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## Returns to private education in Peru

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IZA DP No. 2711

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March 2007

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## ABSTRACT

### Returns to Private Education in Peru<sup>\*</sup>

The private provision of educational services has been representing an increasing fraction of the Peruvian schooling system, especially in recent last decades. While there have been many claims about the differences in quality between private and public schools, there is no complete assessment of the different impacts of these two type of providers on the labor markets. This paper is an attempt to provide such a comprehensive overview. We explore private-public differences in the individual returns to education in Urban Peru. Exploiting a rich pair of data sets (ENNIV 1997 and 2000) that include questions on type of education (public vs. private) for each educational level (primary, secondary, technical tertiary and university tertiary) to a representative sample of adults we are able to measure the differences in labor earnings for all possible educational trajectories. The results indicate higher returns to education for those who attended private schools than those who attended the public system. Nonetheless, these higher returns also show higher dispersion, reflecting wider quality heterogeneity within the private system. The private-public differences in returns are more pronounced at the secondary than at any other educational level. On the other hand, the private-public differences in returns from technical education are almost non-existent. A cohort approach paired with a rolling-windows technique allows us to capture generational evolutions of the private-public differences. The results indicate that these differences have been increasing during the last two decades.

JEL Classification: J31, I2

Keywords: returns to schooling, wages

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## 1. Introduction

The private provision of educational services has been expanding in Latin America in recent decades. This happened originally at the tertiary levels and then moved down to the secondary and even primary ones. Wolff and Castro (2002), using data from UNESCO, show that by the middle of the 1990s, private education already accounted for 34% of the students in pre-primary, 15% in primary, 30% in high-school, and 34% in tertiary. The recurrent explanation for this expansion of the private presence on the educational markets has been the low quality of the public provision of education. In Peru, this led to legislation in the mid-1990s that facilitated private sector participation in the provision of educational services, at all levels. Wolff and Castro (2002) shows evidence that students with primary and secondary private education almost invariably perform better than the rest, based on standardized test and other measures such as scholar retention; but these differences diminish once they control for socioeconomic characteristics of the students. Somers et al. (2004), however, using data on standardized test in mathematics and language for 10 Latin American countries, claim that socio-economic characteristics of the households do not account for much of the gap; attributing a substantial role to peer effects.

One of the most commonly studied private systems has been the Chilean voucher experience, with mixed results. McEwan and Carnoy (2000) shows evidence that Catholic voucher schools perform better than public schools, which in turn perform slightly better than non-religious voucher schools. Ramos (2002) reports that public schools are neither uniformly worse nor better than private schools. Rather, public schools are relatively more effective for students from disadvantaged family backgrounds. Such a system of comparative advantage is consistent with the coexistence of public and private schools in most Chilean communes. Contreras (2002) argues that, even though attending a private subsidized school is associated with increased standardized test scores, the apparent impact is relatively small. Controlling for school choice, using a supply-side instrument (school availability at community level) he obtains substantially larger impacts on test scores for the voucher system. The effect of parents' education on academic performance is smaller than the one implied by simple OLS estimates that do not control for school choice. Finally, he also finds that family school choice is gender biased. Females are sent more often to voucher schools while males are sent more often to private (non-voucher) schools. In addition, the 2SLS estimates show that females gain less than males from going to voucher schools. Hsieh and Urquiola (2003) exploit the system to measure the effects of unrestricted choice on educational outcomes. Using panel data for about 150 municipalities, they find no evidence that choice improved average educational outcomes as measured by test scores, repetition rates, and years of schooling. However, they find evidence that the voucher program led to increased sorting, as the "best" public school students left for the private sector.

One of the first analyses of the functioning of the educational system in Peru is Mac Lauchlan (1994). Focusing on the tertiary level, she documents the process of expansion of the university system that started during the 1950s and analyses its state as of the 1990s. She highlights that private universities, both in terms of quantity and quality, have dominated such expansion. In her account of the sources of deterioration of the quality of

the public system, she presents evidence that total expenditure per student has been falling over time and is now below most countries in the region. Such expenditure is neither equally allocated across universities nor related to any reasonable measure of quality or efficiency. Besides that, most of the resources are allocated towards current expenditures, mainly wages, maintaining investment at very low levels. She also presents statistics illustrating not only that highly educated individuals get higher incomes, but also jobs of better quality (in the sense of stability of the position, access to social security, etc.). This situation is more pronounced in Lima than in the rest of the nation.

Navarro (2002), on the other hand, analyses the primary and secondary levels of the educational system in Peru, highlighting as well the presence of private actors at both levels. There are not only growing shares of private providers of educational services, but also a significant number of schools that are privately managed with public financing. The latter, while having great potential, are trapped in a regulatory framework that limits their possibilities. He coincides with the prevailing diagnosis of the quality and efficiency of the public system highlighting that, also at the primary and secondary levels, even though there has been a notable increase in the number of students during the last decade, expenditures in education as a percentage of GDP remained significantly low compared with other countries in the region. He also points towards problems coming from both the supply side (infrastructure, equipments and materials of the classrooms, structure and application of the curricular plan, and quality of the docents) and the demand side (absenteeism, desertion, repetition and delay.) In sum, his general view of the educational system in Peru is of disarticulation, unfinished tasks, and sub-utilized potential.

Saavedra and Suarez (2002) provide information about the role of families and the State in the financing of education in Peru. Their motivation is the fact that, even though the Constitution in Peru calls for compulsory primary and secondary education, most families who matriculate their children in public schools must finance an important part of its cost, not only through books and materials, but also in the form of monetary transfers. This is mainly the result of the low public spending in basic education in the country, which makes it practically impossible for a school to operate only with that money. They analyze the benefits of this expenditure from the families, and its effect on equality in both the assignment of resources and in the equality of educational opportunities. They found that families account for 32% of the total expenditure in primary education and 33% in secondary education. These expenditures vary with the poverty incidence of the geographic regions and the economic status of the family. Also, parents tend to make higher expenditures in departments where the public expenditure is also higher, with lower expenditure lower in departments displaying higher poverty rates. As a result, they argue, this mechanism is amplifying the inequalities in the educational system.

While it is commonly accepted that, on average, the quality of educational services provided by the private sector is better than the public system, it is also the case that there is more quality heterogeneity in the private sector. These ideas have been part of the policy discussion in the region but have not yet been supported with sufficient quantitative evidence. On the other hand, the international literature on school quality has focused on the analysis of variables such as pupil-teacher ratios, average term length and relative pay of teachers, among others, but the connections between them and the outcomes obtained

from the provision of education have been elusive (Card and Krueger (1996)). In this paper we try to fill both gaps for Peru. For that purpose we measure differences in returns to schooling for individuals who attended public and private educational institutions for their primary, secondary and tertiary education. Even though there is a vast literature relating to returns to education, the distinction between returns from private and public education has not been very common in the literature, and even less when considering developing countries. One of the few pieces attempting to document such differences is Wright (1999), which estimates the effect of private schooling on hourly wage rates of adults in the United Kingdom. Using the British Household Panel Surveys to compare individuals with private schooling to those with state schooling (controlling for other variables), he finds no evidence to support the hypothesis that the rate of return to private schooling is higher than the rate of return to state schooling.

For Peru, Rodriguez (1993) estimates internal rates of return for education in Peru, using a methodology based on conventional cost-benefit analysis, where income flows are calculated using “Mincerian” equations. He finds that investment in education in Peru has high social and private profitability. By educational levels, primary education has the highest rates of return, and men’s education shows a higher profitability than women’s. Abler, Robles and Rodriguez (1998) estimate rates of return to education in Mexico and Peru for the 1980s and 1990s, both before and after widespread economic adjustments. Rates of return are estimated for urban males, urban females, rural males, and rural females. They find no statistically significant changes in rates of return to education in both periods. A statistically significant decline did occur for urban females in Mexico. This could be due to the significant increase in recent years in female labor force participation rates, particularly among educated females in urban areas, which may have diluted returns to female schooling.

Saavedra and Maruyama (1999) provide a detailed description of the labor market evolution in Peru during more than a decade. They document changes in the income structure between 1985 and 1997, focusing on the interaction between returns to education and experience, the difference in those returns according to the position of the individuals in the income distribution, and its sensitivity to the introduction of several control variables. Finally, they estimate the difference in income among individuals with public and private education. Using very detailed data from the ENNIV 1997 household survey, they calculate the premium to private education for different paths of public and private education: primary, secondary, and tertiary (distinguishing among university and technical). They find that those workers who attended private schools at every level enjoy a higher wage premium.

Yamada (2006) estimates returns to schooling, with a special emphasis on returns to tertiary education (either in vocational institutes or universities). In particular, he finds that university education (public and private) offers private and social rates of return that are comparable to other alternatives of financial investments available in Peru. However, tertiary non-university education shows returns that are not very attractive, and even negative. He also reports differences in returns to education with respect to gender, type of job and geographical location of workers, and he shows evidence of non-linearities in returns to schooling. This could be due to a genuine concavity on the relationship between

schooling and wages, as he pointed out, but also to the existence of sheepskin effects (Hungerford and Solon (1987), Jaeger and Page(1996), Park (1999), Schady (2001)). To avoid that discussion we estimate returns to educational achievement rather than years of schooling and focus our attention on the differences between graduates from the public and private institutions.

After this introduction, we describe the data in Section 2. Then, in Section 3 we present the estimation of the earnings equations and show the private-public differences in returns to schooling. In Section 4, with a rolling windows approach, we analyze the evolution of such differences. In Section 5 we explore other labor market differences between those who attended private schools compared to those who attended the public system. In Section 6 we conclude.

## **2. The Data**

We use the National Living Standards Measurement Household Survey for Peru (ENNIV), for the years 1997 and 2000. This data set, which is collected every three years, includes detailed information about the socio-economic situation of a representative sample of households in Peru, covering both rural and urban areas. In particular, the survey asks individuals about the type of school the individuals attended for each attained level. In case the individual went to different types of schools for the same level, the survey registers the one where she or he attended most of the time. The 1997 ENNIV covers 3,804 households: 960 in Metropolitan Lima, 1,392 in other urban areas and 1,452 in rural settings. In 2000, the survey covered 3,978 households: 1,114 in Lima, 1,512 in other urban areas and 1,352 in rural areas.

We restrict our sample to active individuals in the labor market, employed or unemployed, aged between 21 and 67 at the time of the survey. As will be seen in the next section, the information of the unemployed individuals is used only for the selection bias correction of the estimates. As it will be seen in Section 4 with the rolling windows approach, the choice lower and upper ages of the individuals for this dataset are not crucial for the results as we will produce estimators for different birth cohorts. To gain power for the estimations we pool the two data sets and as a result we are left with a sample of 10.635 individuals. In order to respect the sample design of the ENNIV, maintaining them as representative of the population, we use the expansion factors in all the computations. Some descriptive statistics of the resulting data set are:



Table 1 – Descriptive Statistics

	1997	2000
Age (years)	37.9	40.9
Proportion of Males	48.1	47.9
% living in Lima	30.0	30.0
Average Years of Education	8.9	9.1
Marital Status (%)		
Single	21.4	17.8
Formal or Informal Union	69.6	71.5
Divorced	9.0	10.6
Average number of HH members	5.8	5.7
Average number of children by HH	2.8	2.7
Average of Real Monetary Labor Income	550	510
Tenure (years)	9.0	10.9
Average Weekly Work Hours	42.0	43.6
Type of Employment (%)		
Self-Employed	44.9	45.1
Wage Earners	40.8	40.3
Unpaid Workers	14.3	14.6

In this table, we observe that the average age of our sample around is 40 years, 30% are living in Lima, and the average years of education is around 9 years. We do not observe much variation in these statistics between the two periods. On the other hand, two variables that show important changes from 1997 to 2000 are real monetary labor income and job tenure. We control for these differences in the regressions. Regarding educational achievement, slightly less than  $\frac{1}{4}$  of the population completed secondary education and went beyond to obtain tertiary education (either completing it or not), another  $\frac{1}{4}$  of the population completed secondary and did not undertake further schooling and the other  $\frac{1}{2}$  obtained secondary incomplete or less. Next, Tables 2 and 3 present additional details of the distribution of the population by educational achievement.

Table 2. Educational Attainment

No Education	6%
Primary Incomplete	14%
Primary Complete	16%
Secondary Incomplete	14%
Secondary Complete	25%
Tertiary Incomplete	10%
Tertiary Complete	14%
Tertiary Complete Technical	8%
Tertiary Complete University	6%

Then, given the focus of our paper, we distinguish between public and private education. Table 3 shows that for those with only primary complete, most people attended public institutions. Among those with secondary complete, most of them went to both primary and secondary public schools. In the case of tertiary complete, even though we find, again, that most of the people went to public institutions in all the stages, there are two important groups to highlight: those who attended a private institution at the tertiary level and those

who attended private institutions at all levels.

Table 3: Private vs. Public Education

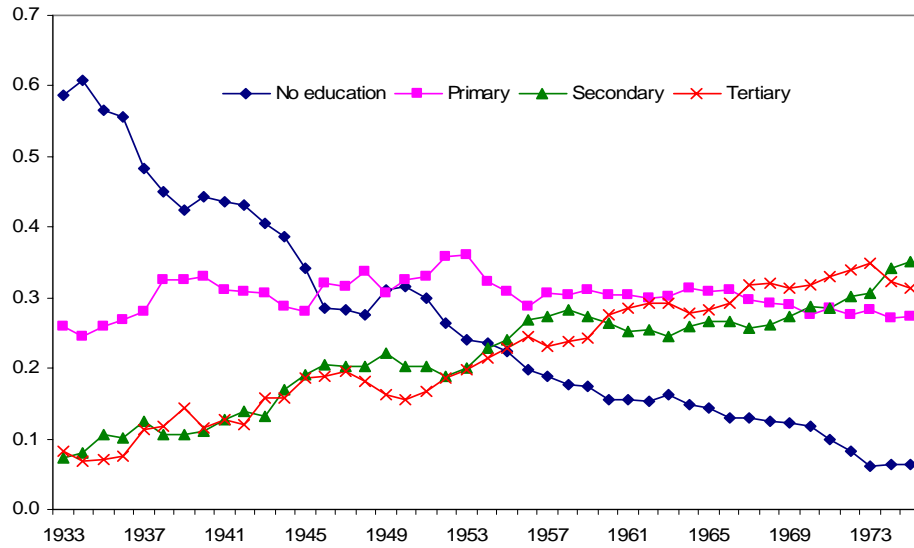
<b>Only Primary Complete</b>	
Primary Public	99%
Primary Private	1%
<b>Only Secondary Complete</b>	
Primary Public Secondary Public	93%
Primary Public Secondary Private	2%
Primary Private Secondary Public	1%
Primary Private Secondary Private	4%
<b>Tertiary Complete</b>	
All Public	65%
Only Primary Private	1%
Only Secondary Private	1%
Only Tertiary Private	12%
Primary and Secondary Private	7%
Primary and Tertiary Private	1%
Secondary and Tertiary Private	1%
All Private	12%

After presenting the distribution of educational attainment for the Peruvian population as well as the private-public differences in attainment, we turn to exploring generational differences in those statistics. Next, in Figure 1 we report the distribution of schooling attainment of the population by birth cohort.<sup>1</sup> The drop in the percentage of the population with no education is notable. While for those born in the mid-1930s 6 out of 10 individuals did not attend school at all, among those born by the mid-1970s only 1 out of 20 individuals was not able to do so. On the other hand, it is also interesting to note the upward-sloping trend of the percentages of the population who attained secondary and tertiary education. The percentage of the population who attended only primary education has remained relatively constant for the birth cohorts under analysis.

Figure 1: Distribution of Schooling Attainment of the Population by Birth Cohort

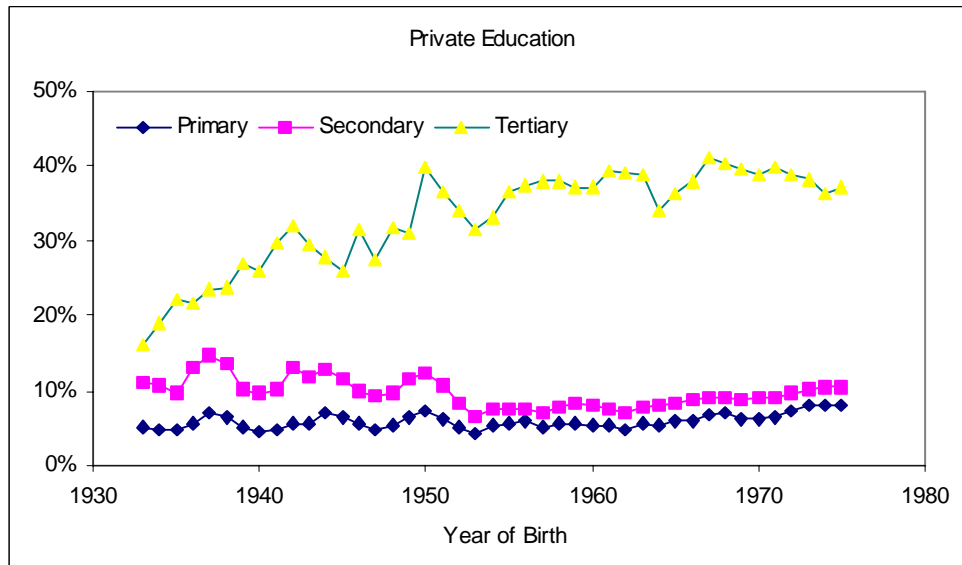
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<sup>1</sup> Those individuals who attended the primary school but not finished are considered within the group of “No Education,” those who attended secondary school but did not finish it are considered in the “Primary” group and so on. All the statistics in the rest of this section are presented with a 3-year moving average.



Next, in Figure 2 we present the evolution, by birth cohort, of the percentage of people who attended a private institution for each educational level (out of those who completed the corresponding level). One interesting element to highlight in the figure is the upward-sloping evolution at the tertiary level. The other two levels also show a positive trend, but weaker and only for those born after 1952.

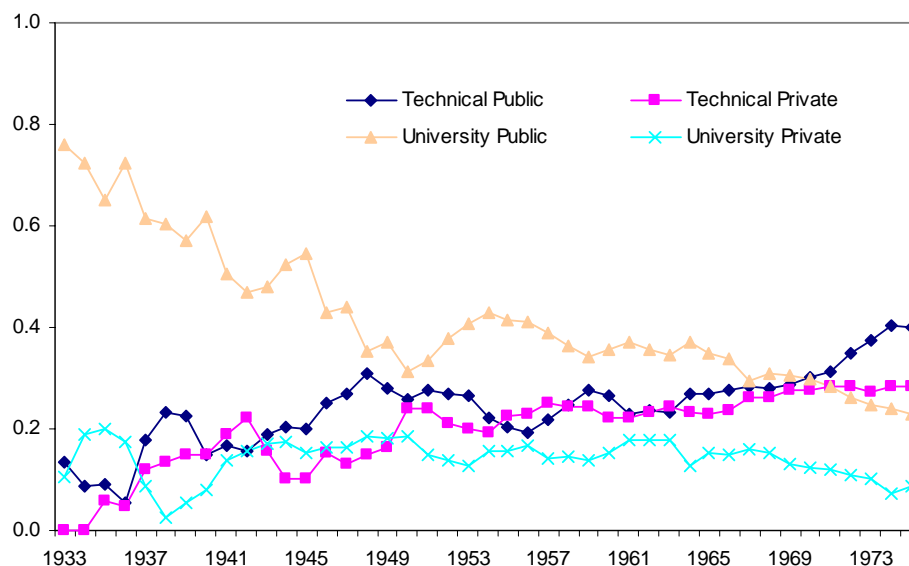
Figure 2: Distribution of the Population that Attended a Private Educational Institution, by Attainment and Birth cohort



Note that the tertiary educational level in Peru involves not only universities but also technical institutions, and the differences between these two are important. While a university degree can be obtained after 5 or more years of study, the degrees conferred by a technical institute require no more than 3 years of study (and in most cases only 2). Also,

the enrollment at these different tertiary education institutions has been changing during the last decades. Next, in Figure 3 we report the evolution by birth cohort of the distribution of those who graduated from tertiary education, disaggregated by technical institutes (private and public) and universities (also, private and public). It is interesting to note the decrease in the relative participation of public universities at the tertiary level. At the same time, the private provision of university education has been relatively constant, and the participation of technical institutions, both private and public, has been increasing. While for the older generations the vast majority of individuals who attained tertiary education did so at public universities, most members of younger cohorts did so at private and public technical institutes. This is very much in line with the account of McLauchlan (1994). Also, there is an interesting pattern of students following a path of having attended public primary and secondary schools, but switching to a private provider at the tertiary level. As we will see later in the paper, the returns to this path are relatively low when compared with others that involve private providers of primary and secondary schooling.

Figure 3. Distribution of the Population Graduated from Tertiary Education by Type of Institutions



Having shown basic characteristics of the data, emphasizing on the distribution of the population by educational attainment level, in the next section we estimate returns to education in Peru. In this estimation we emphasize differences in returns from private and public institutions at each educational level.

### 3. Returns to Education

In Table 4 we present five specifications for the estimation of earnings equations. We run regressions explaining the logarithm of hourly wages from the main occupation controlling for a set of variables. These include a rich set of dummy variables accounting for all possible trajectories of educational attainment, distinguishing between private and public

secondary and tertiary educational institutions. Additionally the set of dummy variables distinguishes between those who attended technical institutes and those who attended universities. Finally, among the latter, we also distinguish between those who completed their studies and those who did not. The base category corresponds to those who did not attain any educational level.

The regressions also control for the traditional individual characteristics (age, gender and marital status), for the capital city (Lima), for the year of the survey and for selection bias into the active and employed labor force, either as a wage-earners or as an independent (Inverse Mills Ratio).<sup>2</sup> The regressions differ in the way some job characteristics are treated in the equations. The first regression considers no additional job characteristics in the estimations. The regression under column 2 is also controlling for economic sectors, with a set of eight dummies (not reported). The regression under column 3 is controlling for occupation of the individuals, with a set of dummies (the estimator for each occupational dummy is not reported either). The regression under column 4 combines the previous two sets of controls: economic sectors and occupations. The last column adds a control for part-time workers, adding a dummy variable that takes the value 1 for those working less than 30 hours a week and 0 otherwise. These 5 specifications will be maintained through all the tables in the rest of this section.<sup>3</sup>

Table 4 – Earnings Equations. Selected Specifications

<b>EDUCATION VARIABLES</b>	(1)	(2)	(3)	(4)	(5)
<b>Primary Complete</b>	0.309*** (0.034)	0.177*** (0.033)	0.181*** (0.033)	0.174*** (0.033)	0.178*** (0.033)
<b>Secondary Complete</b>					
Public	0.608*** (0.041)	0.313*** (0.040)	0.303*** (0.040)	0.292*** (0.040)	0.304*** (0.039)
Private	0.929*** (0.107)	0.592*** (0.103)	0.533*** (0.103)	0.516*** (0.103)	0.529*** (0.101)
<b>Tertiary Technical Public</b>					
w/ Secondary Public	1.024*** (0.060)	0.575*** (0.059)	0.452*** (0.061)	0.432*** (0.061)	0.429*** (0.060)
w/ Secondary Private	0.846*** (0.224)	0.438** (0.214)	0.328 (0.214)	0.316 (0.213)	0.362* (0.211)
<b>Tertiary Technical Private</b>					
w/ Secondary Public	0.844*** (0.068)	0.505*** (0.066)	0.395*** (0.067)	0.393*** (0.066)	0.423*** (0.066)
w/ Secondary Private	1.196*** (0.125)	0.883*** (0.120)	0.726*** (0.121)	0.719*** (0.121)	0.737*** (0.119)
<b>University Incomplete Public</b>					
w/ Secondary Public	0.930*** (0.209)	0.639*** (0.200)	0.634*** (0.203)	0.634*** (0.202)	0.631*** (0.200)
w/ Secondary Private	0.917 (0.566)	0.688 (0.539)	0.644 (0.539)	0.666 (0.537)	0.710 (0.531)
<b>University Incomplete Private</b>					
w/ Secondary Public	0.905*** (0.073)	0.490*** (0.071)	0.394*** (0.072)	0.375*** (0.071)	0.356*** (0.071)
w/ Secondary Private	1.265***	0.911***	0.754***	0.752***	0.730***

<sup>2</sup> The selection equation to control for selection bias is available from the authors upon request.

<sup>3</sup> We are aware of the possible confounding (or endogeneity or multicollinearity) of the last three sets of variables with our treatment of interest. It is for this reason that we report all the estimates simultaneously. Nonetheless, it is interesting to note that the estimated private-public gaps, shown in Table 5, do not change dramatically from one specification to the other.

	(0.145)	(0.139)	(0.140)	(0.139)	(0.138)
<b>University Complete Public</b>					
w/ Secondary Public	1.417***	0.935***	0.719***	0.701***	0.688***
	(0.062)	(0.062)	(0.066)	(0.066)	(0.065)
w/ Secondary Private	1.857***	1.427***	1.176***	1.161***	1.217***
	(0.124)	(0.119)	(0.121)	(0.121)	(0.120)
<b>University Complete Private</b>					
w/ Secondary Public	1.349***	0.938***	0.749***	0.725***	0.779***
	(0.100)	(0.097)	(0.099)	(0.099)	(0.098)
w/ Secondary Private	1.939***	1.637***	1.353***	1.362***	1.409***
	(0.103)	(0.099)	(0.102)	(0.101)	(0.100)
<b>INDIVIDUAL CHARACTERISTICS</b>					
Age	0.060***	0.049***	0.046***	0.046***	0.048***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age Square	-0.001***	-0.001***	-0.000***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender (Male)	0.075**	0.247***	0.258***	0.255***	0.373***
	(0.032)	(0.032)	(0.033)	(0.033)	(0.033)
Formal or Informal Union	0.081	0.091	0.067	0.070	0.043
	(0.060)	(0.057)	(0.057)	(0.057)	(0.057)
Divorced	0.031	0.055	0.070	0.069	0.073
	(0.048)	(0.046)	(0.046)	(0.046)	(0.045)
Lima City dummy	0.433***	0.253***	0.281***	0.281***	0.315***
	(0.051)	(0.049)	(0.049)	(0.049)	(0.048)
Year 2000 dummy	-0.176***	-0.170***	-0.169***	-0.169***	-0.179***
	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)
Inverse Mills Ratio	3.499	-0.126	-2.967	-2.783	-5.546
	(4.922)	(4.710)	(4.700)	(4.694)	(4.640)
Constant	0.172	-0.111	1.302***	0.623***	0.445**
	(0.182)	(0.174)	(0.180)	(0.199)	(0.197)
Economic Sector Dummies		Yes		Yes	Yes
Occupation Dummies			Yes	Yes	Yes
Part-Time Job (<30 hours)					Yes
Observations	10635	10622	10600	10588	10588
R-squared	0.20	0.27	0.27	0.28	0.30

An element to highlight in this table is the fact that the returns to technical education and university incomplete have similar magnitudes, and these are substantially below the returns that those who completed the university get. This is very much in line with the results obtained by Saavedra and Maruyama (1990) and more recently Yamada (2006). Also, note that the standard errors of the returns to private secondary are notoriously higher than those of public secondary. The magnitude of the former is roughly twice as much as the magnitude of the latter for all but one attainment level. This reflects the higher quality heterogeneity shown by the private sector. Judged by the labor returns to schooling, the private sector seems to be better on average, but also more disperse.

A third interesting conclusion to note from the previous table is that the private-public differences in the returns to tertiary education are not as pronounced as those in the returns to secondary education. Focusing on the last column, to make the case, we can observe that the private-public gap in returns to university complete is  $0.779-0.688=0.091$  (equivalent to 10%) for those who attended a public secondary and  $1.409-1.217=0.192$  (equivalent to 21%) for those who attended a private secondary. Nonetheless, for those who completed their studies at a public university, the returns gap with respect to the type of secondary attended achieves  $1.217-0.688=0.529$  (equivalent to 70%). The analogous gap for those who completed their studies at a private university is  $1.409-0.779=0.630$  (equivalent to 88%). Next, in Table 5 we summarize the private-public gaps in returns to secondary schooling for different attainment levels and the 5 specifications of the earnings equations

defined above.

Table 5: Private-Public Gaps in Returns to Schooling (Secondary Education)

		Comparing Public vs. Private Secondary Education									
Maximum Level Attained:		(1)	(2)	(3)	(4)	(5)					
Only Secondary School		0.321	***	0.279	***	0.23	***	0.224	***	0.225	***
Technical Education	Public	-0.178		-0.137		-0.124		-0.116		-0.067	
	Private	0.352	***	0.378	***	0.331	***	0.326	***	0.314	**
University Incomplete	Public	-0.013		0.049		0.01		0.032		0.079	
	Private	0.36	*	0.421	***	0.36	***	0.377	**	0.374	**
University Complete	Public	0.44	***	0.492	***	0.457	***	0.46	***	0.529	***
	Private	0.59	***	0.699	***	0.604	***	0.637	***	0.63	***

\*\*\* Significant at 10%, \*\* Significant at 5%, \* Significant at 1%

Having shown that the private-public gaps in returns to schooling are more pronounced at the secondary level than at the tertiary one, one have then be led to inquire regarding gaps at the primary level. For that purpose we estimated a set of earning equations similar to those reported in Table 4, but distinguishing between private and public schooling at the primary level instead of doing it at the secondary one. Next in Table 6 we report only the private-public gaps, that is, the differences in returns from attending a private primary school vis-à-vis a public one, for different attainment levels.<sup>4</sup>

Table 6: Private-Public Gaps in Returns to Schooling (Primary Education)

		Comparing Public vs. Private Primary Education									
Maximum Level Attained:		(1)	(2)	(3)	(4)	(5)					
Only Secondary School		0.393	***	0.371	***	0.311	***	0.308	***	0.306	***
Technical Education	Public	-0.132		-0.001		-0.006		0.025		0.065	
	Private	0.291	**	0.332	***	0.271	***	0.271	**	0.266	***
University Incomplete	Public	-0.154		0.006		-0.106		-0.071		-0.011	
	Private	0.391	**	0.466	***	0.416	***	0.426	***	0.415	***
University Complete	Public	0.374		0.439	***	0.397	***	0.403	***	0.487	***
	Private	0.583	***	0.699	***	0.61	***	0.645	***	0.637	***

\*\*\* Significant at 10%, \*\* Significant at 5%, \* Significant at 1%

Comparing Tables 5 and 6 we can observe that the private-public gaps in returns to secondary schooling are of similar magnitude than those at primary. Even more, the patterns of the gaps are remarkably similar. The gaps for those who completed public technical education and for those who did not complete their studies at a public university are not statistically different than zero. The gaps for those who completed only secondary schooling and those who completed technical private education are quite similar (around 0.3 or 35%). Last, the private-public gaps for those who attended a private university are among the highest. It is around 0.4 or 49% for those who did not complete their studies and it is around 0.6 or 82% for those who did so.

<sup>4</sup> The full regressions are available from the authors upon request.

Having stated that the private-public gaps in returns to schooling are more pronounced at the primary and secondary levels than at the tertiary one, both (primary and secondary) being of similar magnitude, we now turn to analyzing the connections between these two gaps. For that purpose, instead of having 2 comparing groups we turn to 4: we compare the group who attended public primary and public secondary school with the one who attended private primary and public secondary; with the one who attended public primary and private secondary and finally with the one who attended private schools at both levels. Changing the estimation of the earnings equations accordingly, we estimate the corresponding new gaps. Next in Table 7 we report the private-public gaps in returns to primary and secondary schooling for the same 7 attainment levels that we have been reporting and the 5 specifications of the earnings equations outlined above.

Table 7: Private-Public Gaps in Returns to Schooling (Primary and Secondary Education)

		Comparing Primary Public + Secondary Private vs. All Public				
Maximum Level Attained:		(1)	(2)	(3)	(4)	(5)
Only Secondary School		0.107	0.017	0.01	0.003	0.013
Technical Education	Public	-0.07	-0.067	0.01	-0.012	0.013
	Private	0.341	0.324	0.32	0.309	0.302
University Incomplete	Public	0.262	0.037	0.25	0.24	0.246
	Private	-0.03	-0.021	0.016	0.042	0.047
University Complete	Public	0.122	0.108	0.107	0.099	0.075
	Private	-0.127	-0.089	-0.067	-0.054	-0.081

		Comparing Primary Private + Secondary Public vs. All Public				
Maximum Level Attained:		(1)	(2)	(3)	(4)	(5)
Only Secondary School		0.377	* 0.336	0.284	0.286	0.291
Technical Education	Public	0.043	0.306	0.356	0.388	0.381
	Private	0.004	0.055	-0.027	-0.014	0.012
University Incomplete	Public	-0.314	-0.159	-0.245	-0.248	-0.233
	Private	0.009	0.068	0.213	0.207	0.165
University Complete	Public	-0.221	-0.158	-0.192	-0.192	-0.132
	Private	-0.222	-0.086	-0.019	0.01	-0.019

		Comparing Primary Private + Secondary Private vs. All Public												
Maximum Level Attained:		(1)	(2)	(3)	(4)	(5)								
Only Secondary School		0.393	***	0.377	***	0.302	**	0.296	**	0.292	**			
Technical Education	Public	-0.231		-0.142		-0.169		-0.138		-0.071				
	Private	0.321	**	0.37	***	0.31	***	0.307	**	0.296	**			
University Incomplete	Public	-0.236		-0.04		-0.141		-0.103		-0.043				
	Private	0.399	*	0.503	***	0.427	**	0.444	***	0.437	***			
University Complete	Public	0.456	***	0.542	***	0.496	***	0.505	***	0.59	***			
	Private	0.608	***	0.745	***	0.642	***	0.68	***	0.672	***			

\*\*\* Significant at 10%, \*\* Significant at 5%, \* Significant at 1%

The results shown in the table clarify the picture even more. The higher returns to schooling accrue to those who have both primary and secondary private schooling and not to those who have only primary private or only secondary private. As a matter of fact, the data shown in the previous section suggest that the fraction of the population who switched between the private and the public sector in the transition from primary to secondary



education is remarkably smaller than the fraction of those who stayed in the same type of educational institution, either private or public.

This also raises a point about possible reverse causality in the estimation of the private-public gaps in the returns to schooling. Namely, families who were able to send their children to a private primary and secondary school did so because of their households' different economic situation. It is not unreasonable to expect as well that these families also invested more than other families in the human capital formation of their children, and not only in school. It is also expected that these families enjoyed better social networks, which allowed their kids to find better jobs and hence to achieve higher earnings. Hence, to attribute the reported gaps exclusively to differences in quality between the private and public schooling systems is an exaggeration, and the actual labor market impacts of the differences in quality of the two systems are expected to be smaller.<sup>5</sup> Our estimators are just an upper bound. Nonetheless, the magnitude of the reported estimators calls for attention.

#### **4. Evolution of Private-Public Differences: A Rolling Windows Approach**

In this section we explore how private-public gaps in returns to schooling have been evolving during the last decades in Peru. Given that we are using only two cross-sectional data sets for the years 1997 and 2000, our approach consists of using information about the birth year of the individuals with a rolling windows technique. This consists of estimating the same earnings equations as in Table 7 but with different subsets of the data. We performed the exercise with all the 5 equations that we have been using in the paper, but we are reporting here only the results from specification number 4. We estimate first the earnings regression considering only individuals born within in a window centered at 1933 and with a width of 20 years (i.e., comprising all those born between 1923 and 1943). The estimated returns to schooling are then plotted on the y-axis of the graphs, paired with the value of 1933 on the x-axis. Subsequently, a second earnings regression is estimated with the subset of individuals born between 1924 and 1944 and the corresponding returns to schooling are plotted for the 1934 value of the x-axis. In this way, the rolling window of 20-year width is moved, one year at a time, up to the subset that comprises all those born between 1945 and 1965 (i.e., centered at 1955).

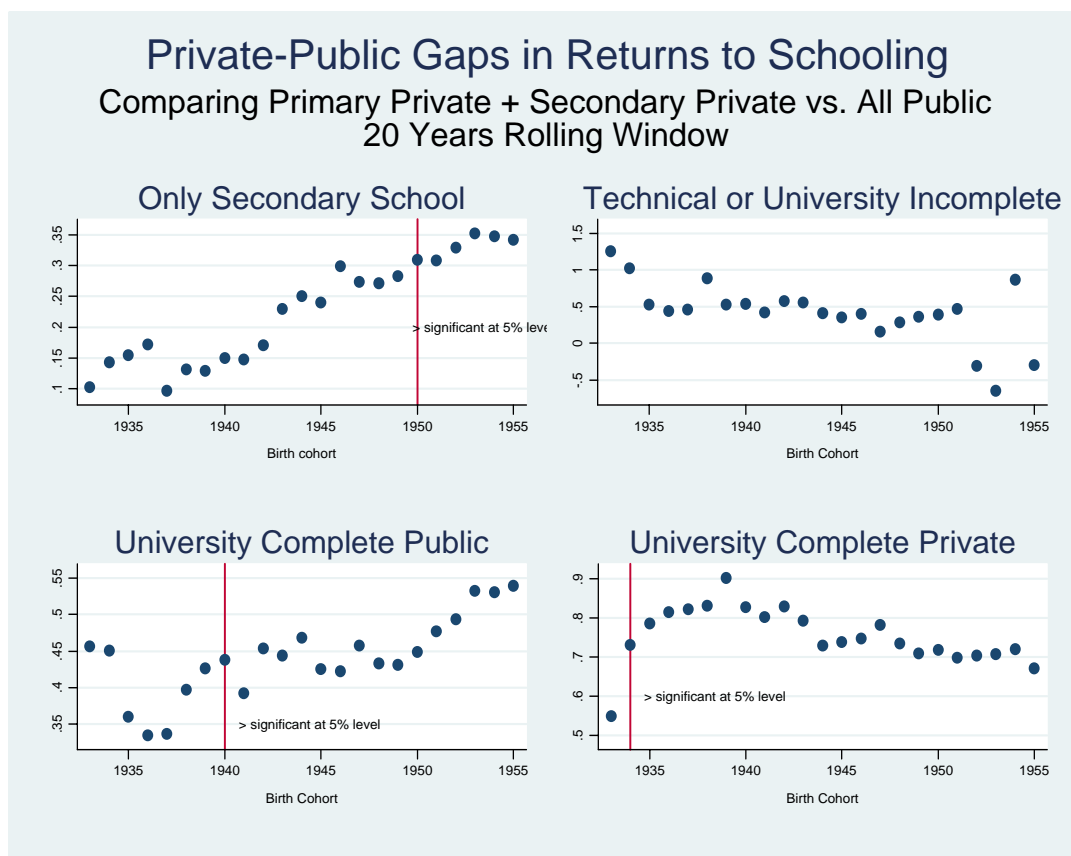
In the following graphs we plot the evolution of private-public gaps in returns to secondary schooling for different attainment levels (for the sake of brevity we combined two attainment levels: technical education and university incomplete). The vertical lines on the graphs correspond to the birth cohort since which the private-public differences became statistically different (at a 5% significance).<sup>6</sup> Performing sensitivity analysis, in Annex I

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<sup>5</sup> Somers et al. (2004), analyzing private-public gaps in achievement in standardized tests (mathematics and language), report that only a small portion of the gap could be attributed to differences in socio-economic status. They find that peer effects explain a substantial part of the differences in achievement in their sample of 10 Latin American countries.

<sup>6</sup> For the attainment level group comprising technical education and university incomplete, private-public gaps are never statistically significant.

we report the analogous estimations with a rolling windows of width=10 years.



The private-public gap in returns to secondary schooling started to be significantly different among those who did not pursue tertiary education only for those born after 1950, among those who graduated from public universities since the cohort born in 1940 and among those who graduated from private universities since the cohort born in 1933. For the group that combines the alumni of technical institutes and those who attended but did not finish university, the private-public gap in the returns to secondary schooling is positive but not statistically significant. As can be seen in Annex I, these results are maintained when we use a rolling window of smaller width.<sup>7</sup>

Private-public gaps widen among younger cohorts. This may suggest an expansion of private-public differences in returns to schooling, but word of caution is needed in interpreting these results. Although we are using two cross-sections, we are not exploiting the time difference between the surveys (indeed, we pooled the two data sets). Our estimators are not measuring the evolution over time of the private-public gaps in returns to schooling, and they are not measuring the evolution of gaps during the life cycle of workers. Instead, the estimators constitute a “snapshot” of gaps, for different age profiles (birth cohorts), at a particular moment (1997-2000) in Peru.

<sup>7</sup> At this point it is important to note that with a smaller width for the rolling window the standard errors of the estimated gaps are bigger and the results are more sensitive to outliers.

## 5. Other Private-Public Differences

In this section we document other labor market outcomes through the lens of private-public differences. Continuing with the type of comparisons made in the previous section, we contrast the labor market outcomes of those who attended private primary and secondary schools with the outcomes of those who attended public primary and secondary schools. This approach does not consider the case of those who switched from one type of primary to a different type of secondary, but they represent less than 4% of the population under analysis. This fact, as well as the results of the previous sections, suggests that the gains in simplicity of the analysis are well worth the restriction.

In Table 8 we present a set of labor markets indicators, comparing the outcomes of those who attended private institutions with those of individuals who went through the public system. In general, the alumni of private schools are more likely to be found inactive or unemployed than their public counterparts, but the differences in unemployment vanish among those who obtain a college degree (public or private). Differences in the proportions of white collars are not as pronounced as those in the proportions of blue collars, and private-public differences in proportions of blue collars diminish as individuals obtain additional schooling. While the difference in proportions of blue collar is around 26% among those who only finished secondary schooling and did not pursue further studies, such difference attains only 3% for those who graduated from private universities. The alumni of private schools are more likely to become managers than the alumni of the public system, and the differences are wider among public university graduates. Among those who did not obtain a university degree, public school graduates are more likely to be self-employed. On the other hand, among university graduates, those who attended private schools are more likely to be self-employed than their public counterparts. Probably the most interesting differences are found in terms of sector of work. Those who graduated from the public primary and secondary schooling system are more likely to work for the public sector than their private counterparts. The differences in access to health insurance and pension plans are not as pronounced.

Table 8: Private-Public Differences in Selected Labor Market Indicators

	Only Secondary Schooling		Technical + Univ. Incomplete		University Comp. Public		University Comp. Private	
	Private	Public	Private	Public	Private	Public	Private	Public
% inactive	43%	22%	32%	22%	17%	12%	17%	13%
% unemployed	5%	3%	6%	4%	4%	4%	3%	3%
Hours worked per week	43.1	47.0	44.7	42.5	48.4	39.4	46.3	42.4
% White collars	9%	5%	24%	26%	62%	57%	58%	58%
% Blue collars	41%	67%	36%	45%	17%	24%	21%	24%
% Managers	1%	1%	3%	1%	5%	4%	8%	4%
% Self-employed	17%	32%	18%	22%	24%	16%	21%	18%
% Working in the public sector	18%	22%	19%	48%	37%	64%	21%	45%

% with health insurance	21%	14%	23%	26%	41%	48%	47%	45%
% with pension plans	17%	12%	18%	23%	36%	41%	42%	41%

Note: Private = Primary and secondary private; Public = Primary and secondary public.

The differences in labor market outcomes outlined above also show linkages to private-public earnings gaps. The most important differences to note are those found among managers and white collars. Among university graduates, managers who come from private schools are likely to earn on average 140% more than their peers from public schools, after controlling for a set of observable characteristics. The analogous figure for white collars is around 72%. These results come from earnings equations estimated on the basis of the specification in column (5) on Table 4 above. The full regressions are available from the authors upon request.

## 6. Conclusions

In this paper we estimate returns to schooling in Peruvian labor markets for 1997 and 2000. A novel feature of the data set used is that it contains detailed information on the type of institution (private or public) that each individual attended for each educational level attained. In this way we are able to estimate private-public differences in returns to schooling for each educational level. The results indicate that the greatest private-public differences in returns to schooling are found at the primary and secondary levels.

One way of reading the results reinforces the literature that has emphasized the prominent role of early investments in human capital formation, as even small differences in quality at the basic levels make a difference that cannot be surmounted by tertiary education. Another way of reading these results is that the quality of the education provided by public universities is not that different from the one provided by the private system. Does this mean that the tertiary education level works as a mechanism that equalizes opportunities, or do wealthier families, who can afford to send their children to private primary and secondary schooling, later on send their children to public universities? These are interesting and important questions that cannot yet be answered by this paper. It would be necessary to explore in more detail the sorting mechanisms that operate on the selection of students into universities and technical institutes (public and private).

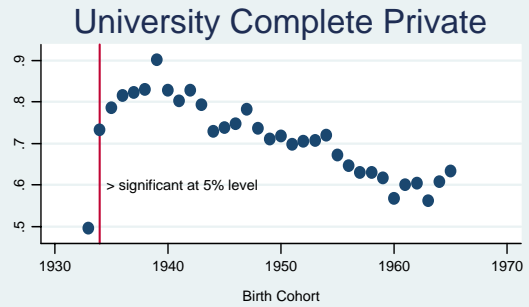
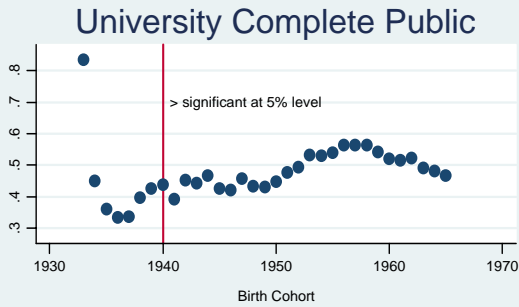
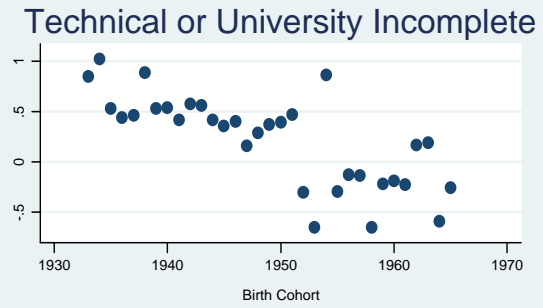
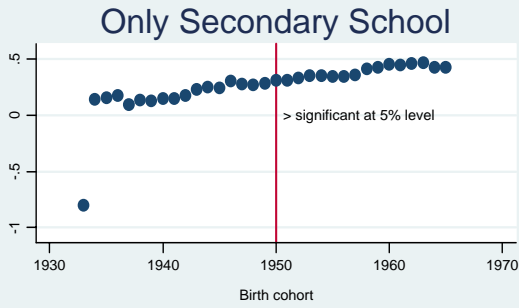
A rolling windows regression approach allows us to explore changes of these returns to schooling by birth cohorts. The results suggest that private-public differences have been increasing for younger generations, while older cohorts do not show significant private-public differences in returns to schooling. In addition, the regressions showed evidence that the higher returns to private education are also more dispersed than those in the public sector, and we found differences in other labor markets indicators. Those who graduated from private school are more likely to be inactive and to be unemployed than their private counterparts. Similarly, alumni of the public primary and secondary school system are more likely to work as blue collars and in the public sector than those who attended private schools.

These results are consistent with the patterns of educational investments seen in Peru, as in many Latin American nations, during recent decades. The educational system has been expanding its coverage, but with low levels of public investment. In this context, poorer families who previously would not have sent their children to school are now doing so, but only to public schools. In turn, the presence of children from underprivileged households in the public classroom, paired with the deterioration of public spending, implies a reduction of the quality of learning in public schools. Likewise, the expansion of private provision of educational services has meant that children from less, kids from less-underprivileged families were able to attend private rather than public schools. As a result, the socio-economic profile of the public classroom has deteriorated. In short, the gap could be increasing due to the deterioration of two elements: the quality of the educational services provided by public school and the socio-economic conditions of the children who attend public schools.

We recognize the potential problems with attributing the measured private-public gaps entirely to the characteristics of schools. The gaps we are measuring here have embedded, among other things, the effects of socio-economic characteristics of the households, peer effects on the learning processes of individuals and the social network formation of the children who attend basic schools (primary and secondary). These other characteristics, which happened in the past (while attending the schooling system), affect current earnings of the adults in our samples and we cannot isolate them. In that sense, the estimates we report can be considered as upper bounds for the private-public gaps in returns to schooling. An appropriate way to clean the effect of type of schooling on earnings would be an instrumental variables (IV) approach. Nonetheless, caveats regarding the appropriate use of this approach have been raised (see Heckman, 1995; Staiger and Stock, 1997). Using only the variables available from a National Household Survey, it is difficult to come up with strong instruments for guaranteeing proper isolation of the effects of interest.

Nonetheless, the magnitude of such estimators calls for attention. For instance, the estimated gaps suggests that an individual who graduates from a private university but attended private secondary and primary schools will earn on average almost twice as much as a student who also graduated from a private university but attended a public primary and secondary school. The differences in returns are notable, especially among the younger cohorts. This suggests an expansion of the private-public gaps in recent decades, which in turn constitutes an important mechanism that works towards the accentuation of other inequalities in Peruvian society.

## Private-Public Gaps in Returns to Schooling Comparing Primary Private + Secondary Private vs. All Public 10 Years Rolling Window



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