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Estimating the Returns to Education in Argentina: 1992-2002

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Abstract. Returns to schooling in urban Argentina for a ten-year period are estimated. In addition to comparable earnings functions, we also estimate the returns using quantile regression analysis to detect differences in the returns across the distribution. Over time, men in higher quantiles have higher returns to schooling compared to those in the lower quantiles. For women returns are highest at the lowest quantile. The returns to education increased during the last decade. We do not rule out that increased demand for skills is driving the increasing returns over the decade.

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I. INTRODUCTION

Argentina has one of the most developed education systems in the Americas. Indicators show that despite the recent economic crisis, school enrollment rates are high (Parandekar, España and Savanti 2003). Educational advances began early in Argentina following the Constitution of 1853, especially due to the efforts of Domingo Sarmiento, the fourth president of Argentina. Sarmiento set the guidelines for the modern education system in the latter half of the nineteenth century, pushing through reforms that supported school expansion for all citizens. The literacy rate rose from 33 percent in 1869 to nearly 50 percent by the turn of the century.

Argentina has a solid base from which an efficient and modern education and training system can be built, helping the country to compete in the global economy. Average years of schooling of the population are 8.5, significantly higher than the regional average of 5.9 years (Table 1). Argentina also compares well with East and Central Europe and East Asia, where average educational attainment is 8.4 years and 7.6 years (Barro and Lee 2000).

Table 1: Educational Attainment of the Total Population Aged 15 and Over: Average years of schooling

	1960	1965	1970	1975	1980	1985	1990	1995	2000
Argentina	5.3	5.5	6.2	6.3	7	7.1	8.1	8.5	8.8
Brazil	2.9	3	3.3	3	3.1	3.5	4	4.5	4.9
Canada	9.1	8.8	9.1	9.8	10.3	10.8	11	11.4	11.6
Chile	5.2	5	5.7	5.6	6.4	6.7	7	7.3	7.6
Greece	4.8	5.1	5.4	5.9	7	7.3	8	8.3	8.7
Italy	4.7	5	5.5	5.7	5.9	6.2	6.5	6.9	7.2
Korea	4.3	5.4	4.9	6.6	7.9	8.7	9.9	10.6	10.8
Mexico	2.8	2.9	3.7	3.9	4.8	5.2	6.7	7	7.2
Portugal	1.9	2.4	2.6	2.8	3.8	3.9	4.9	5.5	5.9
Spain	3.7	3.8	4.8	4.7	6	5.8	6.4	6.8	7.3
Uruguay	5.4	5.1	5.7	6.2	6.2	6.9	7.1	7.3	7.6
USA	8.5	9.1	9.5	9.7	11.9	11.6	11.7	11.9	12.1

Source: Barro and Lee 2000

During the 1990s an increase in the wages of tertiary-, or university-, educated workers relative to the wages of secondary-educated workers in Argentina is observed. In contrast one observes a fall in the wages of secondary-educated workers relative to the wages of primary-educated workers. One also observes increases in the relative supply of tertiary-educated and secondary-educated workers; the level of education of the population increases over time.

The fact that both the relative wages and relative supply of tertiary-educated workers are increasing simultaneously may constitute evidence of increases in the demand for tertiary-educated workers. The evidence for secondary-educated workers is more mixed since relative wages and supply are moving in opposite directions. However, when one isolates changes in the relative demand for secondary-educated workers it is observed that it has been going down over the period (Sanchez-Paramo and Schady 2002; de Ferranti and others 2003). Increases in the demand for tertiary-educated workers took place at a time when countries in Latin America – including Argentina – considerably increased the penetration of imports, including imports of capital goods.

Previous Estimates

There are several previous estimates of the returns to schooling in Argentina since the mid-1980s. In 1985, in Buenos Aires, the labor force averaged 11.1 years of schooling and the private rate of return to another year of schooling was 9.2 percent (Kugler and Psacharopoulos 1989). Social rates of return were 16.7 percent at primary, 6.4 percent at secondary and 7.1

percent at tertiary; and private returns were 30, 9 and 11 percent. In 1989, in urban Argentina the labor force had 9.1 years of schooling and the private rate of return to another year of schooling was 10.3 percent (Psacharopoulos 1994). Social returns were 8.4, 7.1 and 7.6 percent; and private returns were 10.1, 14.2 and 14.9 percent. Returns to schooling for women are slightly higher than for men: in 1985, 9.1 for men and 10.3 percent for women; and in 1989, 10.7 for men and 11.2 percent for women (Psacharopoulos 1994). Returns to schooling are higher for workers in the private sector: 9.6 versus 7.0 percent in 1985; and in 1989, 11.1 versus 8.9 percent. Overall, in the 1980s, the returns to schooling in Argentina are more like an industrial country than the patterns observed in the Latin America region (Kugler and Psacharopoulos 1989).

The returns to schooling in Buenos Aires increased from 10 percent in 1986 to 12.5 percent in 1989 (Pessino 1995). Then they dropped to 9 percent in 1990 and increased again to 10 percent by 1993. Pessino (1995) concludes that returns were higher and increasing during the period of hyperinflation. However, when inflation was brought under control in 1990 returns decreased significantly.

Using a dynamic cohort analysis for Buenos Aires for the period 1980-1999, Margot (2001) shows that workers with secondary incomplete experience rather stable returns, which are on average 12 percent although decreasing in recent years, reaching 10 percent in 1999. Workers with secondary complete experience slightly higher returns – at 13 percent on average for the whole period – but very stable over time and reaching 11 percent in 1999. Workers with

complete higher education seem to be experiencing increasing returns, especially in recent years, reaching 23 percent in 1999.

Others also document an increasing trend over the long term going back to 1975 (Cossa 2000). Andres (2003) shows that workers educated in private schools have higher returns and the quality of schooling significantly affects returns. The returns to schooling are relatively high and increased over time.

There has been research on the determinants of growing wage inequality in Argentina. Galiani and Sanguinetti (2003) test whether trade liberalization played any role in shaping the wage structure during the 1990s. By looking at sectors of the economy where import penetration deepened and observing whether wage inequality increased, they argue that despite some evidence of a trade role, it explains only a small proportion of the observed rise in inequality.

We estimate rates of returns to education in Argentina for a ten year period using official household surveys covering urban areas. The next section describes the methodology used to estimate these returns and the empirical model applied. In section III, data and variables included in the analysis are summarized and variables are compared across sample years. In addition to comparable Mincerian earnings for the period using OLS, we also estimate the returns using quantile regression analysis to detect differences in the returns across the whole distribution. Thus, we focus on within-education-levels wage inequality. Finally, the results for

different specifications are reported, showing that the returns to education in Argentina have increased during the last decade.

II. MODEL

Following Mincer (1974), the natural logarithm of earnings is a function of schooling and experience in the labor market:

$$LnW_i = a + \beta_1 S_i + \beta_2 X_i + \beta_3 X^2{}_i + \mu_i$$

where LnW is the natural log of hourly earnings for the *i*th individual; S_i is years of schooling; X_i is labor market experience (age - average of corresponding educational level - 6); X^2 is experience-squared; and μ_i is a random disturbance term reflecting unobserved abilities. Therefore, β_1 can be viewed as the average rate of return to schooling (see Chiswick 1998).

The earnings function method is also used to estimate returns to different levels of schooling, by converting the continuous years of schooling variable into a series of dummy variables representing the levels of schooling. After fitting the extended earnings function:

$$LnWi = \alpha + \beta_1 Pric_i + \beta_2 Seci_i + \beta_3 Secc_i + \beta_4 Supi_i + \beta_5 Supc_i + \beta_6 X_i + \beta_7 X^2{}_i + \mu_i$$

where *Pric*, *Seci*, *Secc*, *Supi* and *Supc* refer to dummy variables for primary complete, secondary incomplete, higher incomplete and university complete (*Prii* is primary incomplete or no education and is the regressor). Therefore, *Prii* is equal to 1 if incomplete primary school or no

schooling, or between 0 and 6 years of schooling (omitted variable in the regression); *Pric* is equal to 1 if complete primary school (7 years of schooling); *Seci* is equal to 1 if individual did not complete secondary school (between 8 and 11 years of schooling); *Secc* equals 1 if individual has complete secondary school (12 years of schooling); *Supi* equals 1 if individual did not complete university (or college) (between 13 and 16 years of schooling); and *Supc* equals 1 if individual completed university (17 or more years of schooling). The returns to schooling by level are derived from:

$$r_{(Pric)} = \beta_1 / S_{Pric}$$

$$r_{(Seci)} = (\beta_2 - \beta_1)/(S_{Seci} - S_{Pric})$$

$$r_{(Secc)} = (\beta_3 - \beta_1)/(S_{Secc} - S_{Pric})$$

$$r_{(Supi)} = (\beta_4 - \beta_3) / (S_{Supi} - S_{Secc})$$

$$r_{(Supic)} = (\beta_5 - \beta_2)/(S_{Supc} - S_{Secc})$$

where S_{Pric}, S_{Seci}, S_{Secc}, S_{Supi} and S_{Supc} are the total number of years of schooling for each successive level of education.

This model has two important assumptions: (1) the wage differential among workers with different levels of education is constant throughout the whole period; and (2) the only costs of continuing studies are foregone wages during that period. The models will be estimated using OLS.

III. DATA SOURCE AND DESCRIPTION

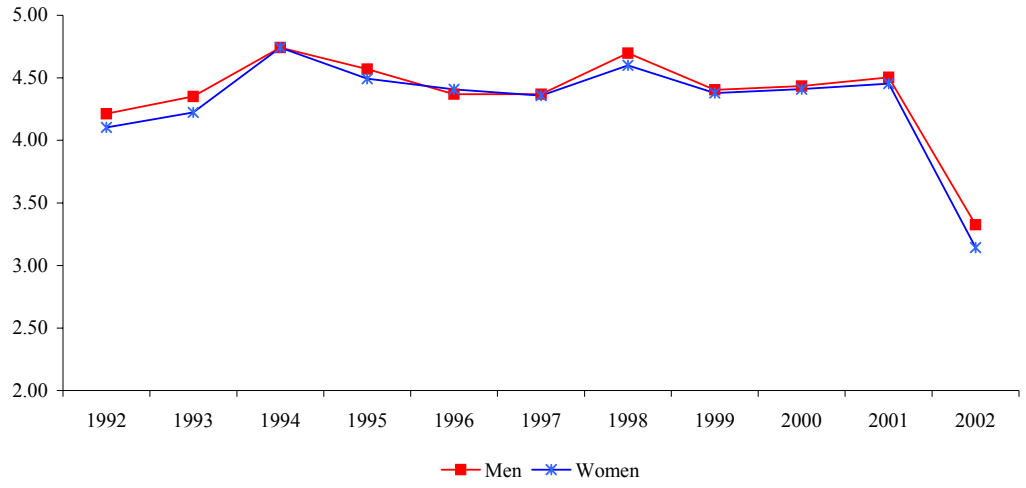
Data used in this paper come from the household surveys carried out by the National Institute of Statistics and Census (INDEC) twice a year since the 1970s. The survey, known as the Permanent Household Survey (*Encuesta Permanente de Hogares* or EPH), has incorporated new regions and cities over time in order to have better coverage of urban households. It now reaches approximately 70 percent of the urban population. For comparability reasons over the years, we consider only conglomerates available for all years in the EPH.[1]

Earnings functions are estimated for men and women jointly and separately. The samples include all workers 14-65 year of age with positive employment earnings. Three type of variables were used in the analysis: educational variables (continuous and dummy variables), as well as quantitative data and price variables (see Annex 1 for definitions). Appendix Table 1 presents the means of these variables for the 1992-2002 samples.

During the last ten years, average years of education have increased by one whole year for the whole sample. Additionally, the proportion of workers with less than secondary education decreased. Conversely, there was a significant increase in the proportion of workers with tertiary-level qualifications (9.5 percent had higher education in 1992, compared with 16 percent in 2002). These figures show an apparent improvement in human capital levels in Argentina. Finally, women's years of education are higher than men's. Years of experience

seem to have increased for women. However, this variable is always around 20 to 21 years during this period. The dependent variable in our analysis is the log real hourly wage rate. Wages were adjusted by the Consumer Price Index in order to have a comparable series through the decade. In contrast to what happened with the variable "years of education," women earned less money than men during the period. The average hourly real wage has declined since 1992 (see Figure 1).

Figure 1: Average Hourly Wages over Time



Summary of the Sample

In 1992 the levels of schooling were as follows: 30 percent of the labor force had a primary education, 18 percent had complete secondary and 12 percent had complete university (see means and standard deviations in Annex Table 1). Women were more heavily represented at higher levels of schooling. For example, while 23 percent of men had incomplete secondary

[1] The conglomerates available for the whole period (1992-2002) and considered in our paper are La Plata, Santa Fe, Paraná, Comodoro Rivadavia, Neuquen, Jujuy, Río Gallegos, Salta, San Luis, Santa Rosa, Tierra del Fuego, Capital and Conurbano Bonaerense.

and only 17 percent had complete secondary, for women 17 percent had incomplete secondary while 21 percent had complete secondary. At the university level, 9 percent of men had completed this level, compared to 17 percent for women. Women overall had more than one-half years more schooling than men: 10.6 versus 9.8 years. Earnings, however, were lower for women, at 7 percent less per hour worked.

By 2002 the levels of schooling were as follows: 23 percent of the labor force had a primary education, 19 percent had complete secondary and 17 percent had complete university. Again, women were more heavily represented at higher levels of schooling. For example, while 23 percent of men had incomplete secondary and 18 percent had complete secondary, for women 15 percent had incomplete secondary while 20 percent had complete secondary. At the university level, 13 percent of men had completed this level, compared to 23 percent for women. Women overall had almost one full year more schooling than men: 11.4 versus 10.5 years. That is, women increased their schooling by almost one year, while men increased by only 0.7 years. Earnings, however, were even lower for women, at 13 percent less per hour worked.

Overall schooling in the labor force increased to 10.9 years in 2002, from 10.1 years in 1992. That is an increase of almost one year in a ten year period. The proportion with university complete increased by almost 50 percent, while the proportion with university incomplete went up by 37 percent. The proportion with secondary complete went up only 2 percent. The proportion with secondary incomplete and primary declined.

Workers with incomplete secondary do not earn significantly more than those with complete primary education (Table 2). A complete secondary education appears to be necessary before earnings rise significantly. There also appears to be a significant premium attached to completing one's university education. Workers in the informal sector earn just over half what workers in the formal sector earn. Average earnings in the informal sector are about the same as what a worker with incomplete secondary education earns. Women earn about the same as men in the formal sector; much less in the informal sector. Employers earn significantly more than employees or the self-employed. Earnings inequality, however, appears to be greater among men, than among women. Female employers earn significantly less than male employers.

IV. RESULTS: MINCERIAN EQUATIONS

The basic earnings functions estimates for the whole sample (men and women) in different years are presented in Appendix Tables 2a-k. Model 1 is the traditional earnings function, model 2 contains dummy variables for educational levels, and in model 3 we incorporate a binary variable indicating sex.

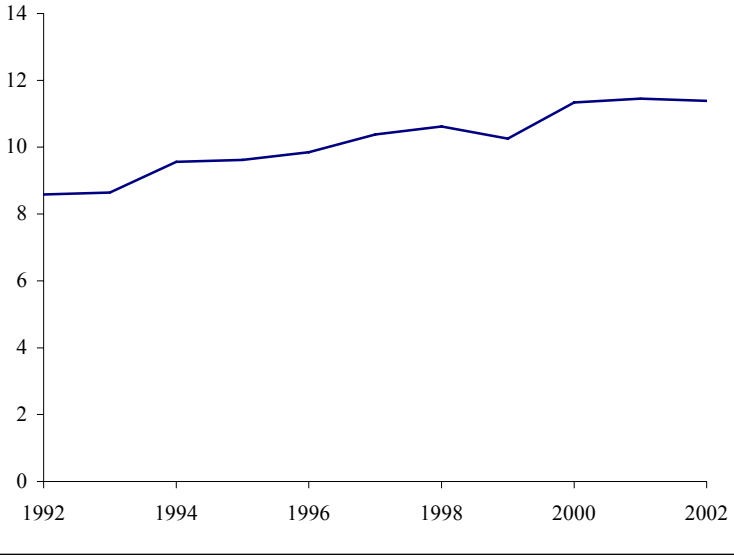
Table 2: Mean Earnings per Hour by Selected Characteristics, 2002 (constant 1999 *pesos*)

Category	Level/Type	Mean	s.d.	N
All	Primary incomplete	1.65	1.36	708
	Primary complete	2.06	2.96	2,142
	Secondary incomplete	2.14	2.67	1,990
	Secondary complete	2.79	2.57	2,149
	University incomplete	3.22	2.54	1,140
	University complete	6.65	6.74	1,546
Sector	Formal	3.59	2.79	4,835
	Informal	2.01	2.72	2,792
Men	Formal	3.62	3.05	2,731
	Informal	2.16	3.59	1,301
Woman	Formal	3.55	2.44	2,104
	Informal	1.85	1.32	1,491
Type	Employer	8.14	12.39	275
	Self-employed	3.10	4.55	1,760
	Employee	2.94	2.87	7,640
Women	Employer	5.27	6.16	66
	Self-employed	3.09	4.24	505
	Employee	2.81	2.20	3,600
Men	Employer	9.16	13.83	209
	Self-employed	3.11	4.69	1,255
	Employee	3.05	3.34	4,040
Status	Permanent	3.41	4.14	7,285
	Temporary	2.23	1.93	659
	Odd Job	3.03	8.79	160
	Unknown	1.90	2.29	1,569
Women	Permanent	3.20	2.88	3,019
	Temporary	2.11	1.55	326
	Odd Job	0.89	0.73	20
	Unknown	1.82	1.97	805
Men	Permanent	3.55	4.83	4,266
	Temporary	2.36	2.29	333
	Odd Job	3.38	9.44	140
	Unknown	1.99	2.58	764

Source: EPH

Overall, the returns to schooling increased over time (see Figure 2 and Table 3). There was a significant increase from 1993 to 1994, and again from 1999 to 2000, with some stability in the last three years.

Figure 2: Returns to Schooling over Time (percent)



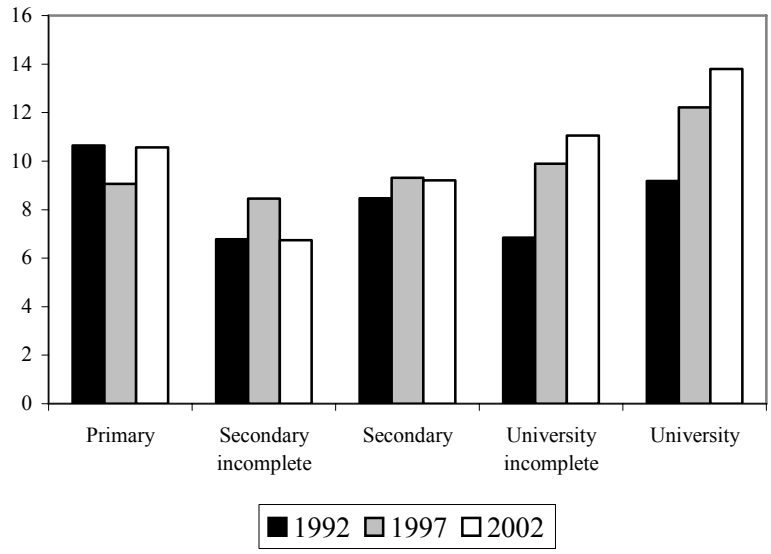
Also there were significant changes in the returns to schooling by level. At the start of the period, primary education exhibited the highest returns. Five years later, the returns to primary decreased, only to recover again in the latter years. The returns to secondary incomplete have decreased, while the returns to secondary have remained remarkably stable. The returns to higher education, both university complete and incomplete have increased substantially, with university now exhibiting the highest returns (see Figure 3).

Table 3: Returns to Schooling over Time

Argentina	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Overall	8.6	8.6	9.6	9.6	9.9	10.4	10.6	10.3	11.3	11.5	11.4
Primary vs none	10.7	8.1	9.4	7.9	8.3	9.1	8.2	8.0	8.4	12.6	10.6
Secondary incomplete vs Primary	6.8	7.0	8.2	7.7	6.5	8.5	7.3	7.1	7.1	5.4	6.7
Secondary vs Primary	8.5	8.2	8.6	8.2	8.6	9.3	8.9	8.8	10.0	9.2	9.2
University incomplete vs secondary	6.9	10.0	10.8	9.7	9.3	9.9	11.2	10.4	10.3	9.6	11.1
University vs secondary	9.2	9.7	11.2	12.5	12.1	12.2	13.0	12.6	13.3	13.6	13.8
Men	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Overall	9.1	9.0	10.0	9.8	10.0	10.7	10.9	10.3	11.4	11.4	12.0
Primary vs none	13.5	10.2	11.6	9.2	9.7	11.0	13.0	10.7	10.7	15.5	16.8
Secondary incomplete vs Primary	7.1	7.9	9.2	7.8	7.9	9.0	8.0	7.5	8.8	6.1	8.0
Secondary vs Primary	8.9	8.5	9.0	8.8	9.2	9.9	8.9	8.7	10.9	9.3	9.8
University incomplete vs secondary	6.8	10.8	11.2	8.9	8.1	8.5	12.2	11.3	9.7	11.3	11.4
University vs secondary	11.3	11.4	13.3	14.4	13.1	14.2	15.1	14.3	13.8	14.8	15.8
Women	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Overall	8.1	8.5	9.1	9.4	9.8	10.2	10.4	10.5	11.5	11.8	10.8
Primary vs none	4.3	3.4	4.2	4.6	5.2	4.9	-1.0	2.7	4.5	7.6	-0.7
Secondary incomplete vs Primary	5.8	5.5	6.1	7.3	3.7	7.3	5.5	6.6	3.2	4.2	4.8
Secondary vs Primary	8.2	8.3	8.5	7.7	7.8	8.7	9.1	9.5	8.9	9.3	8.6
University incomplete vs secondary	6.2	7.6	9.3	9.8	10.4	11.4	9.4	9.0	10.8	7.2	10.5
University vs secondary	8.0	8.8	9.7	11.4	11.5	11.3	11.6	11.7	13.6	13.2	13.0
Women (corrected for selectivity)	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Overall	8.5	9.0	9.7	10.0	10.2	11.0	11.0	11.2	11.8	11.9	11.3
Primary vs none	4.9	3.2	3.6	4.4	5.2	-1.3	-1.3	1.8	3.9	7.3	-1.1
Secondary incomplete vs Primary	5.8	5.6	6.1	7.1	3.5	4.9	4.9	6.4	2.6	4.0	4.1
Secondary vs Primary	8.8	9.0	9.3	8.4	8.4	9.8	9.8	10.5	9.5	9.7	9.3
University incomplete vs secondary	5.6	7.3	9.0	9.5	10.1	9.2	9.2	9.1	10.7	7.5	10.3
University vs secondary	8.7	9.9	10.8	12.5	12.5	13.2	13.2	13.4	14.8	14.2	14.9

Source: Calculated from Mincerian earnings functions, using EPH

Figure 3: Returns to Schooling by Level over Time (percent)



The estimate of the rate of return to schooling in 2002 is 12.0 percent for men and 10.8 percent for women (Table 3). These figures increased since 1992, when the rates of returns were 9.1 percent and 8.1 percent. The returns to all levels of education are much higher for men than for women. The coefficient on general experience did not change for men (4.6 percent) and experienced a slight increase for women (3.4 percent to 3.7 percent). As human capital theory suggests, the sign of the estimated coefficients for experience and experience-squared are of the correct sign. All these coefficients are statistically significant at the 1% level. The F-statistics for the significance of the joint regressors are higher than 119.

Returns to Schooling and Sample Selection

The earning functions were estimated also taking into account sample selection bias for women using Heckman's (1979) two-step procedure, given that there are few male labor market non-participants, and deriving Heckman correction estimates for men yields results that are highly unreliable. We follow the convention of using Heckman's two-step procedure since our goal is to analyze an underlying regression model. That is, we wish to predict the value of the dependant variable that would be observed in the absence of selection. In this case Heckman's approach is more appropriate than other methods since the goal is to predict an actual response.[2] The results are presented in Table 3. Correcting for selection produces somewhat higher returns for females, but still lower than returns to males. This was also the case in a previous analysis for Argentina using 1985 data (Ng 1992).

Reasons for Increasing Returns

Clearly the returns to schooling increased in Argentina over the decade of the 1990s and up to 2002. The returns to schooling increased while the economy grew (during the early 1990s), when the economy contracted (mid-1990s), and during the severe economic crisis (1999-2002) (Figure 4).

[2] The estimation was done using H-TwoStep technique instead of MV following Nawata and Nagase (1996) who showed that MV estimation could be uncertain because iterations could be stopped at a local maximum and not at a global one. Confidence intervals for the coefficient that summarizes the selectivity effect (lambda) is available upon request.

Figure 4: Returns to Schooling and Growth, 1992-2002

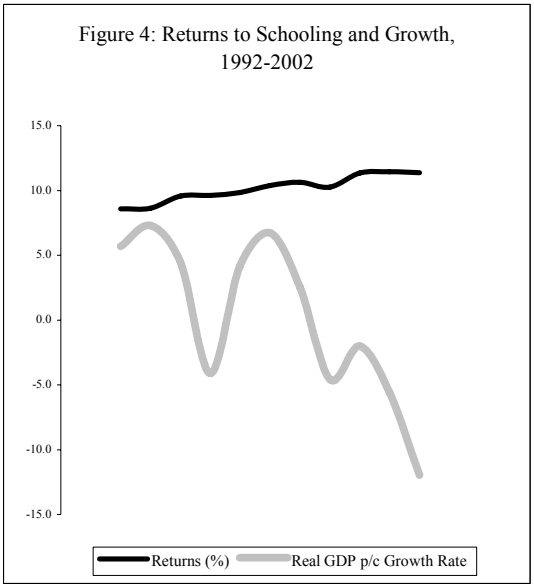


Figure 5: Returns to Schooling and Unemployment, 1992-2002

Also, the returns to schooling increased while the rate of unemployment increased (Figure 5); as well as when the unemployment rate was decreasing. The returns to schooling increased even when real wages declined (Figure 6). Further, the returns increased while overall schooling levels increased and schooling inequality decreased (Figure 7). This provides an initial hint that the returns may be driven by increased demand for skilled labor.

Figure 7: Returns to Schooling and Real Wage, 1992-2002

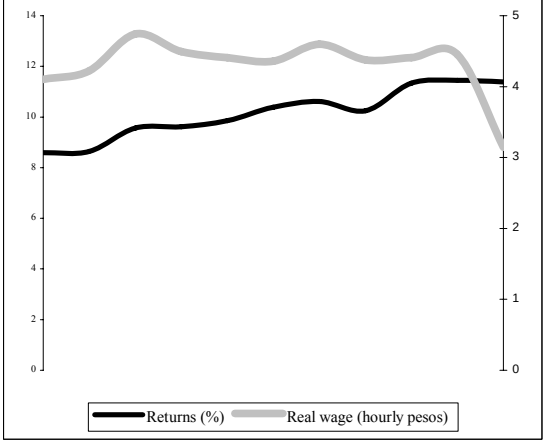
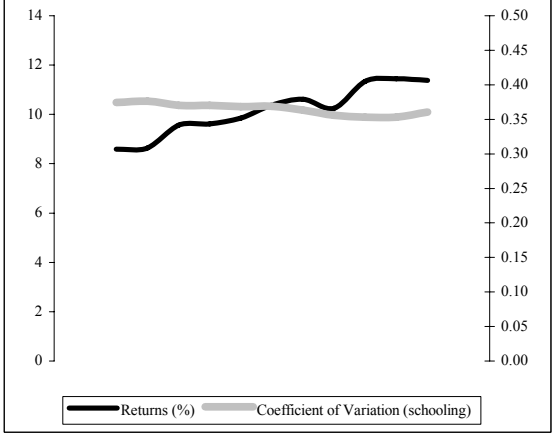


Figure 8: Returns to Schooling and Schooling Inequality, 1992-2002



The only common factor during the whole period under consideration is that Argentina maintained an open economy (see Table 4). Returns to schooling increased as real wages decreased. In fact, returns continued to rise even during times of severe economic crisis. This finding could be related to human capital theory, in that a disequlibrium situation causes an increase in the rewards for schooling (see, for example, Schultz 1961).

Table 4: Returns to Schooling Increased Regardless of Macroeconomic Conditions

Period	Macro conditions	Demand for labor	Returns to schooling
1990-98	Growth, openness, fixed exchange rate	Increased for skilled	Increased
1998-00	Recession, openness, fixed exchange rate	Reduced, less for skilled	Increased
2001-02	Crisis, openness, devaluation	Reduced	Increased

The returns to schooling have increased over time in Argentina. In order to ascertain if this is due to increased demand for skilled labor over the decade we analyze here the supply of educated labor over time. We allow different education types to yield different returns in order to assess whether the increase in the returns to education is limited to specific skill groups. From 1990, the average level of schooling of the population increased from 7.8 years to 8.5 years in 2000. The proportion with higher education increased from 7 percent in 1990 to 12 percent in 2000 (Barro and Lee 2000). This is a significant increase in a short period of time.

Following Katz and Murphy (1992), and implemented elsewhere (see, for example, Fersterer and Winter-Ebmer 2003), we divide our data into 64 distinct groups, distinguished by sex, education and experience. For these groups we calculate the change in supply (Δs) over the period 1992 and 2002, and the changes in the mean wage (Δw). In Figure 8 we plot the changes in relative wages against changes in relative supply. If the demand for skills remained constant over time, then the development of wages should be inversely related to changes in supply. This

simple framework gives an impression of the importance of demand changes. Figure 8 shows a significantly positive relationship between changes in supply and changes in wages for the entire period of 1992 to 2002. The shown regression line is:

$$\Delta w = \underset{(0.028)}{-0.046} + \underset{(0.207)}{0.387}\Delta s \qquad R^2 = 0.053 \text{ (standard errors in parentheses)}$$

While the sign of the schooling change variable is positive and shows that there could have been a significant increase in the demand for skills over the decade. However, the coefficient is barely significant, and the overall model does not seem to explain very much. At the very least then, all one can say is that demand for skills may have increased.

For the period 1993 to 1995, there is little evidence of an increase in the demand for skills; in fact the model does not work for this period:

$$\Delta w = \underset{(0.014)}{0.004} - \underset{(0.177)}{242}\Delta s \qquad R^2 = 0.029 \text{ (standard errors in parentheses)}$$

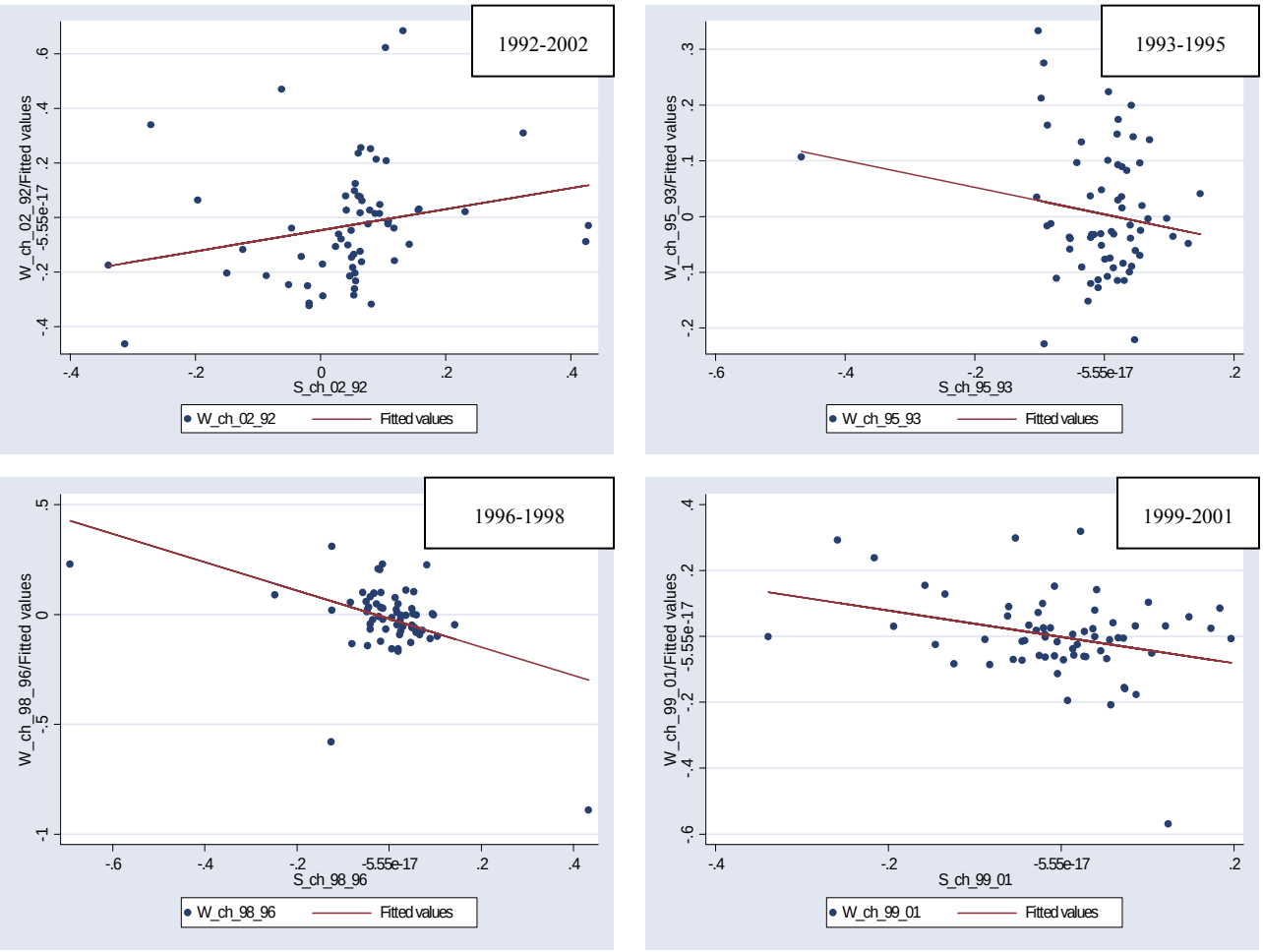
For the period 1996 to 1998, there is evidence of stable demand for skills:

$$\Delta w = \underset{(0.019)}{-0.020} - \underset{(0.157)}{0.647}\Delta s \qquad R^2 = 0.216 \text{ (standard errors in parentheses)}$$

For the period 1999 to 2000, there is some evidence of stable demand:

$$\Delta w = \underset{(0.015)}{-0.001} + \underset{(0.157)}{0.401}\Delta s \qquad R^2 = 0.096 \text{ (standard errors in parentheses)}$$

Figure 8: Price and Quantity Changes for 64 Groups



Therefore, a tentative conclusion is that there could have been increased demand for skills over the entire decade. However, the models do not perform as well as in the case of the United States (Katz and Murphy 1992) or Austria (Fersterer and Winter-Ebmer 2003), so we cannot outright reject stable factor demand for the period 1992 to 2002 in Argentina, although it seems that the rising supply in more educated workers is being compensated by a rising demand for skills.

Quantile Regressions

Returns to schooling estimated from typical wage equations allow us to estimate the mean effect of education on wages. That is, the rate of return to schooling for the average individual. In other words it is assumed that the return to schooling is common across individuals (see, for example, Card 1999). However, the average individual may not be of interest for policy purposes. Fortunately it is also possible to estimate the variance in returns around this mean. The "quantile regression" method estimates the effect of education on wages at different parts of the wage distribution (Buchinsky 1998; Koenker and Hallock 2001). The wage distribution reflects not only education but also other, unobservable, factors, including ability and social skills. Those at the bottom of the wage distribution are liable to have little education but also a lesser endowment of unobservable skills. Thus, it is interesting to ask whether the effects of education are independent of these unobservable skills or whether it compensates for them or complements them. If the effect is independent of unobservable skills, then we should find the effect of education is the same throughout the wage distribution. On the other hand, if education compensates for low skill, then we should find a larger effect at the bottom of the wage distribution than at the top; or a larger effect at the top of the wage distribution if education complements the unobservable skills (Walker and Zhu 2001).

Also, if the expansion of education participation has drawn more and more from the lower end of the distribution of unobserved skills, then one might expect to see the returns to education at the low end of the distribution fall relative to the top. Quantile regressions also allow us to estimate the returns to particular groups, such as those who are financially constrained.

OLS fails to account for the heterogeneity in the effect of education on earnings, as well as the bias introduced due to the endogeneity of schooling (see Buchinsky 1998; Card 1999). The ordinary least squares (OLS) regression relies on the mean of the conditional distribution of the dependent variable. When it is suspected that various exogenous variables – such as ability – influence parameters of the conditional distribution of the dependent variable other than the mean, quantile regressions are particularly useful because they allow the full characterization of the conditional distribution of the dependent variable, rather than only the conditional mean. The quantile regressions method allows an investigator to differentiate the contribution of regressors along the distribution of the dependent variable. In particular, the estimation of returns to education entails much more than the fact that, on average, one more year of education results in a certain percent increase in earnings.

The quantile regression model (Buchinsky 1994) can be outlined as:

$$lnW_i = X_i\beta_\theta + u_{\theta i},$$
$$X_i\beta_\theta = (\text{Quantile})_\theta(lnw_i|X_i)$$

where X_i is a vector of exogenous variables; β_θ is the vector of parameters; $(\text{Quantile})_\theta(lnw_i|X_i)$ is the θth conditional quantile of lnw given X, with $0<\theta<1$. The θth quantile is derived by solving the problem (using linear programming):

$$\min_{\beta \in R^k} \Sigma_i \rho_\theta(lnw_i - X_i\beta_\theta),$$

where $\rho_\theta(\varepsilon)$ is the check function defined as $\rho_\theta(\varepsilon) = \theta\varepsilon$ if $\varepsilon \geq 0$, and $\rho_\theta(\varepsilon) = (\theta-1)\varepsilon$ if $\varepsilon < 0$. Standard errors are bootstrap standard errors. The median regression is obtained by setting $\theta=0.5$ and similarly for other quantiles. As θ is varied from 0 to 1, the entire distribution of the dependent variable, conditional on *X*, is traced.

The quantile approach has a number of useful features, in addition to allowing the full characterization of the conditional distribution of the dependent variable, such as: (a) the linear programming representation of the quantile regression model makes estimation easy; (b) the quantile regression objective function is a weighted sum of absolute deviations, resulting in a robust measure of location, so that the estimated coefficient vector is not sensitive to outlier observation on the dependent variable; and (c) when the error term is non-normal, quantile regression estimates may be more efficient than OLS estimators.

We estimate all the effects simultaneously in order to have an estimation of the entire variance-covariance matrix of the estimators by bootstrapping (that is, randomly re-sampling the data). The coefficients remain the same as opposed to estimating each equation separately. We also performed hypothesis tests concerning coefficients both within and across equations to analyze if the effect of schooling is the same at the highest quintile and at the lowest one.

Most of the cases present significant differences between the highest and the lowest quantile.[3] Differences in returns at the upper and lower level of the income distribution are large (Figures 9 and Table 5). Differences between sexes are more difficult to explain. Over time, despite the year analyzed, men in higher quantiles of the distribution have higher returns to schooling compared to those who are in the lower quantiles (see Figure 10). While for men the gap is always positive, showing that the returns are higher as one goes from the lower to the higher end of the distribution, the case for women is the opposite. Returns are highest at the lowest quantile than in the highest quantile. However, the effect of one year of education at quantile 90 versus quantile 10 is the same at the beginning of the 1990s and in 2002.

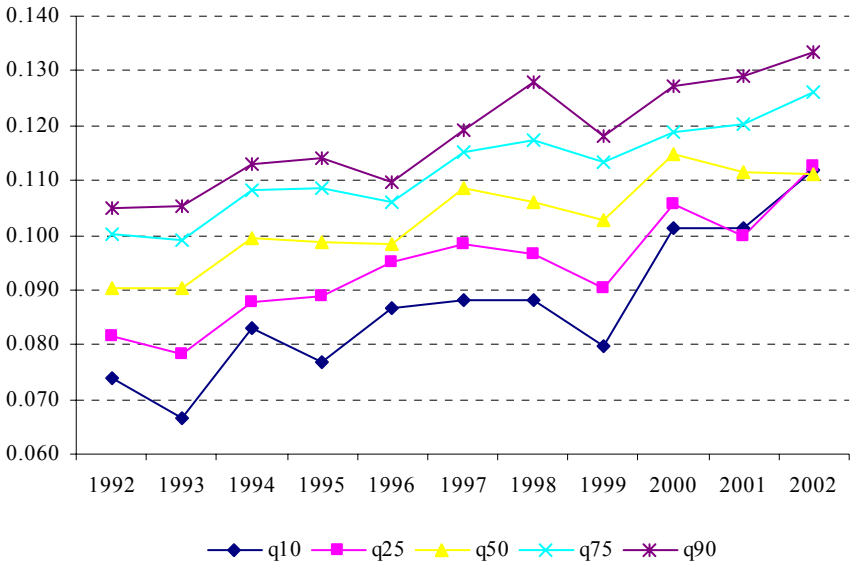
Table 5: Quantile Regressions, Returns to Schooling (%) by Sex (1992-2002)

	Males					Females				
Year	q10	q25	q50	q75	q90	q10	q25	q50	q75	q90
1992	7.4	8.2	9.0	10.0	10.5	8.5	7.8	8.1	7.7	8.0
1993	6.7	7.8	9.0	9.9	10.5	8.2	8.4	8.7	8.6	8.5
1994	8.3	8.8	9.9	10.8	11.3	9.0	8.9	9.4	9.0	9.1
1995	7.7	8.9	9.9	10.9	11.4	9.6	9.4	9.6	9.3	9.1
1996	8.7	9.5	9.8	10.6	11.0	10.9	10.6	9.6	8.8	9.4
1997	8.8	9.8	10.9	11.5	11.9	11.1	10.0	10.4	10.1	9.4
1998	8.8	9.6	10.6	11.7	12.8	11.7	11.0	10.5	10.5	10.1
1999	8.0	9.0	10.3	11.3	11.8	11.6	10.9	10.5	10.6	9.5
2000	10.1	10.6	11.5	11.9	12.7	13.3	11.9	11.6	11.4	10.0
2001	10.1	10.0	11.2	12.0	12.9	14.0	12.6	11.5	11.3	10.9
2002	11.2	11.3	11.1	12.6	13.3	11.0	9.6	10.9	11.6	11.1

[3] Results and tests are available upon request.

Figure 9:

Return to schooling for males along time by quantile



Return to schooling for females along time by quantile

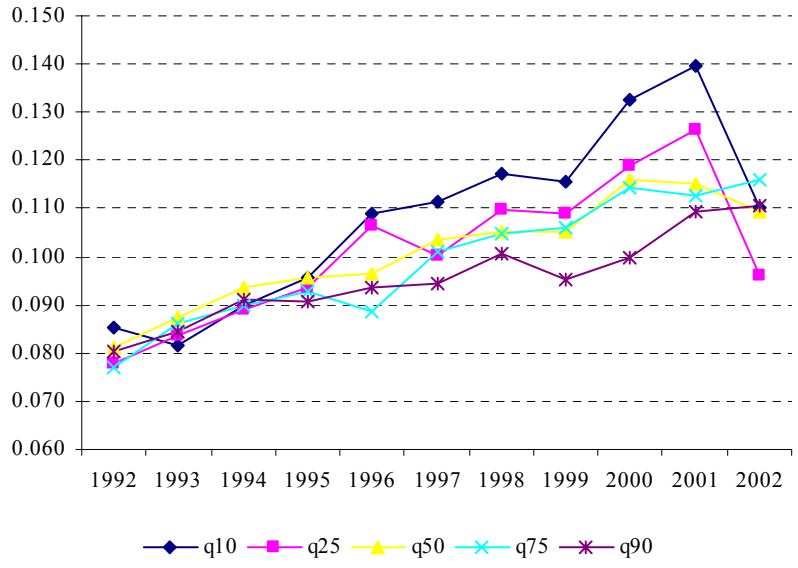
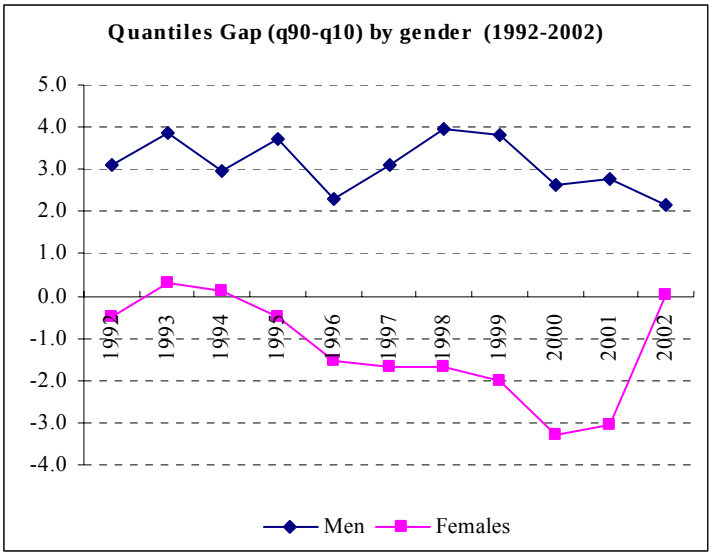


Figure 10



For men, returns are higher towards the upper levels, thus signifying complementarity between education and observables. In the first instance, this may imply that raising the level of schooling for everyone will generally increase the inequality of earnings. However, the returns at the lower levels increase over time, and the gap between returns at the top and bottom has narrowed, thus leading us to reject the idea that expansion has brought more lower ability individuals into the system and reduced the returns. On the contrary, education is becoming a better investment at the lower ends of the distribution. For women, returns are highest at the bottom end of the distribution, implying that education is to a great extent a substitute for unobserved ability in the case of Argentine women. Since the returns at the lower ends of the distribution increased over time, and the gap between the top and bottom has narrowed, then education is a good investment.

In most other countries increasing returns with quantiles have been observed: Austria, Denmark, Finland, France, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden,

Switzerland, United Kingdom, United States (Martins and Pereira 2004) (see also Fersterer and Winter-Ebmer 2003 for Austria); Kenya (Wambugu 2002); Uruguay (Gonzalez and Miles 2001). Only for China (Knight and Song 2003), Germany and Greece (Martins and Pereira 2004), and Mexico (Patrinos and Metzger 2004; Zamudio 2001) is the returns-quantiles profile negative. The returns-quantile profile is also negative in the case of primary education in Panama (Falaris 2003), for Africans in South Africa (Mwabu and Schultz 1996), and females in Venezuela (Patrinos and Sakellariou 2005). Also, Brazil presents a slight U-pattern as the returns dip slightly from the 10^{th} to the 25^{th} quantile (Arabsheibani, Carneiro and Henley 2003). Furthermore, Denny and O'Sullivan (2004), using a flexible interaction between ability and education, find that education is a substitute for ability, meaning that education has a remedial role for those not endowed with high ability.

V. CONCLUSIONS

The returns to schooling in urban Argentina increased over a ten year period, 1992 to 2002. The overall rate of return to an additional year of schooling increased from 8.6 percent in 1992 to 11.4 percent in 2002 – higher than the average for middle-income countries (Psacharopoulos and Patrinos 2004). This represents a 32 percent increase in only 10 years, a large increase as compared to most countries. The coefficient on the male intercept dummy suggests that hourly wages are 8.5 percent higher for men than for similarly educated and experienced women. The rate of return to schooling in 2002 is 12.0 percent for men and 10.8 percent for women. These figures increased since 1992, when the rates of returns were 9.1 percent and 8.1 percent. The return to all levels of education is higher for men than for women.

The returns to primary schooling – which were very flat for most of the 1990s, but increased sharply in the early years of the 21st century – ended up unchanged overall during this period, as did the (already low) returns to incomplete secondary schooling. Workers with incomplete secondary do not earn significantly more than those with complete primary education. A complete secondary education appears to be necessary before earnings rise significantly. The returns to complete secondary education increased, but not nearly by as much as did the returns to university education – complete or incomplete. While complete university education has a high rate of return, the rate of return for incomplete university education increased at a faster rate. For example, in 1992, the highest private returns were for primary schooling. By 2002, the highest returns are for complete university education, followed by incomplete university.

Returns to schooling increased as real wages decreased. In fact, returns continued to rise even during times of severe economic crisis. This finding could be related to human capital theory, in that a disequlibrium situation causes an increase in the rewards for schooling. There also appears to be no relationship between returns to schooling and trends in the unemployment rate – which increased significantly over time during the 1990s. It could be hypothesized that there is excess demand for skills. Schooling inequality decreased over time, as schooling levels increased. Still, the returns to schooling increased. As earnings inequality increased in early 1990s, up to 1996, returns increased; as inequality decreased after that, returns continued to increase. Returns increased as levels of schooling increased. During the last ten years, average years of education have increased by one year for the whole sample. Additionally, the

proportion of workers with less than secondary education decreased. Conversely, there was a significant increase in the proportion of workers with tertiary-level qualifications (9.5 percent had higher education in 1992, compared with 16 percent in 2002). These figures show an apparent improvement in human capital levels in Argentina.

A simple analysis of the demand for skilled labor over the decade shows a positive relationship between changes in supply and changes in wages for the entire period of 1992 to 2002. Therefore, a tentative conclusion is that there could have been increased demand for skills over the entire decade. However, the models do not perform as well as in the case of the United States or Germany, so we cannot outright reject stable factor demand for the period 1992 to 2002 in Argentina, although it seems that the rising supply in more educated workers is being compensated by a rising demand for skills.

In addition to results from Mincerian wage functions, this result is confirmed through the use of quantile regressions estimated for the same period. The quantile regression analysis also shows that men in higher quantiles have higher returns to schooling compared to those in the lower quantiles. For women returns are highest at the lowest quantile. Looking at differential returns across the income distribution, most of the cases present significant differences between the highest and the lowest quintile. Differences in returns at the upper and lower level of the income distribution are large. Differences between sexes are more difficult to explain. Over time, despite the year analyzed, men in higher quantiles of the distribution have higher returns to schooling compared to those who are in the lower quantiles. Quantile regression results for men imply that further investments in education, all else being equal, would contribute to increased

inequality. However, efforts to improve the quality of education and invest more in those with fewer unobserved skills and lower ability – that is, compensatory education – could reverse this trend.

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Appendix Table 1: Means and Standard Deviations of Samples

		All		Men		Women	
	Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1992	Primary incomplete		0.28	0.09	0.29	0.08	0.27
	Primary complete		0.46	0.32	0.47	0.26	0.44
	Secondary incomplete		0.41	0.23	0.42	0.17	0.38
	Secondary complete		0.39	0.17	0.37	0.21	0.41
	University incomplete		0.30	0.10	0.29	0.11	0.31
	University complete		0.32	0.09	0.28	0.17	0.37
	Years of education	10	3.77	9.79	3.71	10.55	3.83
	Experience	20	13.53	21.30	13.63	19.88	13.33
	Experience-squared	614.:	648.86	639.28	665.41	572.90	617.75
	Real hourly wage		4.28	4.21	4.38	3.92	4.09
	Log real hourly wage		0.67	1.17	0.68	1.13	0.64
	N	15,693		9,910		5,783	
1993	Primary incomplete	0.09	0.29	0.10	0.30	0.08	0.28
	Primary complete	0.27	0.45	0.30	0.46	0.23	0.42
	Secondary incomplete	0.21	0.41	0.24	0.42	0.18	0.38
	Secondary complete	0.19	0.39	0.17	0.38	0.21	0.41
	University incomplete	0.11	0.32	0.11	0.31	0.12	0.32
	University complete	0.12	0.33	0.09	0.28	0.18	0.38
	Years of education	10.19	3.83	9.87	3.76	10.74	3.89
	Experience	20.89	13.43	21.18	13.47	20.39	13.33
	Experience-squared	616.74	640.73	630.19	653.86	593.62	616.88
	Real hourly wage	4.22	4.11	4.35	4.43	4.01	3.49
	Log real hourly wage	1.18	0.69	1.19	0.71	1.16	0.67
	N	16,726		10,485		6,241	
1994	Primary incomplete	0.08	0.27	0.08	0.27	0.08	0.27
	Primary complete	0.30	0.46	0.33	0.47	0.24	0.43
	Secondary incomplete	0.21	0.40	0.24	0.42	0.16	0.36
	Secondary complete	0.19	0.40	0.17	0.38	0.23	0.42
	University incomplete	0.10	0.30	0.09	0.29	0.11	0.31
	University complete	0.12	0.33	0.09	0.28	0.18	0.39
	Years of education	10.17	3.76	9.83	3.64	10.75	3.89
	Experience	20.77	13.29	21.35	13.29	19.77	13.22
	Experience-squared	607.96	633.12	632.34	642.03	565.61	615.11
	Real hourly wage	4.74	4.49	4.74	4.52	4.74	4.45
	Log real hourly wage	1.29	0.69	1.29	0.69	1.30	0.69
	N	16,363		10,206		6,157	

cont'd

Appendix Table 1 (cont'd): Means and Standard Deviations of Samples

		All		Men		Woman	
	Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1995	Primary incomplete	0.08	0.27	0.08	0.28	0.07	0.26
	Primary complete	0.29	0.45	0.31	0.46	0.24	0.43
	Secondary incomplete	0.20	0.40	0.22	0.42	0.15	0.36
	Secondary complete	0.19	0.39	0.17	0.37	0.22	0.41
	University incomplete	0.12	0.32	0.12	0.32	0.12	0.33
	University complete	0.13	0.34	0.09	0.29	0.19	0.39
	Years of education	10.32	3.82	9.98	3.74	10.86	3.89
	Experience	20.64	13.23	21.30	13.25	19.57	13.13
	Experience-squared	601.17	632.80	629.34	644.49	555.21	610.51
	Real hourly wage	4.49	4.53	4.57	4.96	4.36	3.72
	Log real hourly wage	1.21	0.73	1.21	0.74	1.22	0.72
	N	16,148		10,061		6,087	
1996	Primary incomplete	0.08	0.27	0.08	0.27	0.07	0.26
	Primary complete	0.28	0.45	0.30	0.46	0.23	0.42
	Secondary incomplete	0.20	0.40	0.23	0.42	0.16	0.36
	Secondary complete	0.19	0.40	0.18	0.39	0.22	0.41
	University incomplete	0.11	0.32	0.11	0.31	0.13	0.33
	University complete	0.14	0.35	0.11	0.31	0.19	0.40
	Years of education	10.46	3.85	10.14	3.76	10.98	3.95
	Experience	20.75	13.32	21.39	13.30	19.70	13.28
	Experience-squared	608.07	643.31	634.19	653.98	564.48	622.70
	Real hourly wage	4.41	5.52	4.37	4.69	4.47	6.68
	Log real hourly wage	1.18	0.74	1.17	0.74	1.19	0.75
	N	15,338		9,513		5,825	
1997	Primary incomplete	0.08	0.27	0.08	0.27	0.08	0.26
	Primary complete	0.26	0.44	0.29	0.45	0.22	0.41
	Secondary incomplete	0.20	0.40	0.23	0.42	0.16	0.37
	Secondary complete	0.18	0.39	0.18	0.38	0.19	0.39
	University incomplete	0.13	0.33	0.12	0.32	0.14	0.35
	University complete	0.14	0.35	0.10	0.30	0.22	0.41
	Years of education	10.54	3.89	10.17	3.76	11.15	4.02
	Experience	20.94	13.60	21.20	13.48	20.52	13.78
	Experience-squared	623.30	661.31	631.16	661.12	610.69	661.48
	Real hourly wage	4.36	4.93	4.37	5.32	4.34	4.23
	Log real hourly wage	1.18	0.74	1.17	0.74	1.19	0.74
	N	15,775		9,639		6,136	

Appendix Table 1 (cont'd): Means and Standard Deviations of Samples

		All		Men		Woman	
	Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1998	Primary incomplete	0.07	0.25	0.07	0.26	0.06	0.24
	Primary complete	0.26	0.44	0.28	0.45	0.22	0.42
	Secondary incomplete	0.21	0.41	0.24	0.43	0.17	0.38
	Secondary complete	0.17	0.38	0.17	0.38	0.18	0.38
	University incomplete	0.13	0.33	0.12	0.32	0.14	0.35
	University complete	0.16	0.36	0.12	0.32	0.22	0.41
	Years of education	10.64	3.87	10.30	3.79	11.18	3.92
	Experience	20.72	13.30	21.09	13.06	20.14	13.64
	Experience-squared	606.12	635.38	615.43	631.53	591.55	641.13
	Real hourly wage	4.60	4.94	4.70	5.26	4.45	4.38
	Log real hourly wage	1.21	0.76	1.22	0.76	1.20	0.75
	N	14,915		9,048		5,867	
1999	Primary incomplete	0.07	0.25	0.07	0.26	0.07	0.25
	Primary complete	0.24	0.43	0.28	0.45	0.19	0.39
	Secondary incomplete	0.21	0.40	0.23	0.42	0.17	0.37
	Secondary complete	0.20	0.40	0.19	0.39	0.20	0.40
	University incomplete	0.13	0.34	0.12	0.33	0.15	0.36
	University complete	0.15	0.36	0.10	0.30	0.22	0.41
	Years of education	10.72	3.82	10.29	3.69	11.35	3.91
	Experience	20.66	13.32	21.28	13.19	19.76	13.46
	Experience-squared	604.30	635.82	627.04	639.57	571.55	629.00
	Real hourly wage	4.38	4.39	4.40	4.59	4.34	4.07
	Log real hourly wage	1.18	0.75	1.17	0.75	1.19	0.75
	N	13,040		7,802		5,238	
2000	Primary incomplete	0.07	0.25	0.06	0.25	0.07	0.25
	Primary complete	0.24	0.43	0.27	0.44	0.20	0.40
	Secondary incomplete	0.20	0.40	0.24	0.43	0.15	0.36
	Secondary complete	0.19	0.40	0.19	0.39	0.20	0.40
	University incomplete	0.13	0.34	0.12	0.32	0.15	0.36
	University complete	0.16	0.37	0.12	0.32	0.23	0.42
	Years of education	10.82	3.82	10.43	3.70	11.39	3.92
	Experience	20.69	13.30	20.95	13.04	20.33	13.67
	Experience-squared	605.17	643.02	608.79	634.68	599.92	654.94
	Real hourly wage	4.41	4.54	4.43	4.68	4.37	4.33
	Log real hourly wage	1.16	0.78	1.15	0.79	1.18	0.78
	N	12,056		7,105		4,951	

cont'd

Appendix Table 1 (cont'd): Means and Standard Deviations of Samples

		All		Men		Woman	
	Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
2001	Primary incomplete	0.07	0.25	0.07	0.25	0.06	0.25
	Primary complete	0.24	0.43	0.27	0.44	0.20	0.40
	Secondary incomplete	0.19	0.39	0.21	0.41	0.15	0.36
	Secondary complete	0.20	0.40	0.20	0.40	0.19	0.39
	University incomplete	0.14	0.35	0.13	0.33	0.16	0.37
	University complete	0.17	0.38	0.12	0.33	0.24	0.43
	Years of education	10.91	3.85	10.51	3.75	11.49	3.93
	Experience	21.05	13.36	21.36	13.15	20.62	13.66
	Experience-squared	621.89	644.23	629.01	637.09	611.65	654.31
	Real hourly wage	4.45	4.75	4.50	5.09	4.38	4.21
	Log real hourly wage	1.15	0.82	1.14	0.82	1.16	0.82
	N	11,337		6,693		4,644	
2002	Primary incomplete	0.08	0.26	0.08	0.27	0.07	0.25
	Primary complete	0.23	0.42	0.25	0.43	0.20	0.40
	Secondary incomplete	0.19	0.40	0.23	0.42	0.15	0.36
	Secondary complete	0.19	0.39	0.18	0.39	0.20	0.40
	University incomplete	0.14	0.35	0.13	0.34	0.15	0.36
	University complete	0.17	0.38	0.13	0.34	0.23	0.42
	Years of education	10.88	3.92	10.52	3.88	11.36	3.92
	Experience	21.28	13.26	21.76	13.22	20.63	13.29
	Experience-squared	628.50	642.35	648.34	649.91	602.04	631.24
	Real hourly wage	3.14	4.05	3.33	4.79	2.90	2.75
	Log real hourly wage	0.78	0.83	0.79	0.86	0.76	0.78
	N	9,675		5,504		4,171	

Source: EPH

Appendix Table 2a: Determinants of Earnings, 2002, All Workers

	Model 1	Model 2	Model 3
S	0.1138		0.1153
	(55.2)**		(55.6)**
X	0.0424	0.0409	0.0423
	(21.6)**	(20.5)**	(21.6)**
X^2	-0.0005	-0.0005	-0.0005
	(13.3)**	(13.4)**	(13.2)**
Pric		0.2113	
		(7.0)**	
Seci		0.3798	
		(12.0)**	
Secc		0.6716	
		(21.2)**	
Supi		0.9481	
		(26.7)**	
Supc		1.3616	
		(40.8)**	
Male			0.0825
			(5.8)**
Constant	-1.0866	-0.423	-1.1482
N	9675	9675	9675
R^2	0.26	0.27	0.26

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2b: Determinants of Earnings, 2001, All Workers

	Model 1	Model 2	Model 3
S	0.1145		0.1159
	(58.8)**		(59.0)**
X	0.0396	0.0376	0.0393
	(21.7)**	(20.2)**	(21.6)**
X^2	-0.0005	-0.0005	-0.0005
	(12.5)**	(12.5)**	(12.3)**
Pric		0.2528	
		(8.7)**	
Seci		0.3883	
		(12.5)**	
Secc		0.7107	
		(23.0)**	
Supi		0.95	
		(27.8)**	
Supc		1.3908	
		(42.9)**	
Male			0.0717
			(5.3)**
Constant	-0.7087	-0.057	-0.7656
N	11337	11337	11337
R^2	0.25	0.26	0.26

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2c: Determinants of Earnings, 2000, All Workers

	Model 1	Model 2	Model 3
S	0.1134		0.1147
	(61.7**		(62.1**
X	0.0402	0.0394	0.0399
	(23.3)**	(22.5)**	(23.2)*
X^2	-0.0005	-0.0005	-0.0005
	(13.9)**	(14.5)**	(13.7)**
Pric		0.1679	
		(6.2)**	
Seci		0.3442	
		(12.0)**	
Secc		0.6683	
		(23.2)**	
Supi		0.9248	
		(28.9)**	
Supc		1.3323	
		(43.9)**	
Male			0.0769
			(6.0)**
Constant	-0.677	0.0029	-0.7355
N	12056	12056	12056
R^2	0.26	0.27	0.26

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2d: Determinants of Earnings, 1999, All Workers

	Model 1	Model 2	Model 3
S	0.1025		0.1039
	(60.3)**		(60.6)**
X	0.0417	0.0413	0.0415
	(26.4)**	(25.7)**	(26.3)**
X^2	-0.0006	-0.0006	-0.0006
	(17.1)**	(17.7)**	(17.0)**
Pric		0.1603	
		(6.6)**	
Seci		0.3382	
		(13.2)**	
Secc		0.6006	
		(23.1)**	
Supi		0.8607	
		(29.6)**	
Supc		1.2294	
		(44.4)**	
Male			0.0716
			(6.0)**
Constant	-0.5286	0.0671	-0.5853
N	13040	13040	13040
R^2	0.24	R2= 0.25	R2= 0.25

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2e: Determinants of Earnings, 1998, All Workers

	Model 1	Model 2	Model 3
S	0.1062		0.1075
	(60.8)**		(61.0)**
X	0.0424	0.0422	0.0422
	(25.7)**	(25.2)**	(25.6)**
X^2	-0.0005	-0.0006	-0.0005
	(15.9)**	(16.7)**	(15.7)**
Pric		0.1641	
		(6.5)**	
Seci		0.3461	
		(12.9)**	
Secc		0.6103	
		(22.2)**	
Supi		0.8915	
		(29.1)**	
Supc		1.2592	
		(43.9)**	
Male			0.0676
			(5.5)**
Constant	-0.5421	0.0799	-0.5951
N	14916	14916	14916
R^2	0.22	0.23	0.22

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2f: Determinants of Earnings, 1997, All Workers

	Model 1	Model 2	Model 3
S	0.1038		0.1054
	(68.5)**		(69.0)**
X	0.042	0.042	0.0417
	(29.4)**	(28.9)**	(29.3)**
X^2	-0.0006	-0.0006	-0.0006
	(19.1)**	(19.8)**	(18.9)**
Pric		0.1812	
		(8.5)**	
Seci		0.3926	
		(17.2)**	
Secc		0.6467	
		(28.1)**	
Supi		0.894	
		(34.0)**	
Supc		1.2572	
		(51.4)**	
Male			0.08
			(7.5)**
Constant	-0.4852	0.0808	-0.5506
N	15775	15775	15775
R^2	0.25	0.26	0.26

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2g: Determinants of Earnings, 1996, All Workers

	Model 1	Model 2	Model 3
S	0.0985		0.0995
	(63.4)**		(63.5)**
X	0.0435	0.043	0.0433
	(29.2)**	(28.5)**	(29.1)**
X^2	-0.0006	-0.0006	-0.0006
	(19.8)**	(20.4)**	(19.7)**
Pric		0.1666	
		(7.8)**	
Seci		0.3295	
		(14.2)**	
Secc		0.5947	
		(25.6)**	
Supi		0.8281	
		(29.9)**	
Supc		1.1993	
		(47.9)**	
Male			0.055
			(5.0)**
Constant	-0.446	0.1163	-0.489
N	15338	15338	15338
R^2	0.23	0.24	0.23

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2h: Determinants of Earnings, 1995, All Workers

	Model 1	Model 2	Model 3
S	0.0962		0.0975
	(64.3)**		(64.7)**
X	0.0422	0.0422	0.042
	(30.0)**	(29.5)**	(29.9)**
X^2	-0.0006	-0.0006	-0.0006
	(20.8)**	(21.6)**	(20.6)**
Pric		0.157	
		(7.8)**	
Seci		0.3485	
		(16.0)**	
Secc		0.5687	
		(26.0)**	
Supi		0.8111	
		(31.3)**	
Supc		1.1916	
		(50.2)**	
Male			0.071
			(6.7)**
Constant	-0.3537	0.1852	-0.4101
N	16148	16148	16148
R^2	0.23	0.24	0.23

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2i: Determinants of Earnings, 1994, All Workers

	Model 1	Model 2	Model 3
S	0.0956		0.0969
	(67.7)**		(68.3)**
X	0.0414	0.0417	0.0413
	(31.4)**	(31.0)**	(31.3)**
X^2	-0.0006	-0.0006	-0.0006
	(21.9)**	(22.6)**	(21.8)**
Pric		0.1877	
		(10.1)**	
Seci		0.3925	
		(19.5)**	
Secc		0.62	
		(30.5)**	
Supi		0.8905	
		(36.4)**	
Supc		1.1817	
		(52.7)**	
Male			0.0793
			(8.0)**
Constant	-0.2717	0.2195	-0.3342
N	16363	16363	16363
R^2	0.25	0.25	0.25

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2j: Determinants of Earnings, 1993, All Workers

	Model 1	Model 2	Model 3
S	0.0864		0.0884
	(60.7)**		(61.8)**
X	0.0403	0.0408	0.0403
	(30.4)**	(30.3)**	(30.5)**
X^2	-0.0006	-0.0006	-0.0006
	(21.2)**	(22.0)**	(21.2)**
Pric		0.1627	
		(8.9)**	
Seci		0.3378	
		(17.2)**	
Secc		0.5718	
		(28.6)**	
Supi		0.8207	
		(33.9)**	
Supc		1.0557	
		(47.3)**	
Male			0.1114
			(11.1)**
Constant	-0.2873	0.1577	-0.3773
N	16726	16726	16726
R^2	0.20	0.21	0.21

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses

Appendix Table 2k: Determinants of Earnings, 1992, All Workers

	Model 1	Model 2	Model 3
S	0.0859		0.0876
	(57.2)**		(58.1)**
X	0.0416	0.0409	0.0415
	(31.0)**	(30.0)**	(31.0)**
X^2	-0.0006	-0.0006	-0.0006
	(21.8)**	(21.7)**	(21.8)**
Pric		0.213	
		(11.5)**	
Seci		0.3824	
		(19.2)**	
Secc		0.6362	
		(31.2)**	
Supi		0.8075	
		(31.6)**	
Supc		1.0949	
		(46.2)**	
Male			0.1051
			(10.2)**
Constant	-0.306	0.1052	-0.3877
	(13.57)**	(4.69)**	(16.25)**
R^2	0.20	0.20	0.21

Source: EPH

* significant at 5% level; ** significant at 1% level; t-statistics in parentheses