

It is easy to see that the provincial economy would be better with locally owned businesses at work in the timber industry than if the industry was dominated by foreign ownership. More money changing hands in the province means local businesses fare better. More money is available to Saskatchewan residents to reinvest in local ventures. More money changing hands means that more taxes can be collected and social programs are more secure, or could be expanded. Another option is that taxes could be lowered if the tax revenue were to increase, thus freeing up more income inside of the province.

From FIGURE 2 we can see that wages are a small factor compared to the rest of the industry. To simply rely on labor and trade jobs to return wealth to the province in exchange for allowing foreign companies to harvest timber is only beneficial in the short term. As the people of Saskatchewan, we must invest in our own industries to achieve the greatest returns. Then we must reinvest those profits to broaden our economy so that, when our non-sustainable resources run out, we will have new industries to sustain us. Perhaps we can even save some of our nonrenewable resources by seeking more profitable ventures and investing in our own economic development with sustainable industries. Simply working as a labor force for those who harvest and profit from our resources is not sustainable. We earn money for the day's work, but the work will be gone when the resource runs out. And then the profits of both our labor and our resources that we traded off for those jobs will have passed beyond our reach.

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## Educational Returns: The Case of Saskatchewan by Prince Owusu

*A man educated at the expense of much labor and time may be compared to one of those expensive machines. The work which he learns to perform will replace to him the whole expense of his education with at least ordinary profit of an equally valuable capital.<sup>1</sup>*

### 1.1 Introduction

In the early 1950's, Canada's recognition of the importance of education to its social and economic life was motivated by a recommendation of the Economics Council of Canada which stated in its *Second Annual Report* that education is pervasive and basic to the prosperity of Canada.

Based on this recommendation, the government injected massive capital into the education sector to the extent that post-secondary spending grew at the rate of 35% per year between 1964 and 1969. Notwithstanding the initial growth in federal educational expenditure especially at the post-secondary level, such investment could not be sustained. Up to 1968, the federal government supplied about 50% of the operating costs of post-secondary institutions, however this figure decreased to about 15% between 1972 and 1978, and between 1995 and 1996, federal expenditure decreased further by about 2.5%. The federal spending priorities have changed and the burden is now rolled over to the provincial governments and students in the form of high tuition. For instance, from 1985 to 1995, university tuition-fee price index more than doubled to 119%.<sup>2</sup>

It is illuminating to note however that the Saskatchewan government has been doing its best under the circumstances. For instance, the proposed tuition hike of between eight and nine percent for the 1999-2000 University of Saskatchewan academic year was not carried through, due to a provincial grant of about \$5 million which helped to reduce tuition increases to 1.9%. According to Minister Janice McKinnon<sup>3</sup> (1997) "thousands of students are frustrated by the federal cuts which they know are driving up tuition. The provincial government has been replacing dollar for dollar, federal cuts to the Saskatchewan universities. Thus despite the federal cuts there has been tremendous support from the provincial government in support of education and this is reflected in the statistics below.

**Table 1** Provincial Spending on Education (in millions of dollars)

	1999/2000	1998/99	1997/98	1996/97
K-12	558,060	567,052	549,714	542,639
Post-secondary	467,360	434,140	386,139	351,060

<sup>1</sup> Adam Smith, *The Wealth of Nations*. (1776, p42)

<sup>2</sup> Statistics Canada, *The Daily*, November 8, 1995

<sup>3</sup> This statement was made by the Saskatchewan Finance Minister in her 1997/98 budget statement.

Thus provincial spending on post secondary education increased by 33% between 1997 and 1999. Within the same period, spending on K - 12 system also increased by about 3%. The above demonstrates the commitments of the Saskatchewan government to improving the quality and accessibility of education to prepare the Saskatchewan people for success in a rapidly changing, highly competitive knowledge based economy under a healthy learning environment.

The Saskatchewan government has demonstrated a continued commitment to the human resource development in the province in line with the OECD's recommendations that there is a need for coherent policies to encourage people of all ages to engage in learning to make them contribute successfully to the economic progress of nations. Thus human capital development is recognized well beyond educational ministries, at the highest political levels. The OECD Council meeting at ministerial level agreed on the urgent need to implement effective strategies for lifelong learning for all, to strengthen the capacity of individuals to adopt and acquire new skills and competencies.<sup>4</sup>

Expectations for human capital investment to deliver key economic and social goals are now high, but also wide-ranging in nature in the province, however, it must be observed that the Saskatchewan government is not immune to the same fate that beset the federal government's educational investment drive in the 60's. This raises the question of how long the Saskatchewan public can continue to sustain these tremendous investments in its *human capital* development, the basis of its growth in the face of competing expenditures for various programs in this new millennium.

## 1.2 Relevance of Study

Saskatchewan is one of the provinces with higher per-capita expenditure on education.<sup>5</sup> Its cost of education per student has been mid-range in comparison to other provinces and in particular, it was higher than those of the four Atlantic Provinces in 1993 to 1996. Lawton et al (1996). Notwithstanding the above high expenditures, a survey of the Canadian empirical work on the topic under consideration reveals that there has not been any specific work done on the topic under consideration for the Province of Saskatchewan, whereas similar rates have been calculated for the provinces such as Ontario by Stager (1968, 1989), Quebec by Belanger and Lavallee (1980), Cousineau (1984), British Columbia, Quebec, Ontario, Atlantic and the prairie provinces by Vaillancourt and Henriques (1986). This leaves policy makers and individuals in the province with no factual evidence for educational investment planning purposes.

Private decision makers faced with alternative choice of either entering the labor market or furthering their education would want to know if there is any returns from both their time and money in further schooling, and if any what program of study will give them higher returns. Such decisions are better made if the private rates of returns from the investment in education are known to the individual so as to make

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<sup>4</sup>A Communique of the OECD Council Meeting at Ministerial Level, May

<sup>5</sup>[http://www.sasked.gov.sk.ca/k/p\\_e/eval/1994/system\\_goals4.html](http://www.sasked.gov.sk.ca/k/p_e/eval/1994/system_goals4.html)

comparison with other alternative investments.

On the other hand, the public faced with competing demands for the scarce funds between the education and other sectors for the economy, and also between primary/secondary and post-secondary education may want to use the public rates of returns to guide their spending decisions.

These rates (especially in the field specific rates) will be very useful for school administrators in their course evaluation processes such as the Systematic Program Review launched out by the University of Saskatchewan<sup>6</sup> since the rates will tell the evaluators, the efficiency in public and private resource usage in the educational programs.

## 2. Methodology

### 2.1 Data and Estimation

Data for educational costs were obtained from Statistics Canada and the Saskatoon Public School Board Division. Some costs information was also obtained from the University of Saskatchewan.

Getter to the later part of 1998, Statistics Canada released the 1996 Census data for public use. From this data source, the earnings trajectories over the lifetime of individuals with different educational backgrounds are estimated.

### 2.2 Sample Selection Bias

In estimating the lifetime earnings profile, the standard practice has been to ignore individuals with zero and negative income from the sample, due to the fact that a log-linear function is mostly used to estimate the earnings profile. It is argued here that, the use of only people with positive incomes are chosen. Thus by selecting people with positive income, we have systematically included only people with high aptitude for market work as opposed to people with less aptitude for labor market work.

The significance of this consideration is that the measured rate of return to education may understate the actual return for those with high aptitude for labor market work and also overstate the return for those with less aptitude for labor market work.

Willis and Rosen (1979), calculated the rates of returns to college education in the USA and corrected for the ability and selectivity bias. They obtained the rate of return to college education to be 9.9 percent after correction for ability and selectivity biases.

All the earlier works done on the returns to education in Canada did not correct for the sample selection bias. The bias is inevitable given that the estimation procedure is to estimate the income trajectory by using a semi-logarithm linear regression with income as the dependent variable. Thus the natural log of people with zero and negative income is not defined. The result of this approach leads to exclusion of people with negative and zero income from the income data. It is argued that this exclusion will lead to bias

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<sup>6</sup>A summary of the Program Review is found in the On Campus News. Vol. 6, No. 16, May, 1999.

estimate of the lifetime income, and hence needs to be corrected by applying standard econometric estimating technique given by Heckman (1979).

Greene (1997), following the work of Heckman (1979), lists a two-step estimation procedure for correcting the sample selection bias arising from the non-experimental nature of sample.

- Estimate auxiliary probit equation by maximum likelihood to obtain. The probit equation gives the probability of labor market participation of the individuals in the whole sample. From the estimate of the probit equation, a variable called the Inverse Mill's ratio or the Heckman's Correction Variable or the Sample Selection Variable, which is denoted by  $\lambda_i$ , is computed for each observation in the selected sample as follows

$$\lambda_i = f(\hat{\alpha}X)/F(\hat{\alpha}X)$$

Where  $\hat{\alpha}$  the vector of estimates of the probit equation and  $f$  and  $F$  are the p.d.f. and the c.d.f. of  $X$  respectively.

- Include  $\lambda_i$  as an explanatory variable in the age-earnings profile and estimate by least squares to get the estimates corrected for sample bias.

An estimate of this procedure is found in table B in the appendix. A priori expectation of the coefficient on  $\lambda_i$  could be either negative or positive indicating upward or downward bias respectively.

### 2.3 Analytical Framework

Ben-Porath (1967) argued that human capital investors behave in the same manner as firms, by purchasing capital up to the point where the marginal cost equals the present value of the marginal gain. Alternatively put, the optimal investment level will occur by discounting the benefit to the point where it equals the cost of the investment. Hence we treat educational spending as investment and hence calculate the internal rate of returns to such investment as:

$$\sum (A_i - B_i)/(1 + r) = C$$

$A$  and  $B$  are obtained from a log-linear earnings profile where a square term for age is included to capture the concavity of earnings over time.

### 3. Results and Discussion

The regression results used in the study are reported in Tables A.1 - A.5. All the a priori expectations are met by the equations and the parameters are significant at both one and five percent levels. However the  $R^2$  values are not uncommon for cross sectional Census data being used in this study. Another reason that can be attributed to such low  $R^2$  values is that, the estimated earnings function is not a full specification of wage equation. Several variables that explain wage such as language, ability, race, union

status, mobility and a host of other relevant variables have been ignored from the equation. This is intended to help us forecast the earnings trajectory of individuals over their lifetime.

Several specifications for the field specific degree for the bachelor's level were tried but the results were not significant. For instance, dummies were used for the various fields for both male and female separately and a concave relationship between fields and age were tested but the results were not good, hence the data was sorted into the different degree fields and a dummy for sex introduced. These results are significant and reported in Table A.2.

The estimated earnings equations support the view that neither the signal nor the productivity theory is sufficient to explain the wage-education link. If the signaling view holds, then one will expect that if education is held constant, people with higher ability - represented here by higher education level - will start at higher income level than those with lower ability. This is not supported by the data. The results show that the intercept terms, which show the initial abilities of individuals in the various education levels, do not follow the trend that people with lower education levels have smaller intercept values. The slopes of the earnings equations demonstrate the education-augmenting productivity of the individual earnings so that there is a positive marginal benefit over the earnings trajectory.

As shown in figures 1 - 3, the age-earnings trajectory are concave in all cases, with the peaks reached at the age of late 40's to early 50's. In almost all cases, males reached their peak incomes at higher earnings and at older age than females. The exception is at the Masters level where females reach their peak earnings at older age than males. Even at this level, males reach their peak at higher earnings than females. Also, at each education level, females earnings trajectories are below that of males with the same education except at the Ph.D. level where this is not the case. The reason why female labor market performance at the Ph.D. level is exceptional can be attributed to the fact that most Ph.D. career women are single and have little or no labor market interruptions. Hence their relatively good performance at the labor market. Another reason can be given to their relative scarcity.

The above observations are consistent with human capital theory. As Mincer and Polachek (1974) pointed out, the average expected work-life of women at age 20 was 27.2 years in 1980 and that for men was about 36.8 years. Women have had fewer working years due to frequent labor market interruptions.

The interrupted nature of many women's careers has profound implications for the acquisition of education and training. First because women's careers are usually shorter than men's, they have less time to reap the rewards of investments in human capital and this lowers the benefits of such investments, rendering women less likely to invest in schooling.

Secondly, the interruptions add further incentives to avoid costly investment, which are susceptible to faster depreciation. During the period of nonparticipation in the labor market, skill depreciates and the continuity of experience is broken especially in highly technical, ever changing fields such as law and medicine. Thus, many women in the pre-maternal years might be expected to avoid investment that will lose value during the years of child rearing, thereby avoiding occupations that require continuity of experience to be successful.

Human capital theory therefore predicts that women will acquire less schooling and less training than men do and hence earn less than men will. The evidence from the

data is generally consistent with the predictions of human capital.

On average the foregone earnings of students constitute more than half of their educational cost, i.e. about 57% of total cost. Hence students' time is very important in their educational decision. For the public it cost about an average of 26% of foregone output if individuals withdraw from the labor market to pursue education.

The results from the participation equation reported in Tables A.4.1 and A.4.2 indicate that government transfers have significant influence on the decision of individuals to participate in the labor market, especially for people with lower educational qualifications. It makes sense not to allow government transfers/social assistance shape the labor market participation decision for people with say, Ph.D. degree. There is no added advantage to depend on social assistance after wasting resources - both time and money - to attain a Ph.D. degree. This explains why the participation equations for the Ph.D. degree holders were not significant.

Also the estimates indicate that single individuals are more likely to participate in the labor market than married couples. However, immigration status and visible minority factors have little influence on individuals decision to participate in the labor market, except individuals with high school qualification whose participation decision are somewhat influenced by visible minority status.

The highest public and private returns are obtained at the completion of primary school education, 16.13% for males and Ph.D. 14.31% for the females. Also at the Bachelors level, Commerce degree has the highest public and private return in the range of 17.52% to 32.84% for both males and females. The rates also show that females have higher returns in education and humanities degrees than for males while males have comparative advantage in other degrees in the science fields than for females. This finding is comparable to Allen's (1998) conclusion that education is predominantly a female field.

The private rate of return for the primary school was not computed because their private cost is very negligible. This is due to the fact that the compulsory primary school attendance does not offer primary students any opportunity costs, which constitute the largest portion of the cost of education. Another reason is that, primary school was used as the base for the computation of the returns.

From the regression results in Table A.5, the Sample Selection Correction factor ( $\lambda$ ), also called the Inverse Mills Ratio is highly significant in all the equations except at the Ph.D. levels. This means that the negative biases in the original estimates in Table A.1 are significantly large.

The rates of return computed using the Sample Selection Correction estimates are reported in Table C.1. The Sample Selection bias has significantly varying effects on the rates at the various levels of education. While the bias caused the public returns to decrease for the primary, college and bachelor degree holders for males, and secondary, college and bachelor degree holders for females, it also caused an increase in that of secondary and masters degree holders for males and primary and masters degree holders for females. Similar effects are felt on the private returns.

On average, the Sample Selection Bias caused about 45% reduction in the returns or an increase of about 63% in the returns. This suggests that, the Sample Selection Bias has a significant effect on the rates of return.

## Policy and Conclusion

The rates of return computed for the various educational levels seems to pass the test of comparison with investment returns in physical capital which Boadway et al (1986) estimated to be about 6.3%, using shares traded on the Toronto Stock Exchange. The high returns, especially at the post-secondary levels imply that the labor market has not become overloaded with university graduates. The fact that the labor market could absorb these graduates without a fall in their returns below the market returns on physical capital means that the demand for university graduates has increased. This explains why current enrollment trends are on an upward swing.

The higher educational returns to the individuals are also indicative that an upward review of tuition fees will not significantly affect human capital development in the province. This is due to the fact that tuition as a proportion of students' educational cost is very low. Student's decision to pursue further studies is greatly influenced by how much they will forgo in terms of earnings and how much they can expect to earn if they decide to go to school. Thus tuition increases accompanied by a review of the student loan program could yield enormous resources to the universities and colleges without impinging on access to education in the province and this could also free resources to the government for other pressing needs in the province.

It must be pointed out that the results of the rates of return should be interpreted with caution in the sense that several statistical factors like ability bias, selection bias, and upward bias could affect the results if all these are taken into consideration. For instance of other non-marketed consumption and external benefit of education are added after adjusting for ability bias the results will look different, though in my view there will still be a positive return to education in the province.

Based on the above estimates of the participation equation and the rates of returns, it can be pointed out that the government should review its transfer policies to individuals since it significantly affects labor market participation and also increases private returns to education whilst reducing the public return. For instance, the government election promise of increasing educational expenditure in the form of paying \$1000.00 to each student in their first year will cause public rate of return to fall by one percentage point and that of private to increase by one percentage point. Though this decline will not significantly reduce the public rate below the optimal level of public spending on post-secondary education, it is still argued that such spending could be efficiently utilized on other seemingly neglected areas in the province. This money could be allocated to other programs like the healthcare delivery system to reduce patients long waiting times.

## APPENDIX

**Table A.1: Estimates of Age-Earnings Profiles for male and female and education levels**  
 Dependent Variable is the natural log of employment income

Male Variable	Prim	Sec	Col	Bach	Mas	Ph.D.
Constant	0.6516 (16.91)	5.6589 (34.51)	7.4162 (39.63)	5.4284 (12.53)	6.2277 (5.74)	7.5389 (4.927)
Age	0.1184 (7.79)	0.1968 (21.99)	0.1265 (14.35)	0.2301 (10.53)	0.1830 (3.91)	0.1341 (2.05)
Age <sup>2</sup>	-0.0011 (-8.09)	-0.0021 (-18.33)	-0.0014 (-14.18)	-0.0025 (-9.52)	-0.0018 (-3.71)	-0.0013 (-1.84)
N	588	1625	1894	608	121	38
F	33.08	359.07	103.09	69.45	8.11	4.42
R <sup>2</sup>	0.10	0.31	0.10	0.18	0.11	0.16
Female Constant	6.7730 (8.18)	5.2761 (27.74)	6.5125 (26.56)	5.4043 (11.84)	5.8684 (6.52)	5.1447 (2.14)
Age	0.0910 (2.82)	0.1885 (17.64)	0.1389 (11.68)	0.2232 (9.26)	0.1795 (4.47)	0.2426 (2.18)
Age <sup>2</sup>	-0.0010 (-3.08)	-0.0021 (-14.88)	-0.0015 (-10.91)	-0.0026 (-8.66)	-0.0017 (-3.90)	-0.0025 (-1.99)
N	247	1578	1964	700	84	16
F	5.35	225.22	73.68	47.87	13.23	4.74
R <sup>2</sup>	0.03	0.22	0.07	0.12	0.23	0.33

R<sup>2</sup> is the Adjusted r-square

Values in bracket represent t-values and they are all significant at 1%. Except the male

Ph.D. constant.

**Table A.2: Age-Earnings Profile for Male and Female and Fields of Study.**  
 Dependent Variable is the natural log of employment income

Variable	Agric	Comm	Educ	Engineer	Humanity	SocScie	PureScie	Health
Constant	4.6570 (5.23)	0.3595 (6.52)	4.6850 (7.76)	6.5420 (7.98)	6.2182 (7.81)	6.3659 (7.55)	6.3805 (4.59)	4.6096 (2.63)
Age	0.2297 (5.18)	0.1718 (3.08)	0.2659 (8.52)	0.1496 (3.87)	0.1615 (3.84)	0.1397 (3.09)	0.1508 (2.04)	0.2571 (2.76)
Age <sup>2</sup>	-0.0023 (-4.46)	-0.0018 (-2.29)	-0.0032 (-8.22)	-0.0015 (-3.48)	-0.0016 (-3.01)	-0.0013 (-2.19)	-0.0015 (-1.64)	-0.0028 (-2.39)
Male	0.4105 (2.05)	0.4693 (3.87)	0.3631 (3.71)	0.6343 (2.12)	0.1627 (1.13)	0.6485 (5.10)	0.6879 (2.51)	0.2568 (0.84)
N	85	163	439	96	109	204	61	50
F	15.65	24.81	30.17	8.17	14.15	26.62	7.70	4.96
R <sup>2</sup>	0.34	0.31	0.17	0.19	0.27	0.28	0.25	0.20

**Table A.3: Maximum Earnings on Life-time Earnings Trajectory**

Level	Male		Female	
	Age	Earnings	Age	Earnings
Primary	51.7	16,523.61	48.4	7,817.40
Secondary	47.8	31,618.75	45.7	14,534.05
College	45.2	28,962.12	46.2	11,596.66
Bachelor	46.0	45,188.39	42.6	25,681.82
Masters	50.8	53,047.76	52.8	40,403.51
Ph.D.	53.7	68,940.90	49.2	66,852.16

Table A.4.1: Probit Estimate of Labor Force Participation.

Dependent Variable Y=1 for a worker

Male Variable	Prim	Sec	Col	Bach	Mas	Ph.D.
Constant	-1.8147 (-4.87)	-0.0610 (-0.18)	0.1940 (-0.49)	-1.6097 (-2.00)	-2.9548 (-1.30)	-874.471 (-0.02)
Age	0.1099 (8.95)	0.0863 (6.23)	0.0801 (5.21)	0.1658 (4.65)	0.1774 (1.92)	38.6785 (0.02)
Age <sup>2</sup>	-0.0012 (-10.41)	-0.0012 (-7.51)	-0.0012 (-7.19)	-0.0021 (-5.18)	-0.0017 (-1.74)	-0.4025 (-0.02)
Govt Transfer	-.0001 (-7.23)	-.0001 (-7.16)	-.0001 (-9.06)	-.00004 (-1.89)	-.0001 (-1.78)	0.0023 (0.01)
Invest't Income	.00002 (3.33)	.000003 (0.40)	.00001 (1.02)	-.000001 (-0.05)	-.00001 (-0.14)	-0.0063 (-0.003)
Other Income	-.0001 (-0.76)	-.00004 (-1.46)	-.0001 (-2.00)	-.0001 (-1.28)	-.0001 (-1.76)	—
Unpaid Homework	0.0004 (0.01)	-0.0045 (-0.13)	-0.1026 (-3.55)	-0.1222 (-1.60)	0.2780 (1.38)	27.3085 (0.01)
Unpaid Childcare	-0.0369 (-1.10)	0.0171 (0.55)	0.0128 (0.49)	0.1285 (1.93)	0.0628 (0.39)	-13.9625 (-0.01)
Unpaid Seniors care	-0.1110 (-1.87)	-0.0915 (-1.49)	0.0123 (0.25)	-0.1865 (-1.66)	0.3228 (0.64)	-36.6041 (-0.01)
Knowledge Of English	0.2247 (1.23)	0.0513 (-0.34)	0.1192 (0.76)	0.3672 (1.57)	-0.4603 (-0.79)	42.5089 (0.01)
Never Married	-0.6113 (-5.60)	-0.5917 (-5.22)	-0.5515 (-5.43)	-0.4561 (-2.41)	0.4992 (0.85)	18.9535 (0.002)
Married	-0.0368 (-0.15)	-0.0849 (-0.24)	-0.3480 (-1.79)	-0.3623 (-0.89)	—	—
Immigrant	0.0819 (0.52)	-0.2797 (-1.64)	0.0123 (0.09)	-0.3766 (-1.67)	0.0073 (0.02)	-16.8561 (-0.01)
Visible Minority	-0.0044 (-0.01)	-0.6733 (-2.07)	0.0220 (0.05)	-0.7595 (-1.74)	-0.5893 (-0.73)	-10.7955 (-0.003)

N	1453	1853	2262	669	141	53
R <sup>2</sup>	0.29	0.21	0.30	0.30	0.28	1.00

Table A.4.2: Probit Estimate of Labor Force Participation.  
 Dependent Variable Y=1 for a worker

Female Variable	Prim	Sec	Col	Bach	Mas	Ph.D.
Constant	-2.9397 (-5.61)	-1.3190 (-4.31)	-1.2547 (-3.39)	-1.4916 (-2.35)	-6.4517 (-2.91)	-67.9235 (-0.001)
Age	0.1070 (6.04)	0.1391 (10.19)	0.1477 (9.71)	0.1600 (5.34)	0.3168 (3.30)	3.5334 (0.001)
Age <sup>2</sup>	-0.0011 (-6.61)	-0.0018 (-11.38)	-0.0019 (-11.32)	-0.0021 (-5.97)	-0.0035 (-3.26)	-0.0385 (-0.001)
Govt Transfer	-0.0001 (-6.93)	-0.0001 (-7.71)	-0.0001 (-9.06)	-0.0004 (-2.78)	.00002 (0.29)	.00049 (0.0003)
Invest't Income	.00002 (2.27)	-0.00001 (-0.06)	-0.00001 (-0.97)	.00001 (0.81)	.00033 (1.98)	.0011 (0.0013)
Other Income	-0.00002 (-0.27)	-0.000004 (-0.19)	-0.00004 (-2.57)	-0.00003 (-1.50)	-0.00007 (-1.45)	_____
Unpaid Homework	0.0577 (1.56)	-0.0385 (-1.35)	-0.1311 (-4.66)	-0.1064 (-1.91)	0.0874 (0.53)	-4.2045 (-0.001)
Unpaid Childcare	-0.0555 (-1.52)	-0.0625 (-3.13)	-0.0735 (-3.86)	-0.0788 (-2.23)	0.0511 (0.44)	-1.7418 (-0.0003)
Unpaid Seniorscare	0.0080 (0.13)	-0.0031 (-0.08)	0.0109 (0.28)	0.1019 (1.19)	-0.1552 (-0.66)	6.8292 (0.0007)
Knowledge Of English	0.2876 (1.27)	-0.2173 (-1.70)	0.1513 (1.03)	0.1107 (0.67)	0.3289 (0.73)	10.1340 (0.001)
Never Married	-0.0466 (-0.28)	-0.1274 (-1.2454)	-0.1289 (-1.31)	-0.1567 (-1.03)	0.9810 (2.00)	-4.3145 (-0.0003)
Married	0.3048 (1.05)	-0.4000 (-1.99)	0.0967 (0.56)	-0.2775 (-0.68)	_____	_____
Immigrant	-0.0182 (0.11)	0.1476 (0.89)	-0.1945 (-1.31)	-0.0628 (-0.29)	-0.5574 (-1.29)	-1.7208 (-0.0001)
Visible Minority	0.4912 (1.09)	-0.9310 (-3.054)	-0.4715 (-1.21)	-0.6808 (-1.53)	-1.0071 (-1.02)	_____

N	1323	2117	2521	801	100	22
R <sup>2</sup>	0.23	0.21	0.32	0.20	0.24	1.00

**Table A.5: Estimates of Age-Earnings Profiles for male and female Corrected for Selection Bias.**

Dependent Variable is the natural log of employment income

Male						
Variable	Prim	Sec	Col	Bach	Mas	Ph.D.
Constant	11.0094 (6.32)	10.2822 (8.53)	16.5584 (21.10)	16.2498 (7.18)	13.7222 (4.30)	6.6693 (3.11)
Age	0.0262 (0.93)	0.1255 (7.96)	0.0294 (2.51)	0.0986 (2.86)	0.0845 (1.40)	0.1529 (2.08)
Age <sup>2</sup>	-0.0001 (-0.41)	-0.0013 (-6.17)	-0.0001 (-0.89)	-0.0008 (-1.90)	-0.0008 (-1.24)	-0.0015 (-1.88)
Lambda	-3.2651 (-2.77)	-3.6142 (-3.52)	-7.8502 (-11.97)	-9.0276 (-4.87)	-5.6456 (-2.49)	0.5142 (0.5856)
N	394	1328	1894	608	121	38
F	11.03	141.77	121.65	55.93	7.71	3.00
R <sup>2</sup>	0.07	0.24	0.16	0.21	0.14	0.14
Female						
Constant	13.4283 (5.24)	11.8256 (11.51)	14.6046 (17.18)	14.3669 (8.26)	11.0019 (4.54)	5.0458 (1.87)
Age	0.0138 (0.33)	0.1155 (7.48)	0.0376 (2.4356)	0.1244 (4.14)	0.1074 (2.13)	0.2426 (2.10)
Age <sup>2</sup>	-0.0001 (-3.58)	-0.0011 (-5.49)	-0.0002 (-1.09)	-0.0013 (-3.37)	-0.0009 (-1.72)	-0.0025 (-1.91)
Lambda	-4.5352 (-2.74)	-5.3837 (-6.48)	-6.5125 (-9.92)	-7.6175 (-5.34)	-3.71 (-2.27)	0.0999 (0.10)
N	247	1578	1964	700	84	16
F	6.17	168.06	84.37	42.66	10.99	2.92
R <sup>2</sup>	0.06	0.24	0.11	0.15	0.27	0.28

R<sup>2</sup> is the Adjusted r-square

Figure 1

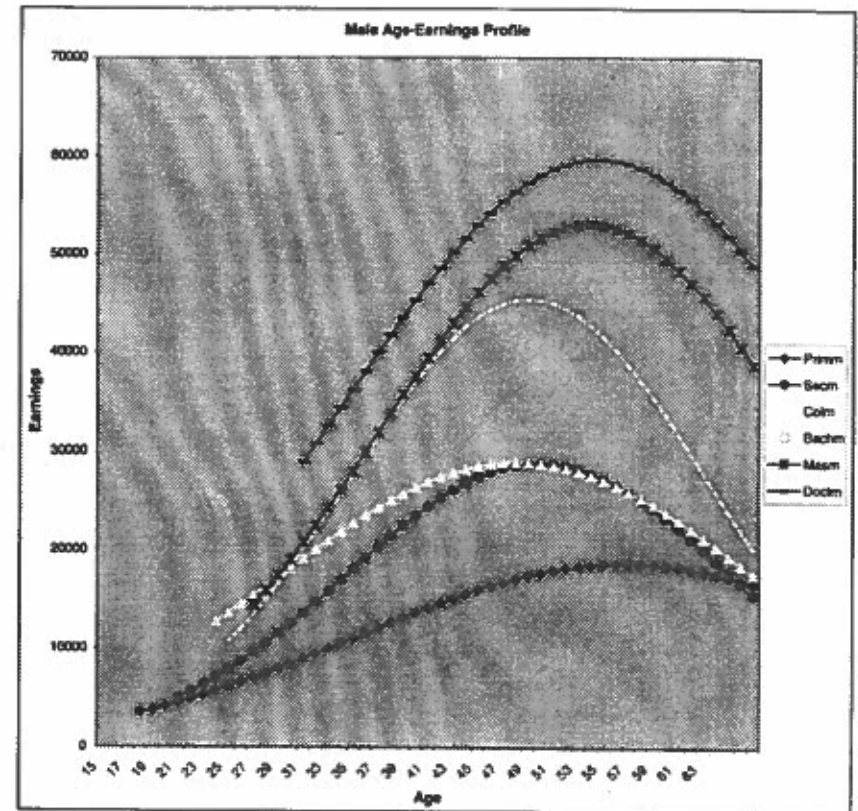




Figure 2

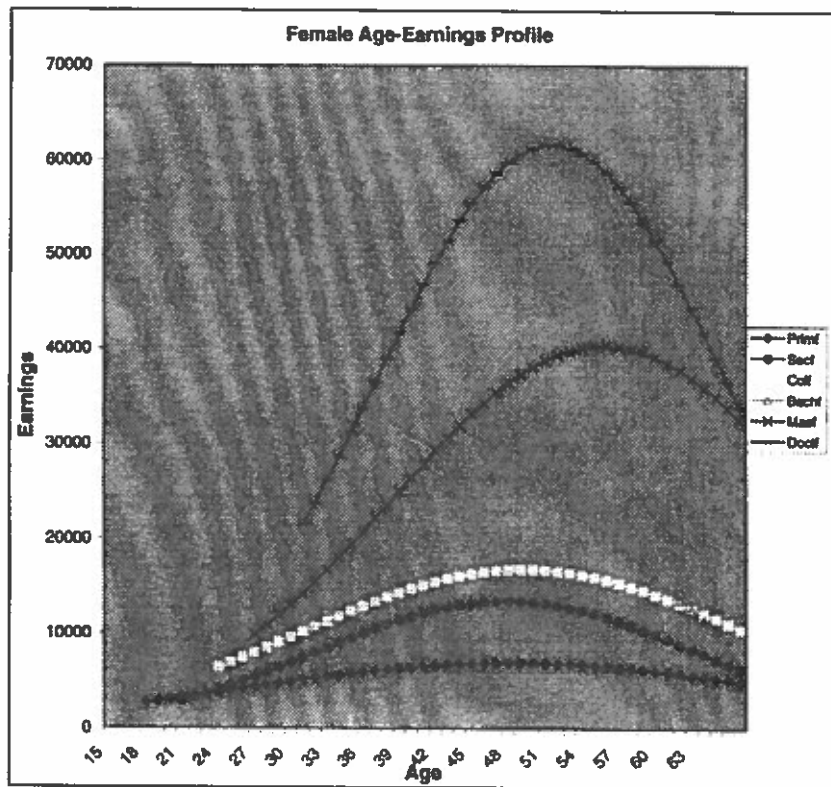


Figure 3

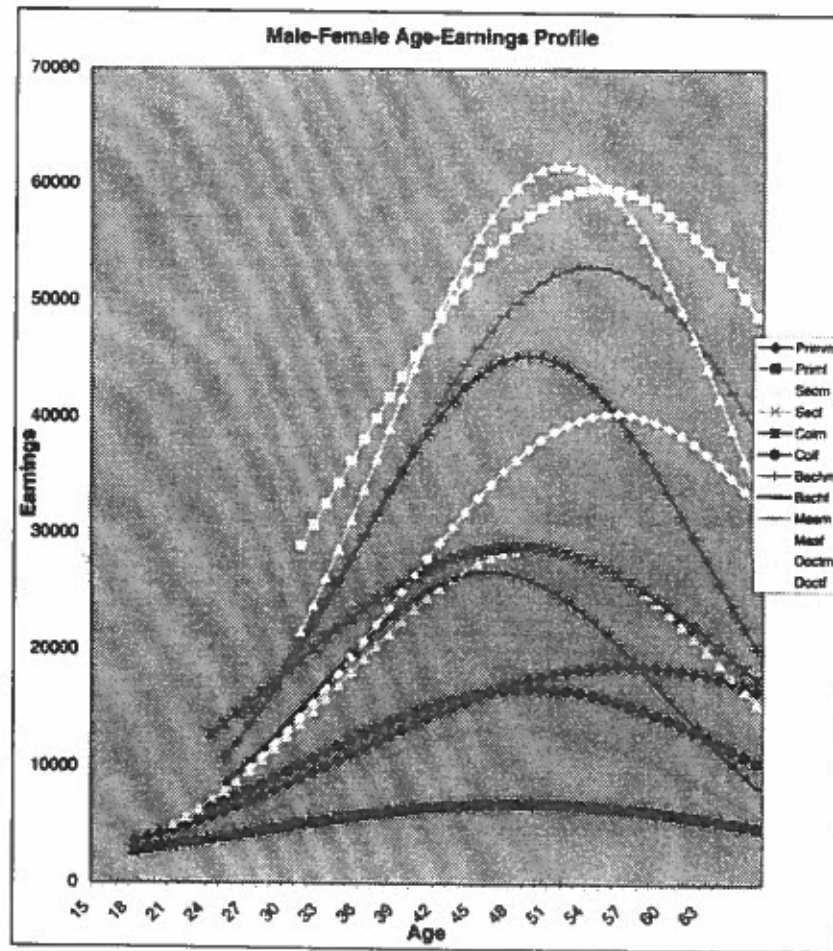


Table B.1: Estimates of Direct Private and Public Cost Per Student  
Per Year

of Study	Fees	Supplies	Fees	Private Cost	Public Cost
Elementary	\$0	\$0	\$55	\$55	\$4,671
Secondary	\$0	\$0	\$85	\$85	\$6,072
College	\$1,711	\$807	\$65	\$2,583	\$10,997
<i>Undergraduate:</i>					
Agriculture	\$2,804	\$915	\$109	\$3,828	\$13,374
Humanities	\$2,804	\$915	\$109	\$3,828	\$13,374
Social Science	\$2,670	\$915	\$109	\$3,694	\$12,737
Education	\$2,670	\$915	\$109	\$3,694	\$12,737
Commerce	\$2,670	\$915	\$109	\$3,694	\$12,737
Pure Science	\$2,804	\$915	\$109	\$3,828	\$13,374
Engineering	\$2,804	\$915	\$109	\$3,828	\$13,374
Health Science	\$2,937	\$915	\$109	\$3,961	\$14,011
All Fields	\$2,770	\$915	\$109	\$3,794	\$13,256
<i>Graduate:</i>					
Masters	\$3,338	\$800	\$109	\$4,247	\$15,973
Doctorate	\$3,338	\$800	\$109	\$4,247	\$15,973
All Fields	\$3,338	\$800	\$109	\$4,247	\$15,973

Table B.2: Estimates of Total Cost of Education Per Student

Private	Direct Cost	Forgone Earnings		Total		C <sub>r</sub> Corrected Forgone Ear	
		Mal	Female	Mal	Female	Male	Female
Primary	440.00	0.00	0.00	440.00	440.00		
Secondary	340.00	5522.74	4122.23	5862.74	4462.23	5406.92	10339.81
College	7749.00	8053.10	4687.66	15802.10	12436.66	7592.52	5547.11
<i>Undergraduate</i>							
Agriculture	15310.00	11406.21	6086.55	26716.21	21396.55		
Humanities	15310.00	11406.21	6086.55	26716.21	21396.55		
Social Science	14776.00	11406.21	6086.55	26182.21	20862.55		
Education	14776.00	11406.21	6086.55	26182.21	20862.55		
Commerce	14776.00	11406.21	6086.55	26182.21	20862.55		
Pure Science	15310.00	11406.21	6086.55	26716.21	21396.55		
Engineering	15310.00	11406.21	6086.55	26716.21	21396.55		
Health Science	15844.00	11406.21	6086.55	27250.21	21930.55		
All Fields	15176.00	11406.21	6086.55	26582.21	21262.55	10521.02	7678.11
Masters	8494.00	10789.40	8569.81	19283.40	17063.81	7952.02	6875.26
Ph.D.	16988.00	31730.24	21629.40	48718.24	38617.40	31247.10	24085.14
<i>Public</i>							
Primary	37368.00	0.00	0.00	37368.00	37368.00		
Secondary	24288.00	7778.50	5808.96	32066.50	30096.96	6844.20	14563.11
College	32991.00	11249.74	6602.34	44240.74	39593.34	10693.69	7812.83
<i>Undergraduate</i>							
Agriculture	53496.00	16065.08	9307.82	69561.08	62803.82		
Humanities	53496.00	16065.08	9307.82	69561.08	62803.82		
Social Science	50948.00	16065.08	9307.82	67013.08	60255.82		
Education	50948.00	16065.08	9307.82	67013.08	60255.82		
Commerce	50948.00	16065.08	9307.82	67013.08	60255.82		
Pure Science	53496.00	16065.08	9307.82	69561.08	62803.82		
Engineering	53496.00	16065.08	9307.82	69561.08	62803.82		
Health Science	56044.00	16065.08	9307.82	72109.08	65351.82		
All Fields	53024.00	16065.08	9307.82	69089.08	62331.82	14818.34	10814.24
Masters	31946.00	15196.34	12070.16	47142.34	44016.16	11200.03	9683.46
Ph.D.	63892.00	44690.48	30463.95	108582.50	94355.95	44009.99	33922.73

Using the assumption of Section 3.3, the Forgone earnings was computed using the equations in Table A.1 and Table A.2.

The following lengths of studies were used for the various levels of schooling.

Primary: Grades 1 - 8; 8yrs.

Secondary: Grades 9 – 12; 4yrs

College: 3yrs after Secondary school

Bachelor: 4yrs after Secondary school

Masters: 2yrs after Bachelor degree

Ph.D.: 4yrs after Masters degree

Table C. 1: Private and Public Rates of Returns To Education. 1996

Levels	Uncorrected Rate of Returns				Corrected Rate of Returns			
	Public		Private		Public		Private	
	Male	Female	Male	Female	Male	Female	Male	Female
Primary	16.13	11.09	584.69	447.07	10.94	19.48	530.61	386.67
Secondary	10.58	8.04	20.54	18.8	12.77	4.51	27.38	7.38
College	8.5	6.98	19.22	15.3	7.88	-1.01	16.78	2.58
Bachelor	11.14	12.44	16.59	22	5.89	4.02	9.17	9.49
Masters	6.14	11.14	10.43	13.92	12.4	14.65	21.22	23.23
Ph.D.	6.36	14.31	4.39	20.56				
<b>Fields</b>								
Agriculture	8.81	9.8	11.73	14.82				
Commerce	20.95	17.52	32.84	29.82				
Education	6.69	12.13	8.8	19.84				
Engineering	16.97	11.17	28.19	19.86				
Health Sc	10.41	13.41	15.12	21.52				
Humanity	4.3	11.26	7.03	18.93				
Pure Sc	16.21	10.03	26.05	17.2				
Social Sc	12.23	8.56	18.42	13.81				

Table C.2

Percentage Changes in the Rates of Returns after adjusting for Selection Bias

	% Changes Public		% Changes Private	
	Males	Females	Males	Females
Primary	-32.20	75.70	-9.3	-13.5
Secondary	20.7	-43.9	33.3	-60.8
College	-7.3	-114.5	-12.7	-83.1
Bachelor	-47.1	-67.7	-44.7	-58.9
Masters	102	31.5	103.5	66.9

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**Nigerian Oil Economy: Development or Dependence**  
by Chris Hajzler<sup>1</sup>

The 1980s and 1990s are seen as a time of agrarian stagnation and crisis in Nigeria. Stagnant or declining output, large increases in food price inflation, the virtual disappearance of agricultural exports and the rapid increase in food imports, and massive external debts are considered a few of the many problems related to the Nigerian government's growth strategy.<sup>2</sup> However, while these problems may be attributed to undesirable government policies, it is necessary to interpret them in terms of the various domestic and international pressures that have thus limited the capacity of government to embark on an independent development plan, not to exclude the internal or institutional shortcomings of the government itself. The most prevalent of these forces, it can be argued, has arisen from Nigeria's historic dependence on oil production and exports, which have been entrusted to the Multinational oil conglomerates that have the financial and technological means to invest in this sector. The dominant influence of these firms in Nigerian development and, by promising substantial immediate financial gains, fiscal economic policies meant that private business has prospered at the expense of long-term economic growth. However, the ways in which the oil export industry has hindered economic growth have been both direct and indirect. The major topics of interest can be broken down accordingly. First, literature highlights the direct effects of pollution resulting from oil production as the main source of poverty and low production in agriculture, contributing to the country's current economic crisis. Secondly, the state's reliance on oil and the consequent oversight of the agriculture and manufacturing sectors has left Nigeria defenseless against major international economic forces, particularly the decline in oil output during the second OPEC crisis. Both of these dilemmas are crucial to our study of underdevelopment in Nigeria, but they are associated with independent policy issues. It will therefore be conducive to our analysis to address each in turn, followed by an evaluation of the various reforms that they might incur on the Nigerian State. The first section of this dissertation is dedicated to a brief review of the development of the Nigerian oil sector.

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<sup>1</sup> An earlier version of this paper was prepared for Shelly Coggins (Economics 270.3) at the University of Saskatchewan.

<sup>2</sup> Tom Forrest. *Politics and Economics in Nigeria*. Oxford: Westview Press, 1993., p.184.