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Returns to education in Argentina: a regional analysis

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RETURNS TO EDUCATION IN ARGENTINA:
A REGIONAL ANALYSIS

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1. INTRODUCTION

The study of regional differences in Argentina in terms of returns to education is highly relevant, primarily due to the existence of deep inequalities in the configuration of regional structures in this country. The main differences are based on several economic and demographic characteristics across regions that have an impact on the social dynamics of such regions.

This issue has been acknowledged in the literature, in order to get a full understanding of the dynamics that might explain those dissimilarities, especially in the educational and labour fields. However, empirical literature or the case of Argentina is still limited.

The analysis of regional differences in human capital, as well as their impact on private returns to education – i.e. income levels of individuals –, has been addressed in a number of studies, such as Winters (2012), Lopez-Bazo and Motellón (2012), and Ciccone et al. (2004), for the cases of the United States, Spain, and Italy, respectively.

For the Argentinean case, no attention has been paid to differences in the returns to education by region. Only a few recent studies, such as Giovagnoli et al. (2005), have approached this issue by using Mincerian equations as the methodological strategy to estimate the returns to education, combined with a quantile regression analysis to detect differences in the returns across the distribution of wages. However, the regional perspective was not incorporated in this study, even when wage differences between regions are remarkable.

On the other hand López Bóo (2010) quantify the returns to education in Argentina according different macroeconomic shocks from 1992 to 2003 but not including the regional perspective neither.

Several literature across the Latin-American countries quantifies the rates of the returns to education using –most of them– quintile regression or time series, such as: Psacharopoulos & Velez (1992) who estimate the returns of education in Colombia for a ten years period; López-Acevedo (2004) that analyse the contribution of educational inequality as a key variable for understanding earnings inequality in Mexico and Patrinos & Sakellariou (2010) who study the relation between the returns to education and the effect of the swings in economic activity on the demand and supply of education and skills in Venezuela for the period 1992 to 2002.

Nevertheless none of them use the regional perspective in their analysis, even when the different levels of returns to education can be explained through regional characteristics as a determinant of those differences.

It is surprising that being this issue greatly relevant in order to understand the heterogeneity among geographic regions in Argentina, no previous studies have considered the role played by human capital in order to explain the substantive regional differences within the national labour market.

This paper seeks to contribute to the study of regional labour markets in terms of their returns to education in Argentina. For that aim we firstly quantify the returns to education for every region using a typical Mincerian equation and then analyse the wage gap through the Oaxaca-Blinder decomposition.

The paper is organized in five sections, as follow: the next one describe the regional structure in Argentina, as well as the main

characteristics of the labour market and the endowment of human capital. Then we explain the methodological strategy so as to estimate the empirical wage model in the second section. A description and summary of the data set is briefly presented in third section. Before that we present the results for different specifications of the model by region in section fourth. Finally, in the last section the conclusions and future extensions.

The author expressly stated that the basis of this chapter gave rise to a paper presented at XI Conference of Labor Economics at the Universitat Autònoma de Barcelona, Spain. The paper was evaluated and approved by the scientific committee of the event.

1.1. Regional Differences

Argentina is divided into twenty three provinces which are grouped into in six geographic regions: Noroeste (NOA), Noreste (NEA), Pampeana, Cuyo, Patagonia and Gran Buenos Aires (GBA).

There is a remarkable concentration of population into major cities such as Ciudad Autónoma de Buenos Aires, Córdoba and Rosario, furthermore we can also identify an dense urban conglomeration around those ones.

Each of these regions have also a very singular productive and economic configurations which contributes to intensify differences in labour market, especially if we considered the educational effects derived −for example− of number of Universities in every region.

In terms of years of schooling −in contrast− we can observe a similar distribution of the average across the regions which could mean preliminarily that there are not notable differences between them, a simple look of these means can be obtained from the second column in Table 1. If we consider the hourly wage for each region, we can also see the main differences between regions (see fourth column in Table 1), we analyse this issue in fourth section when we discuss the results of the Oaxaca-Blinder decomposition.

In the fifth column in Table 1 we presents the proportion of male and female in our sample, in all the cases males represents more than 55% and no more than 60%. Finally in the last two columns in Table 1 we show the proportion of kind of employment where is possible to see that Patagonia −the richest region− has the lowest proportion of

informal workers and on the other hand NOA (one of the poorest region) presents the higher coefficients. A similar pattern is observable if we see the type of work in terms of public or private employer: the richer the region the greater the share of private employment.

Table 1									
Region	N	Schooling	Hourly w age	Gender		Employment		Type of w ork	
				Male	Female	Formal	Informal	Public	Private
NOA	4,781	120.203	251.152	0.5806	0.4194	0.5867	0.4133	0.3428	0.6572
NEA	4,156	121.340	266.734	0.5751	0.4249	0.6092	0.3908	0.3511	0.6489
Pampeana	5,989	125.652	343.055	0.5559	0.4441	0.6838	0.3162	0.2409	0.7591
Cuyo	3,813	121.626	273.432	0.5893	0.4107	0.6163	0.3837	0.3328	0.6672
Patagonia	4,286	123.082	429.736	0.5621	0.4379	0.7982	0.2018	0.3672	0.6328
GBA	2,404	127.113	353.996	0.5578	0.4422	0.6726	0.3274	0.1685	0.8315

Additionally Table 2 shows the comparison of hourly wage means by region (Bonferroni Test) basing on 2013 data from the Annual Survey of Urban Households (EAHU) revealing significant differences in a pairwise comparison by region. More specifically, Patagonia and the metropolitan area of Buenos Aires (GBA) consistently present higher wages than the other regions.

In a specific way last line in Table 2 shows the difference between GBA and the other regions, where we can see that in all the cases –except in Patagonia– the metropolitan area of Buenos Aires has a better hourly wage. It means for example that an individual in GBA wins in average a 10.28% more than an individual in the region NOA, this pattern change when we compare GBA against Patagonia.

Table 2 Mean hourly wage pairwise comparison by region (Bonferroni Test)					
Row Mean / Col Mean	NOA	NEA	Pampeana	Cuyo	Patagonia
NEA	1.558**				
Pampeana	9.190***	7.632***			
Cuyo	2.228***	0.670	-6.962***		
Patagonia	17.858***	16.300***	8.668***	15.630***	
GBA	10.284***	8.726***	1.094***	8.0564***	-7.574***
Notes : *Statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level.					

2. METHODOLOGY

In order to quantify the returns to education we estimate a Mincerian wage equation as shown in (1).

$$\log w_{ir} = \beta_0 + \beta_1 SCH_{ir} + \beta_2 GEN + \beta_3 TE1_{ir} + \beta_4 TE5_{ir} + \beta_5 AGE_{ir} + \beta_6 AGE^2_{ir} + \beta_7 MAR_{ir} + \beta_8 PUB_{ir} + \beta_9 FOR_{ir} + \beta_{10} EXT_{ir} + \beta_{11} SER_{ir} + \beta_{12} I RND_{ir} + u_{ir} \tag{2}$$

Where *log w* denotes the log of the wage of individual *i* in region *r*, SCH indicates years of schooling and the other coefficients denote the set of characteristics that affect the wage of this individual. To control the effects of one more year of schooling we used characteristics related to work and personal traits usually used in literature (gender, tenure, age and marital status), but also we included as control if the individual works in public sector or not, if he/she has formal employment and finally the economic sector in which he/she works.

The results of estimating (1) by Ordinary Least Squares (OLS) are presented in Table 3. Nevertheless, to avoid the bias of the OLS estimates due to the likely endogeneity of education, we employed a Two-Stage Least Squares (2SLS) regression analysis to instrument the years of schooling. In order to estimate (1) by 2SLS we follow López-Bazo and Motellón (2012) and defined two dummy variables, one of them allows us to account the effect of the educational reform applied in 1993 that increased the mandatory years of schooling in two years. The second dummy defined as an instrument consider if individual completed the last educational level on which was enrolled. Classical 2SLS post-estimation test are passed for all the equations estimated (endogeneity, relevance and overidentification). The results of this IV Model are presented in Table 4.

Finally we analyse the wage gap of these potential differentials by applying an Oaxaca-Blinder decomposition, with the aim of quantifying the net effect of education in wages and isolating the effect of the endowment of human capital across regions.

3. DATA

We use the Annual Survey of Urban Households (EAHU) built jointly by the National Institute of Statistics and Census (INDEC) and the Provincial Directorate of Statistics of Argentina (DPE). We focus our interest in the data for the fourth quarter of 2013 as they are the latest released.

According as indicated by INDEC, the Annual Survey of Urban Households is an extension of the continuous operating "EPH - 31 Urban Agglomerates" by joining the sample of private households belonging to towns of 2,000 or more inhabitants, not included in the domains of estimation of continuous operation, for all provinces except the Tierra del Fuego, Antarctica and South Atlantic Islands and the Autonomous City of Buenos Aires.

For the analysis of returns to schooling we used a sample including only salaried workers and with positive wage in the period under study. Additionally, we excluded those individuals with special education as well as those ones without information about the schooling level.

Variable schooling consider only years of study successfully completed, it means that we have not measure the years of school individual permanence, but the years that he/she has completed at each educational level.

We grouped the activities into four economic sectors: construction, extractive industries, services and manufacturing. These sectors have a very similar structure across the regions except in Patagonia, which a bigger weight of the extractive sector than the other ones, as reported in Table 3.

In the model presented in (1)

Table 3	Regional proportions of employment by economic sectors, 2013			
Region / Sector	Construction	Extractive	Services	Manufacturing
NOA	0,0956	0,046	0,7697	0,0887
NEA	0,1061	0,0306	0,7851	0,0782
Pampeana	0,0865	0,025	0,7569	0,1316
Cuyo	0,0863	0,0611	0,7291	0,1235
Patagonia	0,0593	0,0877	0,7692	0,0838
GBA	0,0562	0,0058	0,7737	0,1643

As explained in the previous section, we introduced two dummies to control if the individual works in public sector or not, and if he/she has formal job or not. The regional differences in terms of public-private sector, as well as formal-informal job are shown in Figure 1.

Figure 1 Features of the laubor market
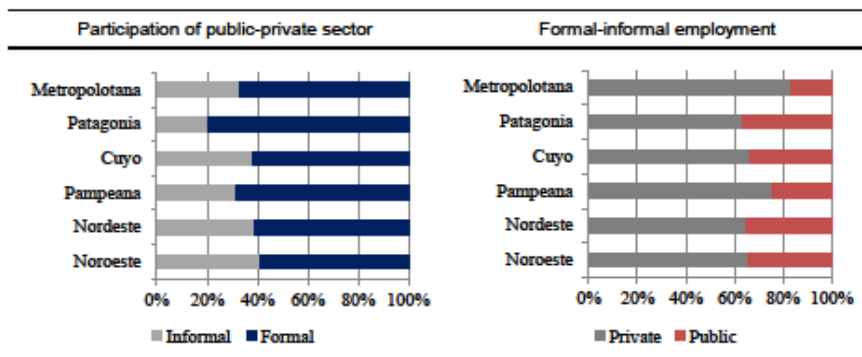
4. ESTIMATION RESULTS

The estimates of the Mincerian equation defined in (1) by using OLS show similar contributions of years of schooling to wage across regions, as we can see in Table 3:

Table 3   Returns to schooling by region in Argentina (OLS)

	NOA	NEA	Pampeana	Cuyo	Patagonia	GBA
Schooling	0,0495 ***	0,0485 ***	0,0489 ***	0,0513 ***	0,0565 ***	0,0657 ***
Gender						
Male [1]	0,0289 *	0,0274 *	0,0696 ***	0,0319 *	0,0482 ***	0,0763 ***
Work type						
Formal [2]	0,4916 ***	0,4347 ***	0,2972 ***	0,4914 ***	0,5027 ***	0,1864 ***
Public [3]	0,2158 ***	0,1794 ***	0,189 ***	0,126 ***	0,1025 ***	0,1013 ***
Tenure [4]						
<1	-0,1483 ***	-0,1179 ***	-0,1519 ***	-0,0289	-0,1326 ***	-0,1301 ***
	-0,0702 ***	-0,0228 ***	-0,0515 ***	-0,0108	-0,0678 ***	-0,0706 **
Age						
Level	0,007 ***	0,0077 ***	0,0081 ***	0,0087 ***	0,0065 ***	0,0065 ***
Squared	-0,0001 **	-0,0001 **	-0,0002 ***	-0,0002 ***	-0,0001 *	-0,0001
Marital status						
Married [5]	0,0552 ***	0,0694 ***	0,069 ***	0,0676 ***	0,0803 ***	0,0566 **
Economic sector [6						
Extractive	-0,1382 ***	-0,1189 ***	0,1685 ***	-0,0739 *	0,2513 ***	0,2018
Services	-0,1225 ***	-0,0958 ***	0,0039	-0,1073 ***	-0,0002	0,0373
Industrial	-0,0977 ***	-0,012 ***	0,0642 **	-0,0327	0,1767 ***	0,0326
Constant	2,7961 ***	2,846 ***	3,0801 ***	2,8397 ***	3,0929 ***	3,1469 ***
N	4781	4156	5989	3813	4286	2404
R²	0.4564	0.4272	0.3306	0.4124	0.3642	0.2559

Notes : *Statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level. (1) Dummy for gender assume 1 if male. (2) Dummy for work type assume 1 if formal. (3) Dummy for participation of public sector assume 1 if the individual works in public sector. (4) Reference tenure of more than 5 years. (5) Dummy for marital status assume 1 if the individual is married. (6) Reference construction sector

Similarly, Table 4 presents the 2SLS estimates of (1). Both sets of results find a significantly positive effect of schooling to wages in Argentina and also the existence of regional variability in the return of education.

The OLS estimates indicate that the GBA region was the one with the biggest returns to schooling, being the rest of regions similar returns to each additional year of schooling. However, the picture that the 2SLS estimator show more substantial differences between regions in terms of these returns in comparison with the OLS estimates. Additionally, the GBA is not anymore the one with the biggest returns, being now in the Pampeana region the highest coefficient (9.09%), almost doubling the returns to schooling in other regions (NEA).

Furthermore, results in Table 4 show that there exists a regional heterogeneity regarding the type of work: for example a worker in

NOA earned 19.61% more if he/she works in the public sector whereas in Patagonia this effect was only 9.20%. Additionally, regions like Pampeana and GBA have smaller differences in terms of formal-informal job when compared with the other regions where this effect can be in the range of 40-50%.

Table 4	Returns to education by region in Argentina (IV)					
	NOA	NEA	Pampeana	Cuyo	Patagonia	GBA
Schooling	0.0704 ***	0.0497 ***	0.0909 ***	0.0648 ***	0.0648 ***	0.0643 **
Gender						
Male [1]	0.0574 **	0.0290	0.1115 ***	0.0468 *	0.0546 ***	0.0746 *
Work type						
Formal [2]	0.4551 ***	0.4326 ***	0.2408 ***	0.4656 ***	0.4902 ***	0.1890 ***
Public [3]	0.1961 ***	0.1777 ***	0.1243 ***	0.1104 ***	0.0920 ***	0.1032 **
Tenure [4]						
<1	-0.1263 ***	-0.1162 ***	-0.0914 ***	-0.019	-0.1255 ***	-0.1316 ***
01-may	-0.0707 ***	-0.0224	-0.0419 **	-0.0132	-0.0680 ***	-0.0710 **
Age						
Level	0.0083 ***	0.0078 ***	0.0106 ***	0.0097 ***	0.0070 ***	0.0064 ***
Squared	-0.0001	-0.0001 **	-0.0001 ***	-0.0002 ***	-0.0001	-0.0001
Marital status						
Married [5]	0.0450 **	0.069 ***	0.0546 ***	0.0622 ***	0.0756 ***	0.0572 *
Economic sector [6]						
Extractive	-0.1109	-0.1176 **	0.1903 ***	-0.0652	0.2497 ***	0.2045
Services	-0.1473	-0.0973 ***	-0.0602 *	-0.1244 ***	-0.0069	0.0383
Industrial	-0.0998	-0.0120	0.0204	-0.0379	0.1741 ***	0.0328
Constant	28.234	28.476 ***	31.298 ***	28.634 ***	31.069 ***	31.459 ***
N	4781	4156	5989	3813	4286	2404
R²	0.4475	0.4272	0.2863	0.4081	0.3627	0.2558

Notes: *Statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level. (1) Dummy for gender assume 1 if male. (2) Dummy for work type assume 1 if formal. (3) Dummy for participation of public sector assume 1 if the individual works in public sector. (4) Reference tenure of more than 5 years. (5) Dummy for marital status assume 1 if the individual is married. (6) Reference construction sector

Finally, if we considered the decomposition of the wage gap in Argentina it confirms the heterogeneity across the regions. In Table 5 we present the results of an Oaxaca-Blinder decomposition. A negative wage gap is obtained when the average wage in the region under analysis is higher than that in the rest of the country, as in the case of Patagonia (-0.3918), Pampeana (-0.1389) and GBA (-0.1277). Focusing on the effects of differences in endowments and in returns to human capital, they are shown in the seventh and eight columns of results in Table 5. These results seem to indicate that larger endowments of human capital are contributing positively to the relative higher wages only in the central regions of Argentina (Pampeana and

the GBA), being the contribution of larger returns in these regions less significant or statistically insignificant. Interestingly, the positive wage gap found for the region of Patagonia is not significantly affected by differences in endowments or coefficients related to the returns of education.

Table 5	Regional wage gap by Oaxaca-Blinder decomposition					
	Wage gap	**Global Decomposition**			**Contribution of schooling**	
		Endowment	Return	Residual	Endowment	Return
NOA	0,2969 ***	0,06 ***	0,2 ***	-0	0 ***	0
NEA	0,1923 ***	0,03 ***	0,2 ***	0 ***	0 ***	-0
Pampeana	-0,139 ***	-0 ***	-0 ***	0	-0 ***	-0 **
Cuyo	0,1509 ***	0,02 ***	0,1 ***	-0	0 **	-0
Patagonia	-0,392 ***	-0,1 ***	-0 ***	0 ***	-0	0
GBA	-0,128 ***	-0	-0 ***	-0	-0 **	-0

Notes : *Statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level.

5. CONCLUSIONS

There are regional differentials in the returns to education in Argentina for the period considered (5%-9%).

Larger endowments of human capital are contributing positively to the relative higher wages only in the central regions of Argentina.

Distinctions between public v.s private (9%-20%) or/and formal v.s informal (19%-50%) are much more important.

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