Pontifícia Universidade Católica do Rio de Janeiro
Departamento de Economia

Monografia de Final de Curso

RETURNS TO HIGHER EDUCATION IN BRAZIL

Beatriz Rache
Matrícula: 1210492

Orientador: Cláudio Ferraz

Dezembro de 2015

Pontifícia Universidade Católica do Rio de Janeiro
Departamento de Economia

Monografia de Final de Curso

RETURNS TO HIGHER EDUCATION IN BRAZIL

Beatriz Rache
Matrícula: 1210492

Orientador: Cláudio Ferraz

Dezembro de 2015

Declaro que o presente trabalho é de minha autoria e que não recorri, para realizá-lo, a nenhuma forma de ajuda externa, exceto quando autorizado pelo professor tutor.

_____
Beatriz Rache

As opiniões expressas neste trabalho são de responsabilidade única e exclusiva do autor.

Acknowledgements

I would like to thank every person that somehow contributed to my path towards becoming one day hopefully a competent economist. I have learned a great deal from my professors at PUC, UCSD, the Climate Policy Initiative and Gávea. Among them, a special thanks to my advisors, Cláudio Ferraz and Karthik Muhalidharan, as well as to Gustavo Gonzaga, Dimitri Szerman, Guilherme Silva and all of those who have lent me their valuable opinion on this work, including my father João.

My family has always been very supportive and a central part of my education, not only by giving me the opportunity to study at PUC, but also by spoiling me with countless book shelves of the most varied topics, subscriptions to the best periodicals, good discussions and always encouraging me to keep growing personally and intellectually. My grandparents, some of whom left us during the course of the last four years, have and will continue to inspire me.

Also, I would like to acknowledge the support of my mother - founder of my 1-member fan club -, my boyfriend Eduardo, and top-notch brothers André and Bernardo, without whose company the past four years would not have been the same.

Abstract

Given that access to higher education has been rapidly expanding in Brazil, this study aims to catalog returns to this level of education across time and finds, as expected, a fall in returns beginning in 2002. Currently at 75.7% by OLS estimates, the returns are high enough to inspire further investment, but returns at lower quartiles, as estimated by quantile regressions, not only are lower - at 55.4% - but also have declined much more sharply. Among the possible causes of this discrepancy are the quality of education, coupled with unequal access to good universities, and the presence of public policies such as Prouni and FIES.

Table of Contents

Table of Figures

1
Introduction

Education is widely regarded as one of the greatest determinants of individual, social and economic prosperity. Not only are graduates shown to earn higher salaries, but additionally they suffer less unemployment, live longer and happier lives, commit less crimes and contribute more to civic life, according to research[1]. Hence, education yields social and nonmonetary returns as well as private and monetary ones.

Access to higher education is expanding rapidly in Brazil. More students enrol each year in private and public universities, weighing wage prospects for college graduates against immediate costs such as tuition and foregone salary. In a country with ever present income inequality, this shift towards more equal access to universities - arguably one of the greatest determinants of income - deserves close attention.

This study aims to catalog the structure of returns underlying these students' decision of enrolling in higher education institutions, its historical evolution as well as distributional aspects. Among the questions it will address is how governmental programs such as subsidized student loans have contributed to this expansion in access, what role expanding private provisions has played for returns, and for which fraction of the society, if any, the promise of higher returns has been proven unfounded.

From 20 editions of PNAD, a mincerian specification will be estimated both by OLS and using the technique of Quantile Regressions, which is more appropriate for distributional analysis, since it yields estimates of returns over the range of the conditional wage distribution. Returns, for that matter, will be estimated for 25%, 50% and 75% wage quartiles.

Other things being equal, an increase in the number of more educated people should narrow the reward structure and lead to a fall in returns. This is what one would expect to find in this study. Another important lesson to draw from the results is, comparatively, whether this fall has taken place with equal intensity in all quantiles, or if some have experienced sharper fall in returns than others.

---

[1] See Hout (2012)

This study will be structured as follows: Section 2 will summarise the existing literature on returns to education in Brazil and their main findings, Section 3 will describe the datasets to be used, Section 4 will give an overview of the Higher Education system in Brazil, Section 5 will explain the intended methodology, while Section 6 will discuss the results before Section 7 concludes. All regressions will be available under the appendix.

2
Research Background

Returns to schooling have been documented in Brazil at different times and through different methods. The most usual measure of private, monetary returns to education so far has been the coefficient on education in Mincer's equation (1974):

$$ln(w_i) = \delta_0 + \beta_s \cdot S_i + \delta_1 \cdot A_i + \delta_2 \cdot A_i^2 + u_i$$

where w accounts for the wage of individual i, S represents years of education, A stands for age, a proxy for labor market experience, and u is an error term. Estimates have varied from 9,8% to 27% to an additional year of education depending on methods and level of schooling[2].

Under certain circumstances, these estimates match the internal rate of return (IRR) of education, which equals the present value of marginal costs of an additional year of schooling to the present value of the marginal benefits from this additional year. Castro (1970) and Langoni (1974) concluded the IRR of education in Brazil was extremely high in the 1960's and 1970's and therefore that education was worth encouraging. Pessoa and Filho (2008) also found investing in education to be extremely profitable still, indicating the investment in previous decades had not been sufficient to incentivize the building of human capital in order to take advantage of the high returns.

In relation to higher education specifically, Pessoa and Filho documented a decrease in returns over time, a fact they attribute to expanding private provision in response to a growing demand by a less educated fraction of the population. Overall, the returns to a college degree for a worker in thirty years in the labor force in their data was 13,8% in 2004.

Menezes-filho et al (2006) also note a decline in returns to higher education relative to high school beginning in 2002, associated with a relative stability of those of primary and secondary education, which they argue has lessened income inequality. Behind this behaviour in returns, the authors point to an increase in the share of population with a higher education degree in the cohort born in 1982.

---

[2] Ueda & Hoffmann (2002); Sachsida, Loureiro & Mendonça (2004); Resende & Wyllie (2006).

In trying to decompose demand and supply-side effects behind the wage premium attached to higher education, Menezes and Pecora (2014) find that the effects of an increase in demand for qualified workers more than compensated those of a 6% rise in its relative supply, resulting in a 7.8% increase in wage differentials between college and high school graduates over the 1990's. As for the 2000's, the authors estimate that the 37.2% increase in relative supply dominated demand side-effects, resulting to a 0.2% fall in premia between 2001 and 2009, according to their calculations.

3
Data

This research draws on rounds from 1987 to 2013 from Brazilian National Household Sample Survey (PNAD), an annual representative survey comprising both household and individual data conducted by the Brazilian Census Bureau (IBGE) in non-census years. It covers both urban and rural areas and totalled 362,554 observations in 2013, its last available edition.

Data were made compatible in conformity to the 1981 edition through Datazoom, a statistical package developed by PUC-Rio. Variables of particular interest are employment, last degree obtained, monetary income from all occupations and age. Also, socio-economic characteristics such as household setting, gender and race will serve as controls.

Statistics from the Higher Education Census (Inep), conducted yearly, will illustrate the expanding access at this level of education, as well as the take up of subsidised loans, which will also shed light on how students are affording their pursuit of a diploma and whether there has been an upsurge in student debt and/or number of defaults.

Another set of data that will be used for descriptive purposes is data on the personal questionnaire of ENADE, a test administrated to entrants and to seniors with at least 80% of their coursework completed to investigate content learned. The personal questionnaire includes questions on name and type of institution (public or private), parents' educational level, type of high school attended and participation in affirmative action or social inclusion program.

4
Overview of the Higher Education System in Brazil

Brazil's 2391 higher education institutions enrol 6.1 million students, 71% of them in private universities, according to the latest higher education census. This marks a drastic increase from as close back as 1997, when there were only 900 universities and students were more evenly divided - in a 60%-40% ratio - between private and public institutions (Figures 1 and 2). As a result, Figure 3 shows an increase in the share of higher education graduates which, all else being equal, should push returns down.

Figure 1: Enrolment in Higher Education (Millions)

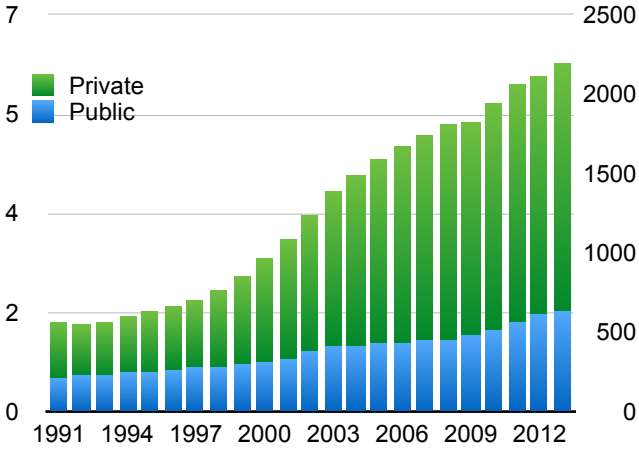


Figure 2: Number of Higher Education Institutions

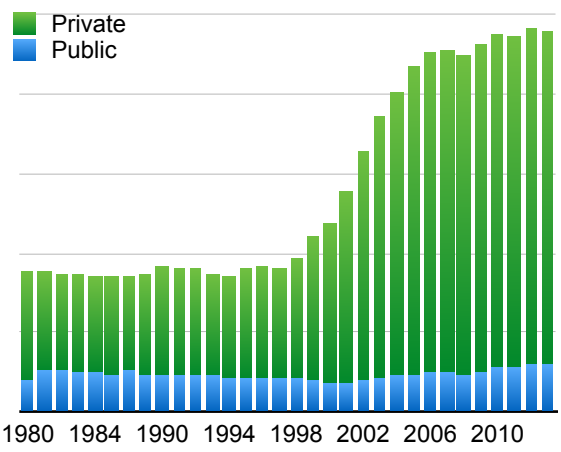
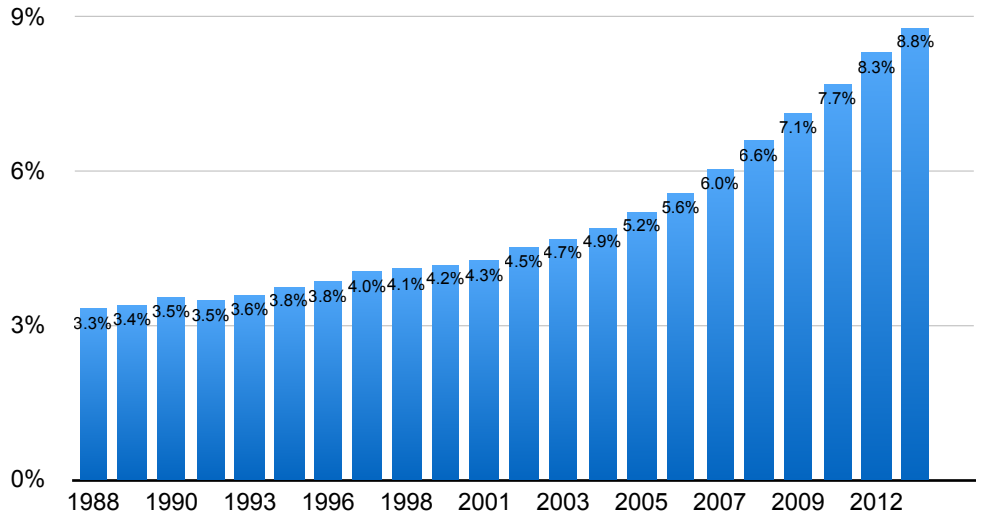


Figure 3: Share of Individuals in PNAD with Higher Education

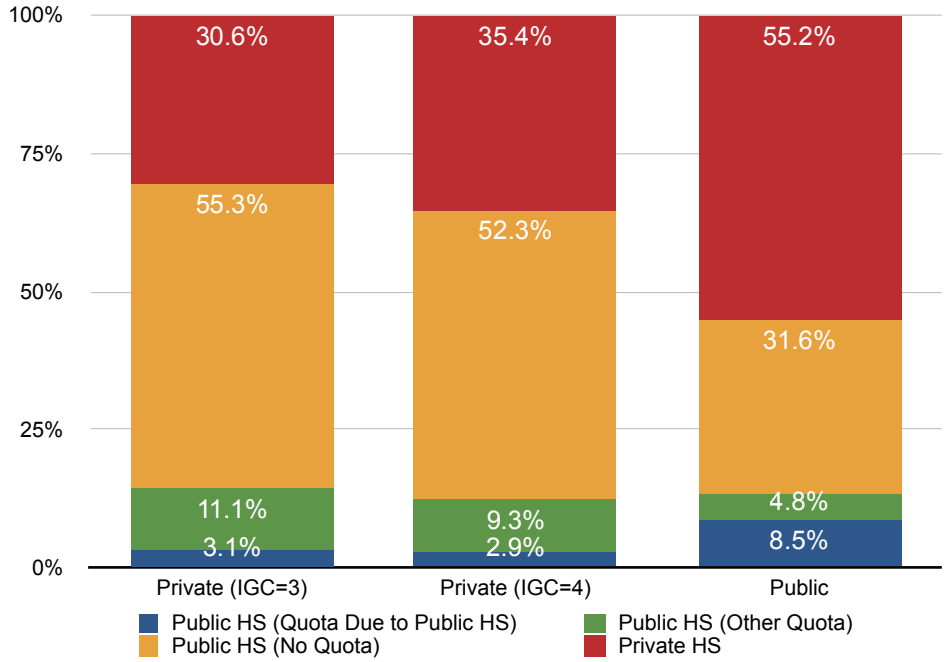


Whereas public universities rank higher according to Ministry of Education's ICG (*Índice Geral de Cursos Avaliados da Instituição*[3]) and tend to be more selective than private institutions, in secondary education public schools perform much worse than their private counterparts, according to the National High School Examination (ENEM).

In 2013, the last year for which ICG is available, only public institutions reached the highest score (5), and only 23 private institutions out of 86 reached a 4. This contrasts with the fact that only 6 public high schools ranked among the 100 first in the latest ENEM, in 2014.

The result is that most of the public college entrants each year have completed their prior education in private schools and come from richer families, who can afford tuition. Based on data from the 2013 ENADE, Figure 4 shows that the share of students in public universities that come from public high schools is lower than that in tier 4 private universities, which in turn is lower than that in tier 3 private universities, stripping out the share that is beneficiary of affirmative action quotas.

Figura 4: Share of Students by Type of High School and Quota



That means that the expansion in provision has not brought about a much-awaited democratisation in access, which remains notoriously unequal. Mont'alvão (2014), in

[3] In a scale from 1 to 5, IGC evaluates universities' undergraduate and pos-graduate programs, including infrastructure, organisation and students' performance in ENADE. Institutions which score 1 or 2 are forbidden to open new courses, campi or enrol additional students.

estimating the probability of high school graduates completing the transition to higher education as a function of sociodemographic characteristics, found persistent inequalities arising from parental economic status, with more affluent students being 2 to 2.5 times more likely to attend a higher education institution than a student from the lowest economic class.

Two policies try to counteract such inequities, namely *Fundo de Financiamento Estudantil* (FIES) and *Universidade para Todos* (Prouni). The first, FIES, was established in 1999 as a program of subsidised student loans of up to 50% of tuition with below-market rates for students in private universities. In 2010, loans were expanded to contemplate 100% of tuition, grace period was extended to 18 months and amortisation period became 3 times the length of the student's major. In 2015, amid the economic downturn Brazil is facing, interest rates were raised from 3.4% to 6.5% and eligibility was restricted to families with monthly per capita income below 2.5 minimum wages.

Prouni, established in 2004, exchanges tax exemptions to private universities for 50% of full scholarships to students from families with monthly per capita income below 1.5 minimum wage who have graduated from a public high school (or a private high school with full scholarship) or are disabled.

Although the two measures facilitate the affordability of higher education, they do not necessarily improve equity in access, since students can only apply once they have been admitted into university, by sitting for the same rigorous exam as before. The result might be the proliferation of low quality, private provision in order to meet this unanswered demand, compatible with the spread of for-profit universities seen in Brazil in the last decade, many of them listed in Bovespa, Brazil's main stock exchange.

In the US, a congressional report in 2012 brought attention to the fact that drop-out rates in for-profit institutions were as high as 64% and that 22% of their revenues were spent on marketing and recruiting, against only 18% on teaching. Further research could shed light on whether differences in quality exist in Brazil between for-profit universities and non-profit private and public universities.

.

5
Methodology

The following Mincerian equation will be used to compute returns to higher education over time for individuals who are employed and no longer attend school:

$$ln(w_i) = \delta_0 + \beta_s \cdot higher\_ed + \delta_1 \cdot A_i + \delta_2 \cdot A_i^2 + \delta_x \cdot X_i + u_i$$

A dummy *higher_ed* will equal 1 for individuals whose last degree obtained had been from a tertiary education institution and 0 for those whose highest diploma had been from a secondary institution. *w* accounts for the wage of individual *i*, *A* stands for age, a proxy for labor market experience, X is a vector of controls and *u* is an error term

Two issues usually pose challenges to the estimation of such equations, namely sheepskin effects and an ability bias. Sheepskin effects, as described by Hungerford and Gary (1987), consist of the empirical observation that grades associated with degrees accrue higher benefits to individuals. For this reason, assuming a linear relationship between schooling and log earnings will yield distorted results. However, given the focus of this study on returns to higher education, these effects will not bias results.

The second problem, that of the ability bias, is common to any attempt to measure returns to education. Given that individuals with higher inherent ability tend to acquire more education and aptitude is well-rewarded in the labor market, unless individual ability is accounted for, by the inclusion of appropriate controls, education will be endogenous to the model and causality will not be inferred.

Economists have grappled with this problem of trying to disentangle education effects over salary from that of one's general aptitude by either constructing samples of identical twins, finding quasi-experiments or - as this study intends to - simply by controlling for background characteristics.

The most important part of the empirical investigation, however, is the estimation of returns to education using quantile regressions such as the following:

$$Q_{0.25}[ln(w_i)] = \delta_{0.25,0} + \beta_{0.25,s} \cdot higher\_ed + \delta_{0.25,1} \cdot A_i + \delta_{0.25,2} \cdot A_i^2 + \delta_{0.25,x} \cdot X_i + u_i$$
$$Q_{0.50}[ln(w_i)] = \delta_{0.50,0} + \beta_{0.50,s} \cdot higher\_ed + \delta_{0.50,1} \cdot A_i + \delta_{0.50,2} \cdot A_i^2 + \delta_{0.50,x} \cdot X_i + u_i$$
$$Q_{0.75}[ln(w_i)] = \delta_{0.75,0} + \beta_{0.75,s} \cdot higher\_ed + \delta_{0.75,1} \cdot A_i + \delta_{0.75,2} \cdot A_i^2 + \delta_{0.75,x} \cdot X_i + u_i$$

This method is elucidative to the research question being posed, since returns will be estimated over the wage distribution. This will provide insight on how schooling affects individuals in different income percentiles.

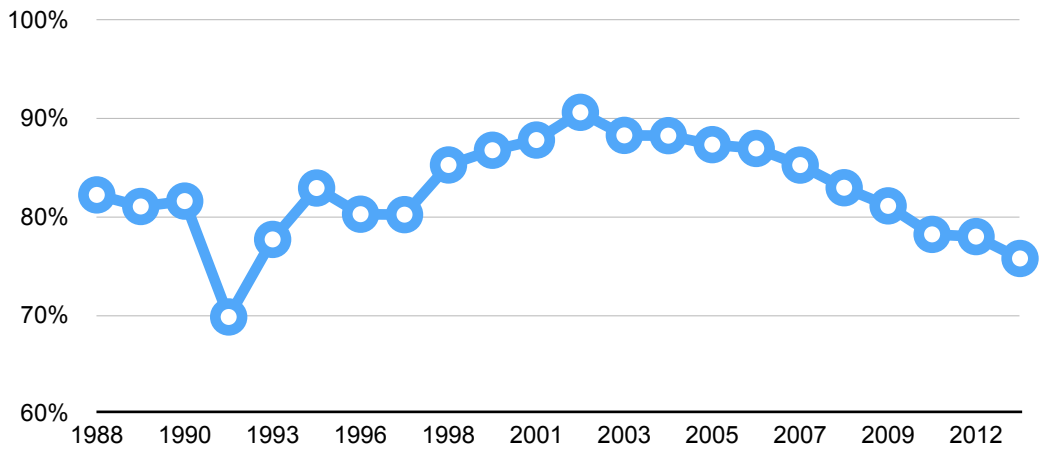
The coefficient beta, now representing the effect of an infinitesimal increase in education in the log earnings of each quantile q, will have the following format:

$$\beta_{0.25,s} = \frac{\partial Q_{0.25}[ln(w_i)|higher\_ed]}{\partial higher\_ed}$$
$$\beta_{0.50,s} = \frac{\partial Q_{0.50}[ln(w_i)|higher\_ed]}{\partial higher\_ed}$$
$$\beta_{0.75,s} = \frac{\partial Q_{0.75}[ln(w_i)|higher\_ed]}{\partial higher\_ed}$$

6
Results

As conjectured, returns on higher education show a clear declining trend since 2002 by all four estimates - OLS and the three quartiles -, albeit they remain high: a higher education diploma is associated with earnings 75.7% higher than those of a high school graduate, controlling for race, gender and household setting. This is down from a historical high of 90.6% in 2002 (Figure 5).

Figure 5: OLS - Coefficient on Education



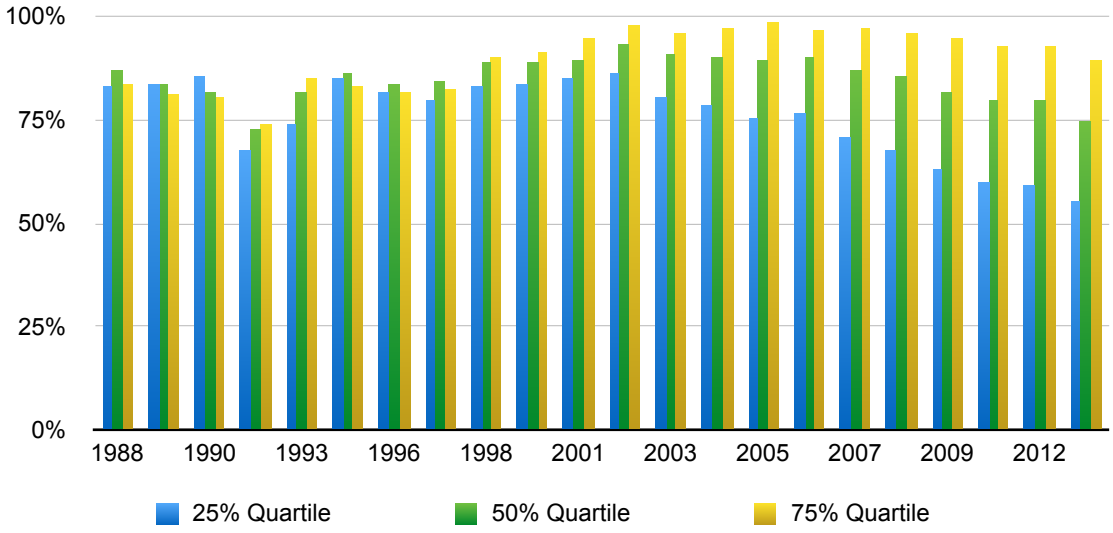
This evidence is consistent with the interpretation by Menezes and Pecora (2014) that a 37.2% increase in relative supply of qualified workers (i.e., with higher education) between 2001 and 2009 had more than compensated the increase in demand for such workers, resulting in a 0.2% fall in the higher education wage premia during that period.

Results from the quantile regressions allow a more thorough understanding of the dynamics still. As shown in Figure 6, coefficients on education also decrease beginning in 2002, but two main features deserve attention: (i) returns are markedly higher for higher income percentiles and (ii) the decrease in returns is more accentuated the lower the income percentile.

The first point might reflect the fact that in higher quantiles, effects from background characteristics such as parent schooling - which we are unable to observe and control for - are still in place. Stefani and Biderman (2006) catalog returns using 1996 PNAD edition, which exceptionally contains a special feature with data on family

background, and find similar results even after controlling for this sort of characteristics: they also find higher returns at upper quantiles, which they say "reinforces the idea of complementarity between education and abilities, what gives an advantage to those located at the top of the distribution of wages."

Figure 6: Quantile Regressions: Coefficient on Education



Other aspect behind the differences in levels of returns might be the quality of the education individuals at the lower income percentiles are pursuing. Studies controlling for quality of education have found returns significantly higher for better quality education, according to metrics such as expenditures and instructors per student. Solmon (1985), one of the first such studies to focus its attention in higher education, found significantly higher returns the higher the quality of the education. Card and Krueger (1992a) found higher returns from education in states with better schools, and in a subsequent paper (1992b) attributed 20% of the fall in racial earnings disparities between 1960 and 1980 to changes in quality of education.

Given the disparities in access to higher education, noted in Section 4, it might be that returns are lower in the 25% quartile because graduates at this level of income could only afford a college education with inferior quality than that of the 75% quartile.

Another reason might be any relation between economic background and choice of major: extensive research[4] has shown returns are heterogeneous across majors, with some such as engineering yielding higher returns than art majors, for example. If it were

[4] Arcidiacono (2004)

the case that income in some way affects course decisions, then it is possible that this could account for some of the heterogeneity in estimated returns across income quartiles. This supposition is not at all unlikely, since ill-prepared students might be put off by the difficulty of entrance exams, something which further research could elucidate.

As for the second point, returns might have fallen in a sharper manner for lower wage percentiles because access appeared to have expanded the most precisely in less-privileged strata of the society. In fact, anecdotal evidence suggests the aforementioned higher education boom managed to attract and educate first generation college students, which was certainly supported by educational policies such as FIES and Prouni.

This is confirmed by the observation that average household per capita income - deflated for October 2012 prices - has declined markedly among college students starting in 1998, against an increase experienced nationally, especially from 2003 onwards with the expansion of cash transfer program *Bolsa Familia*. (Figure 7)

Figure 7: Average Household Per Capita Income (Oct/2012 Prices)

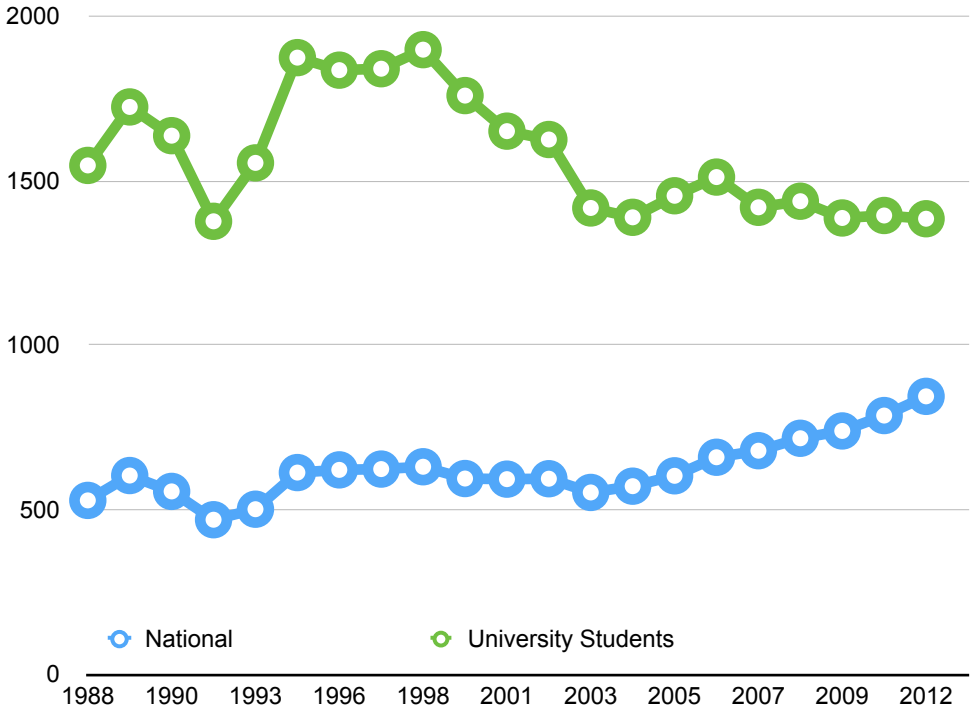


Figure 8: Coefficient on Higher Education

Year	MQO	25% Quartile	50% Quartile	75% Quartile
1988	82.2%	82.8%	86.8%	83.8%
1989	81.0%	83.8%	83.7%	81.1%
1990	81.6%	85.8%	81.9%	80.7%
1992	69.8%	67.5%	72.5%	74.1%
1993	77.7%	73.8%	81.5%	85.1%
1995	82.9%	84.7%	86.3%	82.9%
1996	80.3%	81.6%	83.7%	81.9%
1997	80.2%	80.0%	84.1%	82.4%
1998	85.3%	82.7%	88.6%	90.4%
1999	86.8%	83.5%	88.9%	91.5%
2001	87.8%	84.9%	89.2%	94.4%
2002	90.6%	86.5%	93.5%	97.8%
2003	88.3%	80.2%	90.8%	96.1%
2004	88.3%	78.1%	89.9%	96.9%
2005	87.3%	74.9%	89.2%	98.2%
2006	87.0%	76.3%	89.9%	96.5%
2007	85.3%	70.6%	86.6%	96.8%
2008	82.9%	67.7%	85.3%	95.9%
2009	81.1%	63.1%	81.7%	94.4%
2011	78.2%	59.7%	79.9%	92.8%
2012	78.0%	59.2%	80.0%	92.4%
2013	75.7%	55.4%	74.5%	89.4%

7
Conclusion

Given the recent expansion in access and provision of higher education in Brazil, this study set out to estimate returns for this level of schooling in the time span from 1988 to 2013, both in terms of its mean and at three quartiles of the conditional income distribution.

Consistent with the recent literature and with evidence of a hike in the number of graduates, returns have been declining by all metrics and were estimated at 75.7% in 2013. Returns over the wage distribution, however, have shown disparities in the degree of decline, as well as in the level of returns: in the 25% income percentile, returns are considerable lower, at 55.4%, and have presented a steeper decline than those at the median or the 75% income percentile.

Expansion in the number of graduates reflects policies in place since the beginning of the decade which facilitate entry to and affordability of higher education programs, with now close to 10% of the total pool of students receiving subsidised loans from the government. Enrolment levels have soared, as well as private institutions, many of them profit-seeking and listed in Bovespa, Brazil's main stock exchange.

Therefore, although high returns inspire further investment in Higher Education, an important policy implication is that quality of education should continue to be monitored with special attention so that no student falls prey to illusive promises of returns while paying prohibitive tuition and opportunity costs.

8
References

ARCIDIACONO, P. **Ability Sorting and the Returns to College Major.** Journal of Econometrics 121, p. 343-75, 2004.

CARD, D. **The Causal Effect of Schooling on Earnings**, in Orley Ashenfelter and David Card (ed.) Handbook of Labor Economics. Amsdertam: North Holland, 1999

CARD, D.; KRUEGER, A. **Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States.** Journal of Political Economy, v. 100, n 1, p. 1-39, 1992a

_____. **School Quality and Black-White Relative Earnings: A Direct Assessment.** The Quarterly Journal of Economics, v. 107, n. 1, 1992b

CASTRO, C. (1970) **Investment in education in Brazil: a study of two industrial communities**. Tese (Ph.D.). Graduate School of Vanderbilt University.

FIES. **O Que é o FIES**. Available from : <http://sisfiesportal.mec.gov.br/faq.html>. Accessed on 11/29/15.

HOUT, M. **Social and Economic Returns to College Education in the United States.** Annual Review of Sociology, v. 38, p. 379-400, 2012

HUNGERFORD, T.; GARY, S. **Sheepskin Effects in the Returns to Education.** Review of Economics and Statistics 69(1): 175-177, 1987

LANGONI, C. G. **As causas do crescimento econômico do Brasil**. Rio de Janeiro: Apec, 1974

LEMIEUX, T. The Mincer Equation Thirty Years after Schooling, Experience, and Earnings. In: **Jacob Mincer, A Pioneer of Modern Labor Economics.** Berlim: Springer Verlag, 2006

LOUREIRO, P.; GALRÃO, F. **Discriminação no mercado de trabalho: uma análise dos setores rural e urbano no Brasil.** Economia Aplicada, v. 5, n. 3, p. 519-545, 2001

MENEZES-FILHO, N.; FERNANDES, R.; PICCHETTI, P. **Rising human capital but constant inequality: the education composition effect in Brazil**. São Paulo: Universidade de São Paulo, 2003

MENEZES, N.; PECORA, C. **O Papel da Oferta e da Demanda por Qualificação na Evolução do Diferencial de Salários por Nível Educacional no Brasil.** São Paulo: Estudos Econômicos, v. 44, n. 2, p. 205-240, 2014

MINCER, J. **Schooling, experience, and earnings**. National Bureau of Economic Research, 1974

PESSOA, S. A.; BARBOSA, F. **Retorno da Educação no Brasil.** Rio de Janeiro: Pesquisa e Planejamento Econômico, v. 38, p. 97-125, 2008

PROUNI. **O Que é o Prouni.** Available from: <http://siteprouni.mec.gov.br/>. Accessed on 11/29/15.

RESENDE, M.; WYLLIE, R. **Retornos para a educação no Brasil: evidências empíricas adicionais**. Economia Aplicada, v. 10, n. 3, p. 349-365, 2006

SACHSIDA, A.; LOUREIRO, P., MENDONÇA, M. **Um estudo sobre o retorno em escolaridade no Brasil**. Revista Brasileira de Economia, v. 58, n. 2, p. 249-265, 2004

SOLMON, L. C., **Quality of Education and Economic Growth.** Economics of Education Review, v. 4, n. 4, p. 273-290, 1985

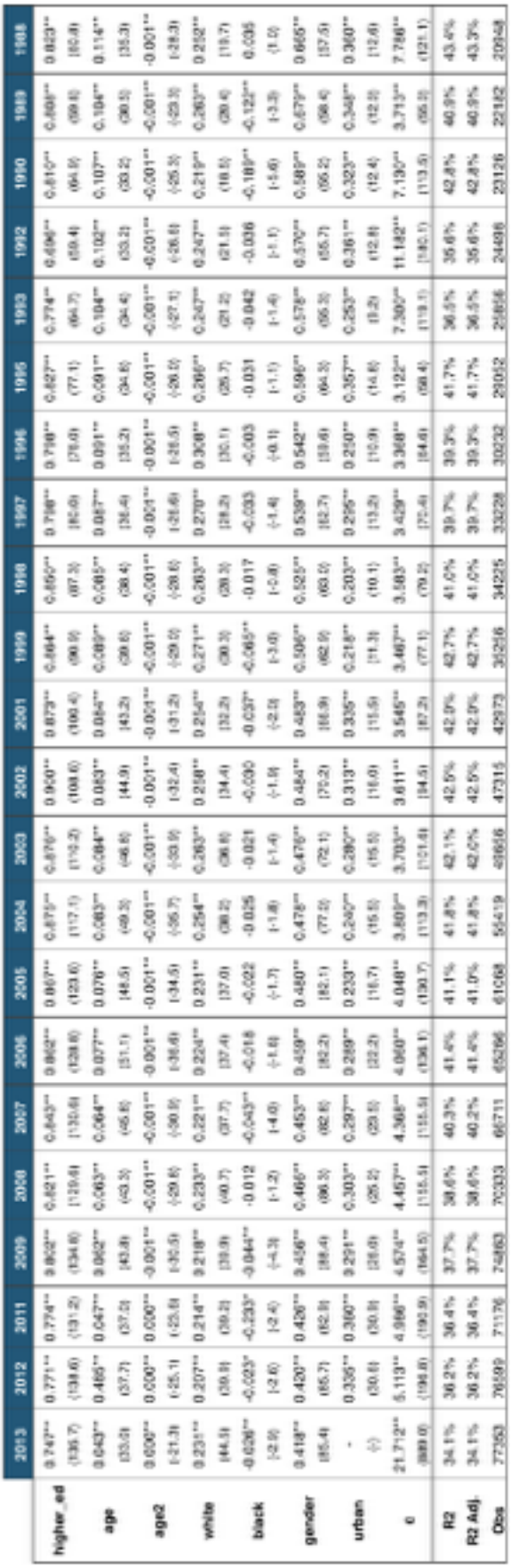
STEFANI, P.; BIDERMAN, C. **Returns to Education and Wage Differentials in Brazil: A Quantile Regression Approach.** Economics Bulettin, v. 9, n. 1, p. 1-6, 2006

U.S. SENATE. **For Profit Higher Education: The Failure to Safeguard the Federal Investment and Ensure Student Success.** Available from: <http://www.help.senate.gov/imo/media/for_profit_report/Contents.pdf>. Accessed on 11/29/15, 2012

UEDA, E.; HOFFMANN, R. **Estimando o retorno em educação no Brasil**. Economia Aplicada, v. 6, n. 2, p. 209-238, 2002

Appendix

Figure 9: OLS Regression Table



	2013	2012	2011	2009	2008	2007	2006	2005	2004	2003	2002	2001	1999	1998	1997	1996	1995	1993	1992	1990	1989	1988
higher_ed	0.747***	0.771***	0.774***	0.862***	0.821***	0.843***	0.862***	0.867***	0.875***	0.876***	0.900***	0.873***	0.864***	0.856***	0.798***	0.798***	0.827***	0.774***	0.698***	0.810***	0.808***	0.823***
	(336.7)	(338.6)	(331.2)	(334.8)	(319.6)	(330.6)	(338.8)	(333.6)	(317.1)	(319.2)	(308.6)	(308.4)	(300.8)	(297.3)	(285.6)	(278.0)	(277.1)	(264.7)	(259.4)	(264.6)	(259.8)	(260.8)
age	0.043***	0.465***	0.047***	0.062***	0.063***	0.064***	0.077***	0.076***	0.083***	0.084***	0.083***	0.084***	0.089***	0.085***	0.087***	0.091***	0.091***	0.104***	0.102***	0.107***	0.104***	0.114***
	(33.6)	(37.2)	(37.2)	(43.8)	(43.3)	(45.8)	(51.1)	(48.5)	(49.3)	(48.8)	(44.9)	(43.2)	(39.6)	(38.4)	(36.4)	(35.2)	(34.8)	(34.4)	(33.2)	(33.2)	(30.5)	(35.3)
age2	0.000***	0.000***	0.000***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-21.3)	(-25.1)	(-25.8)	(-35.5)	(-29.8)	(-30.9)	(-36.6)	(-34.5)	(-35.7)	(-33.9)	(-32.4)	(-31.2)	(-29.5)	(-28.6)	(-26.6)	(-26.5)	(-26.5)	(-27.1)	(-26.8)	(-25.5)	(-23.3)	(-28.3)
white	0.231***	0.207***	0.214***	0.218***	0.233***	0.221***	0.224***	0.231***	0.254***	0.263***	0.258***	0.254***	0.271***	0.263***	0.270***	0.308***	0.266***	0.267***	0.247***	0.219***	0.263***	0.252***
	(44.3)	(39.8)	(39.2)	(39.9)	(40.7)	(37.7)	(37.4)	(37.0)	(38.2)	(38.6)	(34.4)	(33.2)	(30.3)	(28.3)	(28.2)	(30.1)	(28.7)	(27.2)	(21.5)	(18.5)	(20.4)	(19.7)
black	-0.028***	-0.023***	-0.233***	-0.044***	-0.012	-0.043***	-0.018	-0.022	-0.025	-0.021	-0.030	-0.037***	-0.065***	-0.017	-0.033	-0.003	-0.031	-0.042	-0.036	-0.188***	-0.122***	0.035
	(-2.9)	(-2.6)	(-2.4)	(-4.3)	(-1.2)	(-4.0)	(-1.8)	(-1.7)	(-1.8)	(-1.4)	(-1.8)	(-2.8)	(-3.6)	(-5.8)	(-1.4)	(-0.1)	(-1.1)	(-1.4)	(-1.1)	(-5.6)	(-3.3)	(1.0)
gender	0.418***	0.420***	0.426***	0.456***	0.466***	0.453***	0.459***	0.480***	0.478***	0.476***	0.464***	0.463***	0.506***	0.525***	0.539***	0.542***	0.596***	0.578***	0.570***	0.589***	0.679***	0.665***
	(85.4)	(85.7)	(82.8)	(88.4)	(86.3)	(82.8)	(82.2)	(82.1)	(77.2)	(72.1)	(70.2)	(68.9)	(62.6)	(63.0)	(62.7)	(59.6)	(60.3)	(59.3)	(55.7)	(56.2)	(56.4)	(57.5)
urban	-	0.356***	0.360***	0.291***	0.303***	0.297***	0.269***	0.233***	0.260***	0.286***	0.313***	0.335***	0.218***	0.203***	0.295***	0.250***	0.357***	0.253***	0.361***	0.323***	0.348***	0.360***
	(-)	(30.8)	(30.8)	(28.6)	(28.2)	(25.8)	(22.2)	(16.7)	(15.8)	(15.5)	(16.0)	(15.5)	(11.3)	(10.1)	(13.2)	(10.9)	(14.6)	(9.2)	(12.8)	(12.4)	(12.8)	(12.6)
c	21.712***	5.113***	4.986***	4.574***	4.457***	4.368***	4.060***	4.048***	3.869***	3.703***	3.611***	3.545***	3.467***	3.583***	3.429***	3.368***	3.122***	7.380***	11.142***	7.130***	3.713***	7.786***
	(889.0)	(196.8)	(199.9)	(164.5)	(155.5)	(155.5)	(156.1)	(130.7)	(113.3)	(101.8)	(84.5)	(87.2)	(77.1)	(79.2)	(72.4)	(64.6)	(68.4)	(119.1)	(180.1)	(113.5)	(65.2)	(121.1)
R2	34.1%	36.2%	36.4%	37.7%	38.6%	40.3%	41.4%	41.1%	41.8%	42.1%	42.5%	42.9%	42.7%	41.6%	39.7%	39.3%	41.7%	36.5%	35.6%	42.8%	40.9%	43.4%
R2 Adj.	34.1%	36.2%	36.4%	37.7%	38.6%	40.2%	41.4%	41.0%	41.8%	42.0%	42.5%	42.9%	42.7%	41.6%	39.7%	39.3%	41.7%	36.5%	35.6%	42.8%	40.9%	43.3%
Obs	77353	76599	71176	74863	70333	66711	65266	61068	55419	49656	47315	42973	36256	34225	33228	30232	29052	25856	24498	23126	22182	20948

Figure 10: 25% Quantile Regression Table

	2013	2012	2011	2009	2008	2007	2006	2005	2004	2003	2002	2001	1999	1998	1997	1996	1995	1993	1992	1990	1989	1988
higher_ed	0.546***	0.568***	0.567***	0.626***	0.668***	0.700***	0.753***	0.745***	0.771***	0.791***	0.864***	0.841***	0.826***	0.826***	0.794***	0.813***	0.846***	0.736***	0.672***	0.854***	0.829***	0.824***
	(116.5)	(113.6)	(98.6)	(109.9)	(120.9)	(110.1)	(109.1)	(105.7)	(92.3)	(80.7)	(121.7)	(70.5)	(70.3)	(62.3)	(62.5)	(55.2)	(57.9)	(61.2)	(40.1)	(54.1)	(53.5)	(45.8)
age	0.030***	0.034***	0.034*	0.045***	0.046***	0.048*	0.054***	0.060***	0.065***	0.066***	0.067***	0.069***	0.083***	0.080***	0.079***	0.082***	0.087***	0.096***	0.096***	0.116***	0.093***	0.103***
	(26.0)	(26.1)	(24.2)	(48.2)	(36.6)	(35.8)	(34.8)	(36.1)	(35.1)	(30.7)	(45.5)	(26.1)	(30.6)	(27.1)	(26.4)	(25.2)	(24.6)	(31.6)	(22.2)	(29.5)	(24.7)	(25.2)
age2	0.000***	0.000***	0.000*	0.000***	0.000***	0.000*	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-21.5)	(-22.7)	(-17.7)	(-36.7)	(-27.3)	(-26.1)	(-25.7)	(-29.4)	(-28.4)	(-23.6)	(-33.5)	(-20.2)	(-24.5)	(-21.8)	(-20.5)	(-16.8)	(-19.4)	(-26.9)	(-16.5)	(-23.7)	(-19.3)	(-21.4)
white	0.171***	0.169***	0.170*	0.182***	0.203***	0.183*	0.182***	0.216***	0.231***	0.241***	0.235***	0.236***	0.260***	0.255***	0.265***	0.317***	0.286***	0.252***	0.242***	0.244***	0.269***	0.253***
	(39.1)	(38.8)	(37.6)	(51.3)	(41.3)	(32.3)	(30.5)	(36.0)	(31.5)	(27.8)	(37.5)	(21.8)	(25.5)	(20.3)	(21.8)	(22.3)	(20.7)	(21.6)	(14.8)	(16.5)	(20.2)	(15.2)
black	-0.054	0.007	-0.006	-0.016*	0.000***	-0.017	0.005**	0.005	-0.012	-0.002	0.004	-0.010	-0.013	0.000	0.008	0.025	-0.002	0.018	-0.017	-0.156***	-0.055	0.056
	(0.1)	(0.6)	(-0.6)	(-2.5)	(0.0)	(-1.7)	(0.5)	(0.6)	(-0.8)	(-0.1)	(0.3)	(-0.4)	(-0.5)	(0.0)	(0.3)	(0.7)	(-0.1)	(0.6)	(-0.4)	(-3.7)	(-1.3)	(1.2)
gender	0.269***	0.267***	0.309*	0.337***	0.353***	0.350*	0.359***	0.385***	0.386***	0.380***	0.429***	0.417***	0.472***	0.488***	0.515***	0.529***	0.583***	0.519***	0.534***	0.596***	0.637***	0.624***
	(65.7)	(64.4)	(53.5)	(101.2)	(76.7)	(66.5)	(66.5)	(66.9)	(59.8)	(47.4)	(66.8)	(42.5)	(47.4)	(43.2)	(47.5)	(41.8)	(49.2)	(49.6)	(36.7)	(44.4)	(46.2)	(41.3)
urban	-	0.301***	0.323*	0.277***	0.259***	0.288*	0.256***	0.213***	0.234***	0.266***	0.271***	0.323***	0.215***	0.215***	0.323***	0.266***	0.404***	0.291***	0.399***	0.338***	0.341***	0.359***
	(-)	(30.1)	(24.6)	(38.3)	(23.2)	(23.6)	(19.3)	(15.5)	(13.6)	(12.1)	(16.3)	(10.8)	(9.0)	(7.9)	(11.4)	(8.3)	(12.4)	(10.6)	(10.5)	(10.4)	(10.4)	(9.7)
c	21.863***	5.298***	5.121***	4.755***	4.647***	4.464*	4.316***	4.151***	3.896***	3.792***	3.654***	3.536***	3.204***	3.285***	3.155***	3.061***	2.894***	7.031***	10.844*	6.449***	3.391***	7.548***
	(1060.8)	(223.7)	(176.5)	(260.6)	(169.8)	(167.2)	(141.3)	(136.8)	(106.1)	(87.2)	(114.3)	(63.8)	(59.2)	(54.9)	(52.2)	(42.8)	(37.7)	(115.2)	(124.3)	(62.4)	(45.8)	(62.8)
R2	12.79%	14.14%	14.46%	14.09%	15.63%	16.48%	17.16%	17.8000%	18.23%	19.44%	20.52%	20.53%	21.69%	20.83%	20.71%	21.06%	22.82%	18.46%	18.3000%	24.46%	22.94%	23.07%
Obs	77353	76599	71176	74863	70333	66711	65266	61068	55419	49656	47315	42973	36256	34225	33228	30232	29052	25856	24498	23126	22182	20948

* Significant at 5% Significance Level;** Significant at 1% Significance Level

Figure 11: 50% Quartile Regression Table

	2013	2012	2011	2009	2008	2007	2006	2005	2004	2003	2002	2001	1999	1998	1997	1996	1995	1993	1992	1990	1988
higher_ed	0.735**	0.791**	0.789**	0.808**	0.845**	0.859**	0.897**	0.887**	0.891**	0.902**	0.932**	0.892**	0.886**	0.885**	0.839**	0.834**	0.862**	0.812**	0.722**	0.816**	0.867**
	(137.6)	(120.3)	(139.1)	(142.3)	(175.2)	(149.3)	(120.5)	(142.0)	(106.6)	(104.1)	(127.9)	(85.9)	(75.5)	(83.5)	(82.2)	(85.4)	(76.5)	(63.8)	(55.0)	(47.2)	(51.0)
age	0.029**	0.033**	0.034**	0.044**	0.048**	0.048**	0.057**	0.065**	0.072**	0.075**	0.073**	0.081**	0.090**	0.090**	0.086**	0.092**	0.087**	0.099**	0.098**	0.115**	0.114**
	(23.2)	(21.6)	(27.9)	(32.4)	(43.4)	(38.7)	(34.1)	(46.2)	(37.9)	(38.3)	(45.1)	(34.9)	(32.4)	(37.2)	(35.0)	(38.1)	(31.8)	(30.6)	(28.5)	(25.8)	(28.1)
age2	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	(-12.7)	(-12.3)	(-15.6)	(-19.6)	(-27.2)	(-22.9)	(-21.9)	(-31.5)	(-26.0)	(-26.7)	(-30.8)	(-25.3)	(-23.7)	(-28.2)	(-25.5)	(-28.6)	(-22.7)	(-23.8)	(-22.8)	(-20.1)	(-22.4)
white	0.191**	0.190**	0.192**	0.194**	0.211**	0.208**	0.209**	0.217**	0.242**	0.249**	0.255**	0.271**	0.280**	0.275**	0.270**	0.317**	0.276**	0.236**	0.253**	0.247**	0.251**
	(38.0)	(30.9)	(36.6)	(37.1)	(48.3)	(39.9)	(31.4)	(39.1)	(32.6)	(32.0)	(38.9)	(28.7)	(25.4)	(27.2)	(27.5)	(33.4)	(25.5)	(19.1)	(19.6)	(15.1)	(15.6)
black	-0.014	-0.009**	-0.018	-0.021**	-0.009	-0.008	-0.015	-0.017	-0.017	-0.001	0.000	0.008	-0.030	-0.036	-0.029	-0.002	-0.054	-0.052	-0.025	-0.146**	-0.037
	(-1.6)	(-0.8)	(-1.9)	(-2.2)	(-1.1)	(-0.9)	(-1.2)	(-1.6)	(-1.1)	(0.0)	(0.0)	(0.4)	(-1.1)	(-1.5)	(-1.2)	(-0.1)	(-1.8)	(-1.6)	(-0.7)	(-3.1)	(-0.8)
gender	0.356**	0.359**	0.371**	0.373**	0.400**	0.391**	0.388**	0.424**	0.432**	0.435**	0.443**	0.451**	0.499**	0.526**	0.529**	0.556**	0.606**	0.564**	0.575**	0.581**	0.672**
	(74.9)	(62.1)	(75.2)	(75.9)	(97.4)	(80.2)	(62.6)	(81.7)	(62.4)	(60.5)	(73.3)	(52.4)	(50.2)	(58.1)	(60.1)	(65.7)	(62.3)	(50.7)	(50.2)	(39.3)	(46.3)
urban	-	0.259**	0.252**	0.217**	0.220**	0.225**	0.221**	0.215**	0.216**	0.222**	0.303**	0.333**	0.202**	0.208**	0.315**	0.264**	0.330**	0.225**	0.346**	0.311**	0.348**
	(-)	(20.1)	(22.5)	(20.4)	(24.1)	(20.0)	(15.2)	(17.3)	(12.5)	(11.2)	(17.6)	(12.9)	(8.4)	(9.5)	(13.8)	(12.3)	(13.1)	(7.7)	(10.9)	(8.6)	(9.7)
c	22.031*	5.509**	5.366**	5.035**	4.856**	4.751**	4.522**	4.311**	4.064**	3.941**	3.794**	3.591**	3.454**	3.478**	3.436**	3.304**	3.164**	7.428**	11.276*	6.994**	7.778**
	(930.1)	(179.4)	(213.7)	(189.9)	(222.7)	(189.8)	(136.4)	(156.6)	(108.2)	(99.2)	(113.2)	(73.9)	(62.3)	(70.6)	(69.0)	(68.2)	(56.4)	(114.0)	(162.3)	(80.3)	(96.3)
R2	20.47%	22.27%	21.87%	22.79%	23.65%	24.82%	25.85%	25.09%	26.02%	26.36%	27.02%	26.59%	26.74%	25.97%	24.73%	24.36%	25.7%	22.35%	21.7%	26.16%	27.21%
Obs	77353	76599	71176	74863	70333	66711	65266	61068	55419	49656	47315	42973	35256	34225	33228	30232	29052	25856	24498	23126	20948

Figure 12: 75% Quartile Regression Table

	2013	2012	2011	2009	2008	2007	2006	2005	2004	2003	2002	2001	1999	1998	1997	1996	1995	1993	1992	1990	1989	1988
higher_ed	0.888**	0.918**	0.917**	0.933**	0.944*	0.959**	0.960**	0.972**	0.965**	0.955**	0.972**	0.940**	0.911**	0.904**	0.818**	0.816**	0.828**	0.847**	0.738**	0.804**	0.805**	0.845**
	(153.0)	(161.3)	(111.8)	(142.6)	(143.9)	(140.2)	(110.7)	(105.2)	(91.6)	(104.7)	(87.7)	(87.6)	(89.7)	(62.9)	(64.3)	(63.7)	(56.3)	(51.9)	(46.8)	(56.2)	(37.3)	(46.7)
age	0.039**	0.046**	0.047*	0.061**	0.063*	0.066**	0.081**	0.082**	0.089**	0.092**	0.092**	0.094**	0.098**	0.094**	0.101**	0.105**	0.100**	0.114**	0.106**	0.105**	0.113**	0.129**
	(28.5)	(35.0)	(27.4)	(39.5)	(41.7)	(42.0)	(40.9)	(39.0)	(36.4)	(43.9)	(36.7)	(37.7)	(39.5)	(27.5)	(32.3)	(32.4)	(26.6)	(26.9)	(25.4)	(27.6)	(19.6)	(28.6)
age2	0.000**	0.000**	0.000*	0.000**	0.000*	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	(-13.9)	(-18.7)	(-14.3)	(-23.3)	(-25.0)	(-25.0)	(-26.7)	(-25.6)	(-24.5)	(-29.8)	(-24.7)	(-25.3)	(-27.1)	(-19.3)	(-22.6)	(-23.5)	(-18.4)	(-20.2)	(-19.3)	(-20.0)	(-14.4)	(-22.3)
white	0.220**	0.207**	0.211**	0.212**	0.229*	0.223**	0.228**	0.223**	0.259**	0.272**	0.269**	0.265**	0.270**	0.252**	0.271**	0.322**	0.278**	0.232**	0.258**	0.207**	0.239**	0.262**
	(40.0)	(38.8)	(27.6)	(35.2)	(38.3)	(35.8)	(29.4)	(27.2)	(27.5)	(33.2)	(27.0)	(27.2)	(28.3)	(18.4)	(22.2)	(25.8)	(19.7)	(14.8)	(16.6)	(15.1)	(11.6)	(15.2)
black	-0.018	-0.024**	-0.031*	-0.043**	-0.026*	-0.042**	0.228	-0.050**	-0.036	-0.010	-0.037	-0.037	-0.087**	-0.059	-0.043	-0.017	-0.014	-0.105*	-0.063	-0.197**	-0.184**	0.039
	(-1.9)	(-2.6)	(-2.3)	(-3.8)	(-2.3)	(-3.7)	(29.4)	(-3.0)	(-1.8)	(-0.6)	(-1.7)	(-1.6)	(-3.8)	(-1.8)	(-1.4)	(-0.6)	(-0.4)	(-2.5)	(-1.5)	(-5.0)	(-3.1)	(0.8)
gender	0.437**	0.429**	0.441*	0.447**	0.460*	0.444**	0.440**	0.471**	0.471**	0.475**	0.486**	0.489**	0.518**	0.536**	0.536**	0.546**	0.573**	0.586**	0.569**	0.579**	0.685**	0.652**
	(83.7)	(84.7)	(61.0)	(78.4)	(81.7)	(76.2)	(60.8)	(61.2)	(53.8)	(62.9)	(53.1)	(55.4)	(60.8)	(43.9)	(49.2)	(49.6)	(45.5)	(41.5)	(41.5)	(47.4)	(37.0)	(42.5)
urban	0.000**	0.238**	0.243*	0.196**	0.207*	0.224**	0.219**	0.217**	0.202**	0.246**	0.308**	0.309**	0.223**	0.190**	0.258**	0.161**	0.315**	0.238**	0.336**	0.270**	0.345**	0.280**
	(0.0)	(21.1)	(14.9)	(15.9)	(16.6)	(16.7)	(13.0)	(11.8)	(9.3)	(11.9)	(11.8)	(11.6)	(10.8)	(6.4)	(9.1)	(5.8)	(9.6)	(6.4)	(8.9)	(9.0)	(7.5)	(7.3)
c	22.025*	5.489**	5.358*	4.958**	4.845*	4.696**	4.367**	4.278**	4.074**	3.913**	3.786**	3.711**	3.675**	3.823**	3.622**	3.599**	3.412**	7.578**	11.561*	7.709**	4.073**	8.076**
	(838.6)	(203.0)	(149.1)	(159.8)	(160.1)	(148.7)	(110.3)	(102.2)	(83.7)	(91.5)	(72.9)	(72.4)	(74.8)	(55.3)	(57.5)	(55.8)	(45.3)	(89.0)	(137.4)	(104.7)	(36.2)	(91.2)
R2	26.0%	27.1%	27.3%	28.3%	28.8%	29.5%	30.5%	30.0%	30.0%	30.3%	30.0%	29.2%	29.0%	27.9%	26.5%	25.8%	26.7%	24.5%	23.1%	27.0%	25.9%	28.9%
Obs	77353	76599	71176	74863	70333	66711	65266	61068	55419	49656	47315	42973	35256	34225	33228	30232	29052	25856	24498	23126	22182	20948

* Significant at 5% Significance Level;** Significant at 1% Significance Level