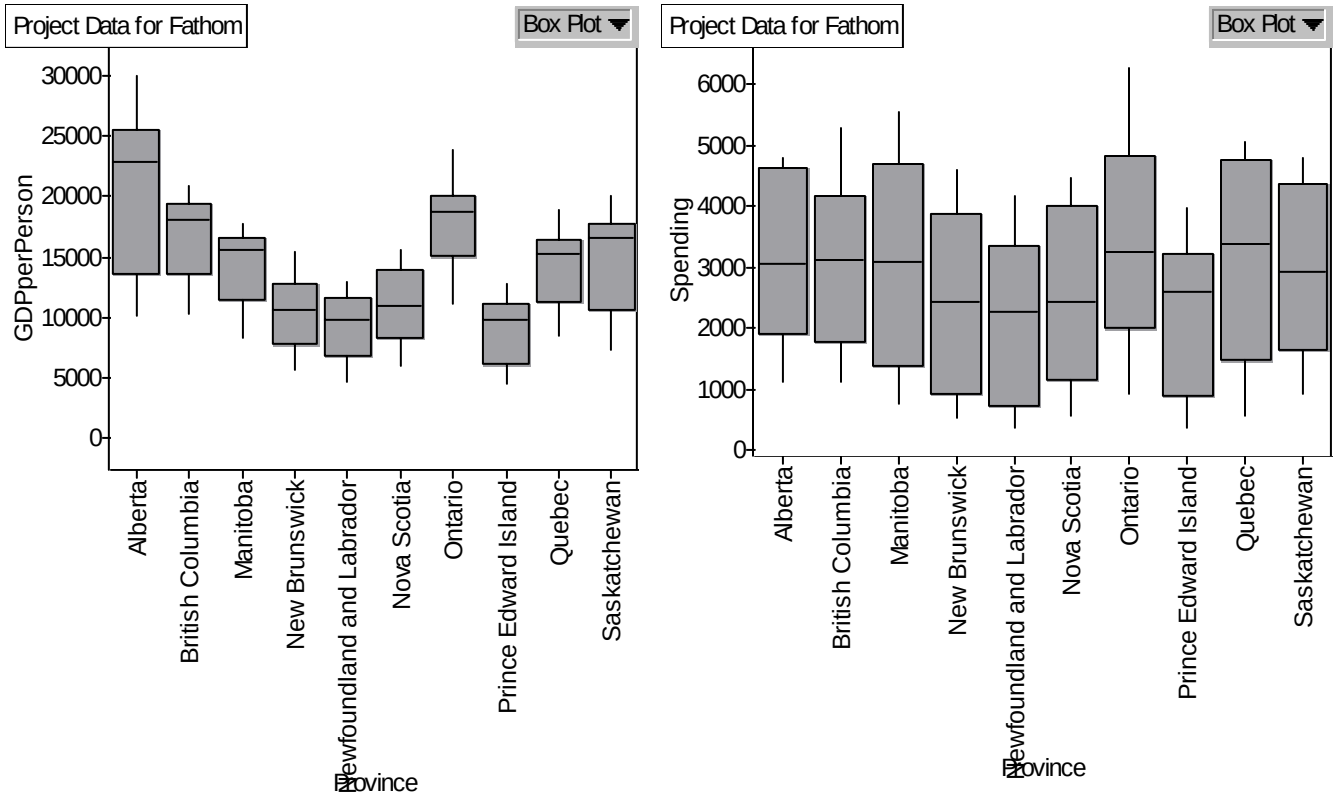


2.4 Looking at Differences in Provincial GDP per person

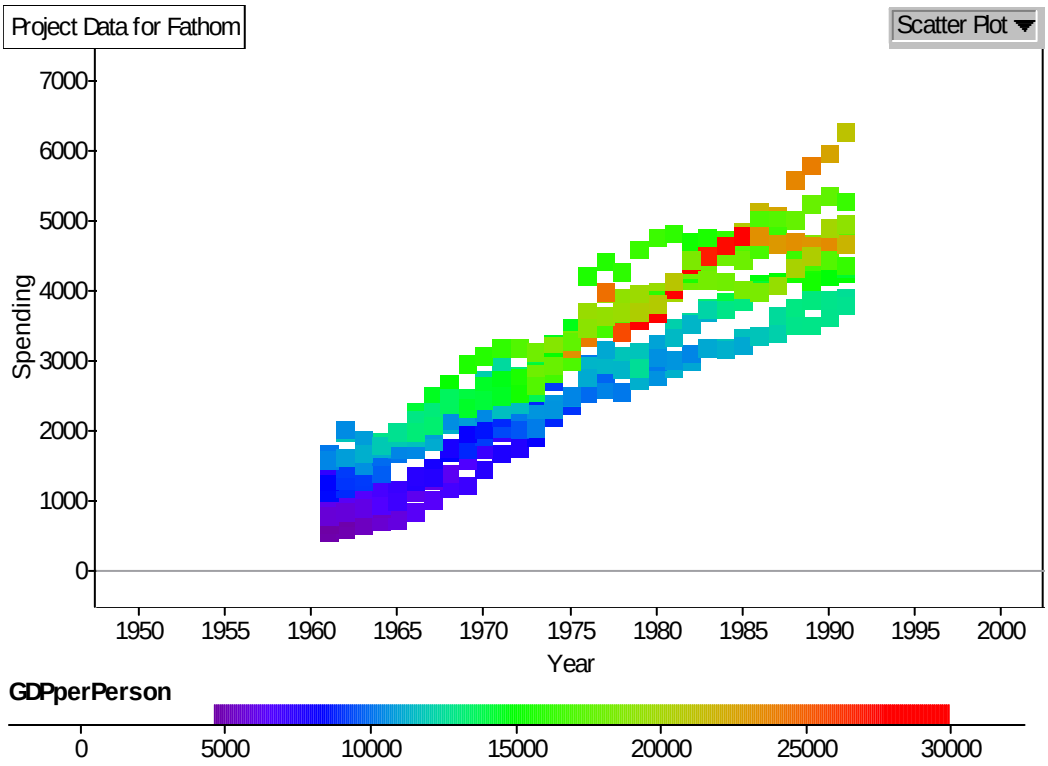
When I was looking at the GDP data in a spreadsheet and on the provincial GDP and SPSAC graphs, I was interested to see what appeared to be a large difference between provinces. I wanted to see if there was consistently a large range in GDPs over time so I followed a similar procedure as with the SPSAC data and created a box and whisker plot for all the provincial GDPs per person over time.



The size of the boxes, indicating the middle range of the data, remain fairly consistent throughout the years, with the whiskers growing larger over time. This would tend to suggest that the rich provinces are getting richer and the poor poorer. The range of the data is widest during the early 1980s. The top whisker, or the top 25% of the data, is almost as big as the box and bottom whisker, the other 75%. This indicates that there is a small number of provinces producing substantially more than the majority of the other provinces. In order to see how the provinces compared to each other, I drew another box and whisker plot of the province's GDP from 1961-1991 with the provinces on the x-axis, similar to the one used to analyse spending.



I could see from this graph that Ontario and Alberta both had GDP's substantially higher than the other provinces. I also noticed the range of the GDP in most provinces was similar, with Alberta having the largest range. Ontario had one of the smaller ranges in GDP leading one to expect SPSAC to also be more consistent. However, when I compared the box plots of SPSAC and GDP I found that Ontario also had one of the larger ranges in SPSAC. Which would seem to suggest that GDP has an effect on, but does not necessarily determine, SPSAC. To better illustrate this conclusion, I constructed a graph of time and SPSAC in Fathom using the GDP as a third attribute.



The general trend appears to be that the higher SPSAC is the higher GDP is however there are several points where SPSAC is sometimes higher in one province with a lower GDP than others. I speculate that the politics of the day, when it comes to choices in government spending, probably play as big if not a bigger role as does GDP.

2.5 Probability and Independence

I wanted to find a more mathematical way to show that the "poorer" provinces, i.e. those with a lower GDP per person, are not as likely to have high SPSAC as "richer" provinces; that is that SPSAC is not independent of GDP. To prove this, I had to find the probability of high SPSAC and the probability of high SPSAC, given the fact that the province is poor. I defined the sample space as being the data for all the provinces from the years 1961-1991 (all years for which I have data for both GDP and SPSAC). So n(S)=310 (31 years of data for ten provinces).

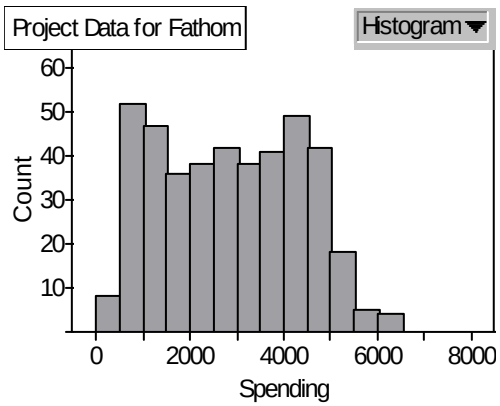
I let A be the event that the SPSAC in a province is high (in the third quartile) and let B be the event that the GDP in a province is low (in the bottom half).

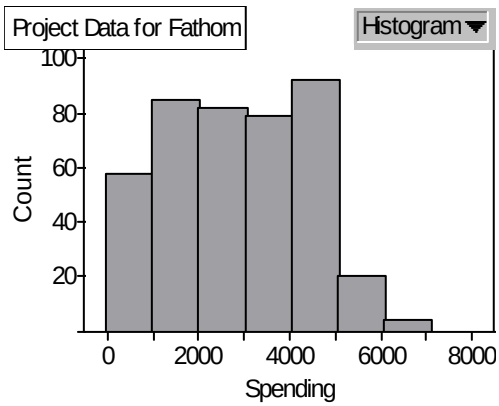
Using formulas in Excel, I was able to find n(A)=78, n(B)=155, and n(A1B)=0; clearly P(A|B)=0 and P(A)=78/310. Since P(A)øP(A|B) A and B are not independent events. This clarified why I had trouble proving that if a province dramatically increased its SPSAC an

increase in GDP would be prompted— A and B are disjoint sets. So “poor” provinces have never reallly spent a large sum on education.

2.6 Using Normal Distribution to Analyse the Differences in SPSAC

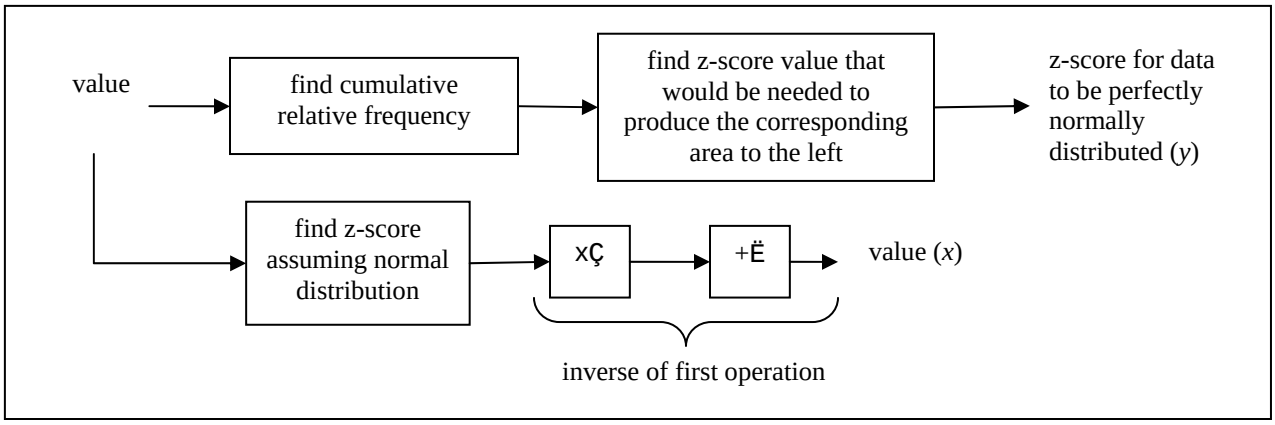
I wanted to see if I could do further analysis with the data regarding SPSAC using the normal distribution. To see if the data was normally distributed I drew a histogram. However, as the class interval was adjusted I noticed that sometimes the data appeared to be uniformly distributed, while at other times it appeared skewed, and still other times it almost appeared if it may have been normally distributed. Here are two examples of the histograms I was able to





create grouping all of the provincial SPSAC data together. The first graph shows more of a gradual decline in frequency as SPSAC increases while the second creates an impression that the data is uniformly distributed with a few outliers.

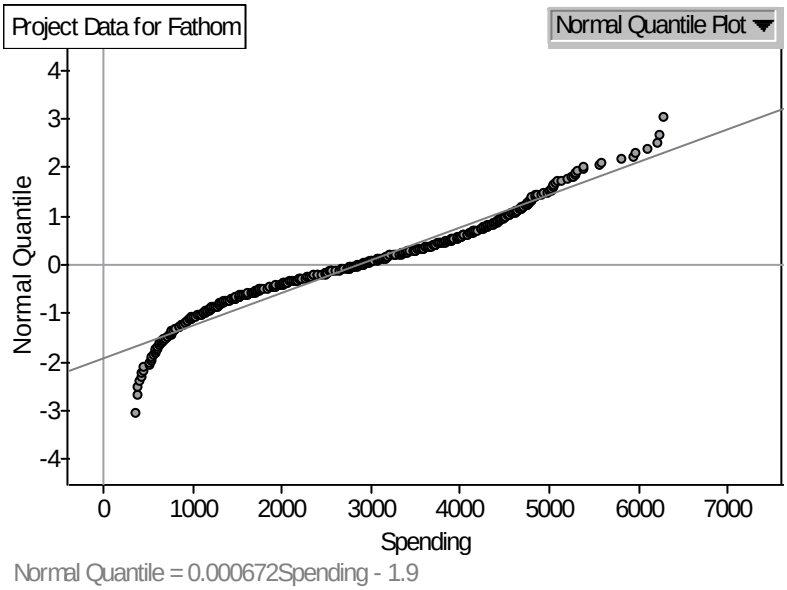
As a result, I created a normal quantile plot in Fathom to determine if I could model provincial SPSAC with a normal distribution. The following input-output diagram illustrates the



steps Fathom takes to produce the normal quantile plot.

If you were to graph before taking the inverse, and the data were perfectly normally distributed you would expect the data to form a straight line with equation $y = x$. However, Fathom graphs the original values of the data on the x-axis, so the inverse, which corresponds to a set of linear transformations is applied. So you would expect the data to form a line with equation $y = (x - Ë)/Ç$.

The normal quantile plot of my data shows a fairly straight line with data below the line at the lower extremes and above at the upper extremes. This indicates that the ends of the graph are not spread out enough, however it follows the line reasonably well so I will assume that the data is normally distributed with mean \$2 848.77 and standard deviation \$1 486.82 and will let X represent the



SPSAC in dollars.

Again, I wanted to show that the provinces with high or low spending were not just randomly distributed. Four out of 420 values of SPSAC are greater than $6000. Using the fact that X–N(2 848.77, 1 486.82^2) I found P(X>6 000)∇0.0170. 4/420∇0.0095, so the normal approximation of my data is not too bad, especially considering I knew that if was a bit off on the extremes. About 1.7% of my data corresponds to about seven provinces spending more than $6 000 in any given year. However, I know from my graph that the only province that spend more than $6 000 was Ontario, and it was all during the 1991-1994 period, so the provinces with high SPSAC are not randomly distributed.

3 Project Conclusions

3.1 Regarding My Original Hypothesis

I was not able to find the relationship I had originally anticipated finding. I would have liked to conclude this project by being able to say "if you spend more on educating each child today, x years down the road, GDP per person seems to increase." GDP is of course affected by many different factors, in today's world global trends especially will have an influence as will the price of each province's key exports. I also had no way of accounting for the number of inter-provincial migrations. It is possible that this would have had an effect, as the best and brightest will often leave a "poorer" province after they have received the necessary education, for brighter opportunities in more prosperous provinces. I would have liked some way to track the "quality" and efficiency of the education provided since all the funding in the world will not make much of a difference if the system is poorly managed. It seems that standardized tests are the only real quantitative data available on the subject. Using a standardized test to measure quality brings up many other issues relating to who set the test, who marks it and student performance not accurately measured. It also would have been interesting to also look at post-secondary funding and how it has changed over the years and perhaps would have had more of an effect on GDP. However I still believe that an investment is required in providing students with a quality elementary and secondary school education as it sets up a student's skills and perceptions of learning for the rest of his or her life.

3.2 Differences Between Provinces

I discovered that there is a wide gap between provinces in both SPSAC and GDP. I knew that many provinces were not as well off as Ontario or Alberta, but these differences were demonstrably significant.

3.3 What Should Be Done in the Future

I would like to see governments increase the SPSAC, especially in those provinces where GDP is low. At a national level, more should be done to reduce the spending gap between the "haves" and the "have-nots". Hopefully in the future, a baby born in Newfoundland will have the same chance of having as large an investment made in his or her education as a baby born in Ontario would expect; that high spending on education will become independent of a low GDP. Perhaps it is only then that we will begin to see GDP rise as a result of spending.