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# **Evaluation of CEMBA/MPA**

**Allama Iqbal Open University /Commonwealth of Learning**

## **Draft Report 1**

By

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based on data collected by

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## Executive Summary

The Commonwealth Executive Master of Business Administration (CEMBA/MPA) and Master of Public Administration Programs (CEMPA) have been operating with Commonwealth of Learning (COL) and partner universities in many countries. Broadly defined, the objective of these programs is to empower people with the learning that enables them to be agents of economic and social development. We evaluated and provided evidence of the effect of CEMBA/MPA on labour market outcomes. Specifically, we estimated the impact of graduating from CEMBA/MPA at the partner Allama Iqbal Open University, in Pakistan, on earnings, wages, income, occupational choice and entrepreneurship.

Our empirical strategy compares the outcomes before and after graduation of CEMBA/MPA for treatment and control groups. Treatment group is composed by alumni of CEMBA/MPA who graduated between 2012 and 2017 (“graduates”). And the control (comparison) group is composed by students who have not graduated by end of 2017 (“still in school”).

Data was collected by surveying the graduates and current students of CEMPA/MPA with a questionnaire that includes questions on labour market outcomes for the years of 2012 and 2017; demographic characteristics; educational characteristics and others. Our sample is composed by 341 observations (193 still in school and 147 graduates).

We employ the difference-in-differences research design. Given the survey data collected refers to information before and after the program for treated and control groups, by using this methodology we would eliminate any time-invariant selection bias due to unobserved heterogeneity between treatment and control groups. The effectiveness of this approach rested on meeting three key assumptions: i) in the absence of treatment, outcomes of the treatment group would have changed like the control group (“parallel trends”); ii) the data collected from the surveys comes from a random sample of the population of interest; and iii) the information collected from administrative data and survey data is suitable and reliable.

The results of the difference-in-differences regression analysis report that graduating from CEMBA/MPA caused the following on the treatment group:

- An increase of 37.6% on monthly earnings, which corresponds to approximately 19,588 PKR ( $\approx$ 222 CAD).
- An increase of 31.6% on annual income, which corresponds to approximately 160,405 PKR ( $\approx$ 1,819 CAD).
- An increase of 28.5 percentage points in the probability of having an occupation as manager, which corresponds to more than twice that probability in 2012 for treatment group.
- An increase of 36.8% of wage (earnings per hour).

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We did not find robust evidence of impacts on labour supply (hours of work), probability of owning a business, probability of getting business profits, probability of incorporating a business.

To calculate the benefit of the program, we used the impact of the program on the average annual personal income from all sources. While this impact does not take into account all the possible impacts from the program, it synthesizes in one many related outcomes (such as earnings, labour supply, wages, business creation and employment). With cost information per student and the estimated benefit per student, we created various scenarios of potential cashflows to calculate the economic return of CEMBA/MPA. Each scenario assumes different parameters for the duration of impacts, the discount rate, magnitude of costs and benefits. By looking at the measures of economic return in each scenario, we can see how sensitive the results are to parameter changes.

We concluded the program present high economic return even in very conservative/pessimistic scenarios. In our preferred scenario, in which the impact last for 5 years, decays 30% every year and the discount rate is 6%, the return on investment is 239% per year. That is, for every dollar a student invests in CEMBA/MPA, she/he gets on average 3.39 dollars in return. The fact that the cost of the program is low (as a share of total student income) and the estimated impact on income is high explains the high economic return calculated.

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## 1. Introduction

The Commonwealth Executive Master of Business Administration (CEMBA) and Master of Public Administration Programs (CEMPA) have been operating with Commonwealth of Learning (COL) and partner universities in many countries. Broadly defined, the objective of these programs is to empower people with the learning that enables them to be agents of economic and social development. We evaluated and provided evidence of the effect of CEMBA/MPA on labour market outcomes. Specifically, we estimated the impact of graduating from CEMBA/MPA at the partner Allama Iqbal Open University, in Pakistan, on earnings, wages, income, occupational choice and entrepreneurship.

This report is organized as follows. After this introduction, section 2 covers main concepts of impact evaluation, section 3 describes the main features of CEMBA/MPA, section 4 presents the methodology for estimation of impacts, section 5 covers the data. Section 6 reports the descriptive statistics. Finally, section 7 reports the results, including estimation of impacts and calculation of the economics return of the programme.

## 2. Program Evaluation

The main objective of an impact evaluation is to verify whether a program is achieving its objectives or expected impacts. It tries to answer questions such as: “How would individuals who participated in the program have fared in its absence? Were any improvements a direct result of the project, or would they have improved anyway?”. It is very difficult to answer these questions, since an individual either participated or did not in the program, and comparing results of the same individual over time is problematic, as many other variables may have changed during the program operation. In this context, ‘impact’ means the difference between the situation of program participants after their participation and the situation in which they would have been if they have not participated in the program. While the former is a real situation, the latter is hypothetical one. There is a growing literature in program evaluation<sup>1</sup> that has designed methods for the estimation of impacts in different settings.

Instead of finding the effect of a program in individuals, researchers try to obtain the average impact of the program by comparing a group of individuals who participated in the program with another similar group which was not exposed to the program. It is often difficult to find two groups with very similar characteristics, but only one that participated in the program under analysis. If there is not a good comparison group, differences between the control group and the treatment group can be attributable to pre-existing differences (selection bias) and the impact of the program.

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<sup>1</sup> See Gertler et al (2016) for an introduction to the topic of impact evaluation and its practice. See Angrist and Pischke (2009) for more details on the econometric methodologies commonly used.

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The estimation of the impacts of a program is important, but it is not enough to evaluate its effectiveness. We also need to measure this impact and contrast it to the costs. Knowing the benefit-cost ratio or return on investment of a program allows comparisons with different projects which helps stakeholders to make decisions regarding the programs to invest.

Ideally, an evaluation would consider all the costs and social benefits of a program both on the program participants but also on the agents in the rest of society that are indirectly affected by the program through externalities. That is often difficult to determine because programs generally have multiple objectives and it is challenging to convert many of the outcomes that measure the success of those objectives into a monetary measure. When there are many different impacts to be estimated, evaluators have the alternative to estimate the willingness to pay of program beneficiaries by asking them directly. However, participants tend to overestimate the price they would be actually willing to pay to have access to a program and some with low valuations tend to report zero as willingness to pay.

While asking participants their willingness to pay for a program (or using any other instrument that measures more broadly the success of a program) can be a good idea, there are a few reasons why measuring more specific impacts is desirable. First, often stakeholder want to know if the program achieved its success (or satisfaction) through their designed means as opposed to any other unknown way. Second, measuring impacts on specific outcomes is often simpler to learn from participants, either by observing their behavior or by asking them directly.

In the evaluation of CEMBA/MPA, we choose specific outcomes of interest, and follow common practice in evaluation literature to define impact as the difference between the changes in outcomes of treatment and control groups over a time period. Although there should be pre-existing differences between graduates and current student, we can use quasi-experimental methods that attempt to offset problems of selection bias.

### 3. CEMBA/MPA

The Commonwealth Executive Master of Business Administration and Public Administration (CEMBA/MPA) Programs operate in the various partner universities<sup>2</sup>. Students are usually working

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<sup>2</sup> CEMBA/MPA operates in Allama Iqbal Open University (Pakistan), Bangladesh Open University, Botswana College of Distance and Open Learning (BOCODOL), Kwame Nkrumah University of Science and Technology (Ghana), Open University of Mauritius, National Open University of Nigeria, Open University of Sri Lanka, University College of the Caribbean (Jamaica), University College of the Cayman Islands, University of Guyana, and Wawasan Open University (Malaysia).

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professionals and take the course part-time while working. The standard program duration is two years, but students have up to five years to complete it. In order to graduate, students need to complete 90 credits, or 15 courses. The programme is offered in online and distance learning modes.

This evaluation includes students and graduates of the partner Allama Iqbal Open University (AIOU). The table below reports the numbers of graduates per year at AIOU.

*Table 1 - Number of students who graduated: 2004-2012*

year	CEMBA	CEMPA
2004	36	0
2005	168	33
2006	346	113
2007	583	85
2008	877	72
2009	1148	60
2010	1430	92
2011	1425	96
2012	1273	77
Total	7286	628

#### 4. Methodology

Our empirical strategy for the estimation of impacts is to use the differences-in-differences model which compares outcomes before and after graduation of CEMBA/MPA for treatment and control groups. Treatment group is composed by alumni of CEMBA/MPA who graduated between 2012 and 2017, and the control (comparison) group is composed by students who have not graduated by end of 2017. Individuals in both groups (“graduates” and “still in school”) had to go through and pass an admission process<sup>3</sup> of CEMBA/MPA, which guarantees some level of similarity between these two groups. Additionally, the control and treated individuals have a similar profile in terms of ambitions, education, motivation given that both groups chose to enroll in CEMBA/MPA.

A challenge to estimate impacts of education programs or job training programmes is that, typically, the control group is formed by individuals who did not participate in the programme/job training

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<sup>3</sup> The admission criteria include the following: at least a second class Bachelor's degree from a recognized university; a minimum of two years of relevant post-qualification experience; a good working knowledge of the English language at postgraduate level; satisfactory score on the CEMBA/MPA/CEMPA Admission Test (general awareness, English language, quantitative aptitude, and reasoning); some Partner Universities require citizens to be resident in the country.

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course. In that case, program participants that self-select into a programme would necessarily be more motivated than the control individuals. That motivation (which is not observed by the evaluator) could be what, in fact, affects the outcomes, instead of the actual programme intervention. The inability to distinguish those two sources of impact can bias estimation results. We avoid that problem by choosing a control group formed by current students of CEMBA/MPA with likely similar levels of motivation as former students.

Since the data collected refers to information before and after the program for treated and control groups, by using this methodology we would eliminate any time-invariant selection bias due to unobserved heterogeneity between treatment and control groups. Thus, we rely on the assumption of parallel trends, that is, the outcomes for control and treatment groups would follow the same trend over time in the absence of the program.

The difference-in-differences approach was an appealing methodology in this context as this evaluation was designed and implemented *a posteriori*, after CEMBA/MPA was operating for multiple years. The main advantage of this methodology is that it does not require that control and treatment groups to have the similar pre-existing observable characteristics. Instead, what is needed is that the average change in outcomes from 2012 to 2017 of control and treatment groups would be the same had the treated not graduated from CEMBA/MPA. Thus, the average outcomes do not have to be at the same level at any point in time for this assumption to be met. While we cannot show evidence of support of this assumption<sup>4</sup>, the model we use controls for any individual time-invariant characteristic that affects income and also controls for tenure and work experience (time-varying characteristics).

Let  $i$  indexes individuals and  $t$  indexes year. The impact of the CEMBA/MPA can be estimated with difference-in-differences expressed by the equation below:

$$Y_{it} = \beta_1 GRAD_{it} + \theta_i + BX_{it} + \varepsilon_{it}$$

Where  $Y_i$  is the outcome of interest,  $GRAD_i$  is an indicator for whether the individual  $i$  graduated from CEMBA/MPA or not at time  $t$ ,  $\theta_i$  is the individual fixed effect,  $X_{it}$  is a vector of individual time-varying characteristics and  $\varepsilon_{it}$  is the statistical error. In this model,  $\beta_1$  represents the impact of graduating from CEMBA/MPA on the outcome variable. We include covariates (in the vector  $X_{it}$ ) which correspond to characteristics that should not be affected by the program<sup>5</sup>. The standard errors are estimated with Eicker-White Hetero-robust estimator.

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<sup>4</sup> Typically, researchers report a chart with the evolution of the average outcomes for control and treatment group prior to intervention suggesting parallel paths. We do not have enough data on outcomes before the intervention to make this chart and it would potentially not be a suitable way to support the parallel trends assumption, as many of the control group individuals would likely still be in school and therefore out of the labour force in the years preceding 2012.

<sup>5</sup> We have different model specifications with and without the time-varying covariates: years of work experience and years of tenure with current employer.

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In this evaluation, we narrowed the outcomes of interest to: earnings, wages (earnings per hour), income, number of hours of work, entrepreneurship, occupation change/promotion.

## 5. Data

Our population of interest for this evaluation is composed of all students and graduates from CEMPA/MPA at AIOU. A team from AIOU selected and surveyed a sample of graduates and students for our data collection. The interviews were done over the phone and in person in the period from November 2017 to January 2018.

The questionnaire used in the survey includes questions on the outcome variables for the years of 2012 and 2017; demographic characteristics; work characteristics and educational characteristics. While it is preferable not to ask retrospective questions to avoid recall bias, as long as the recall bias for the control and treatment groups are the same, our impact estimates remain unbiased.

## 6. Descriptive Statistics

This section reports the descriptive statistics of our sample to better understand the population of participants of CEMPA/MPA. We show some statistics by group: still in school (control) and graduated (treatment) to highlight relevant pre-existing differences in their characteristics.

### Demographic characteristics

Our sample is composed with 193 individuals still in school and 148 who have graduated, totaling 341 observations, most of them from CEMBA program.

*Table 2 - Number of observations by program*

<u>Program</u>	<u>Still in school</u>	<u>Graduated</u>	<u>Total</u>
CEMBA	171	139	310
CEMPA	22	9	31
<u>Total</u>	<u>193</u>	<u>148</u>	<u>341</u>

While most of the control group individuals started their studies at CEMBA/MPA between years 2014-17, the ones from treatment group started between 2009-14. Those different starting dates meant that by 2012 no one in the sample had graduated, and by 2017 all individuals in the treatment had graduated but none from the control group.

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*Table 3 - Program start year by group*

Program start year	Still in school	Graduated	Total
2006	0	1	1
2008	0	2	2
2009	0	11	11
2010	0	14	14
2011	1	40	41
2012	1	42	43
2013	0	25	25
2014	10	10	20
2015	30	3	33
2016	74	0	74
2017	77	0	77
<b>Total</b>	<b>193</b>	<b>148</b>	<b>341</b>

Table 4 reports that our survey respondents are spread in multiple cities in Pakistan, which is possible since the programme is offered in online and distance learning modes and can, thus, reach people from many different locations.

*Table 4 - Number of observations by city*

City	Still in school	Graduated	Total
Abbottabad	14	9	23
Faisalabad	5	5	10
Gujranwala	32	14	46
Karachi	0	6	6
Lahore	39	19	58
Multan	12	16	28
Rahim Yar Khan	6	5	11
Rawalpindi	18	28	46
Sahiwal	7	16	23
Sialkot	0	5	5
Islamabad	56	14	70
Sargodha	4	11	15
<b>Total</b>	<b>193</b>	<b>148</b>	<b>341</b>

As the treated group already graduated by 2017, it is not surprising that its age distribution is to the right of the one of the control group. The treated have therefore a higher average age. The gender composition of each group differs significantly as 11% of respondents are women in the control group and 28% in the treatment group. In terms of household type, a large share of respondents still in school reported being from lone parent households, while the graduates were mostly from couple households with other

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relative. Control group has on average more numerous households (6.8 members) with a larger share of single individuals (40%), in contrast with treatment groups which has on average 5.5 members in the household and 20% are single. Not surprisingly, control group has a larger average number of household members working full-time, in comparison to the treatment group.

Figure 6 reports that it is very uncommon to have household members working part-time.

Figure 1 - Age distributions

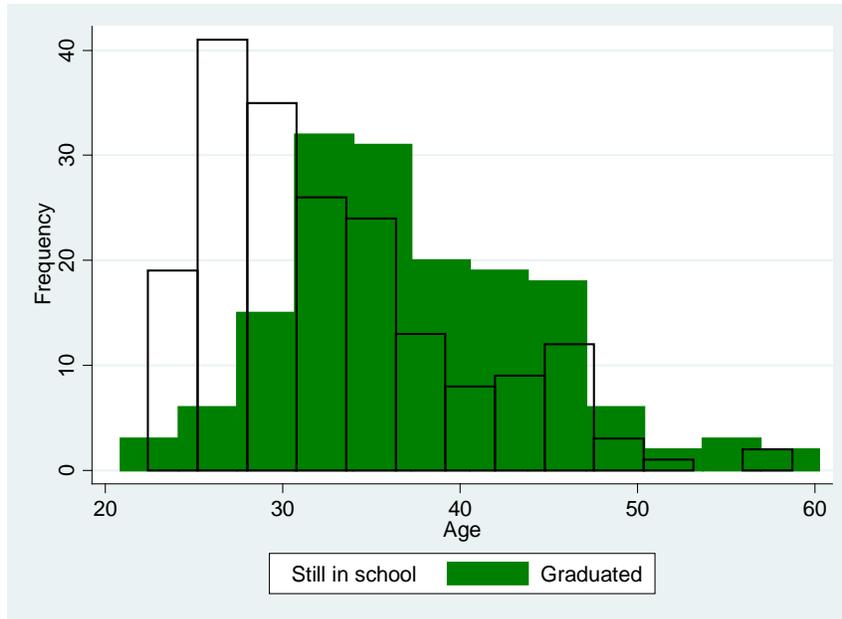
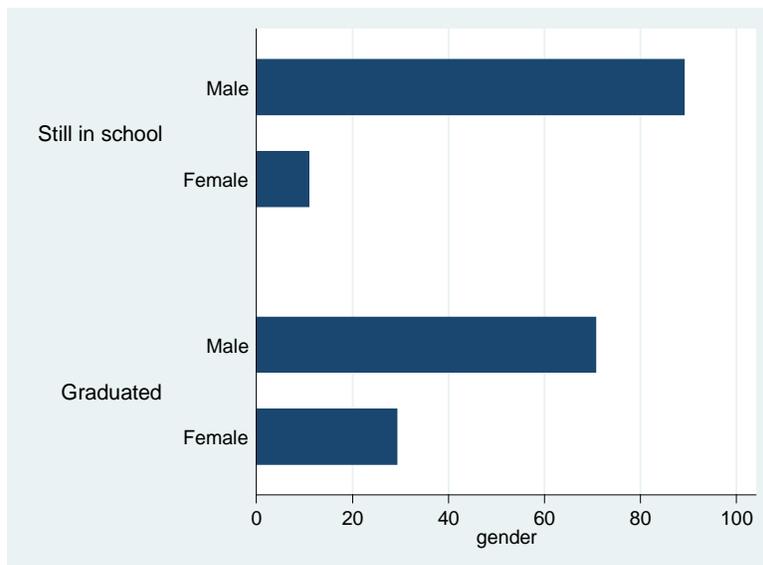


Figure 2 - Gender by group (%)



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Figure 3 – Household type by group (%)

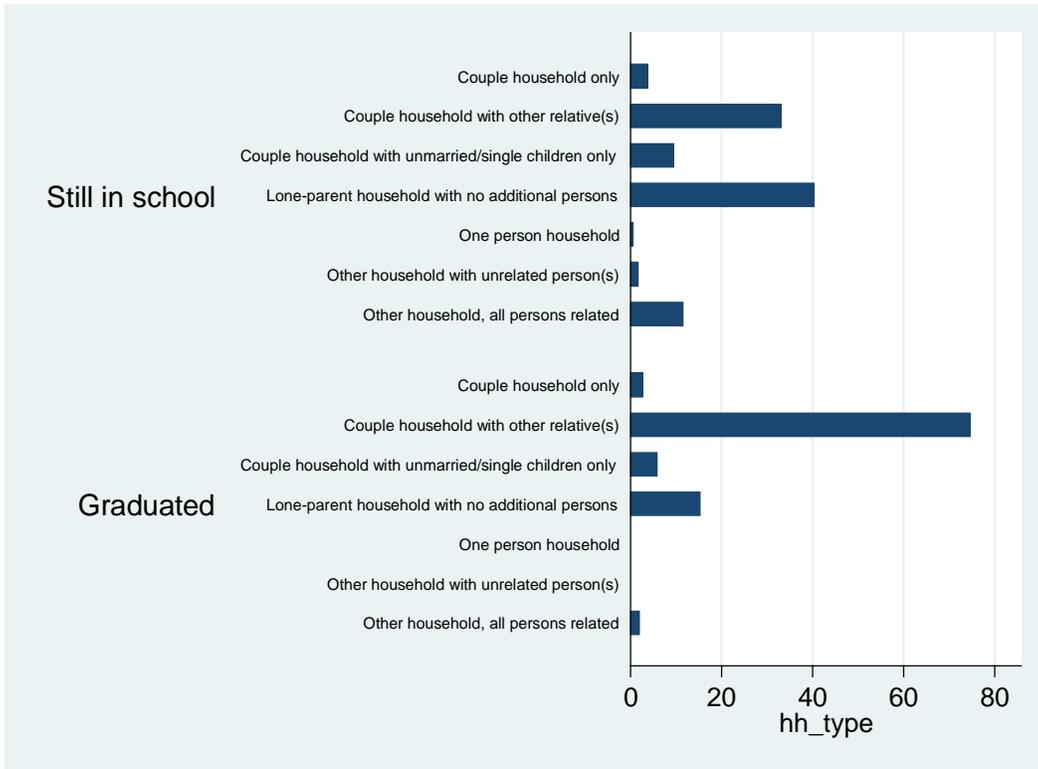
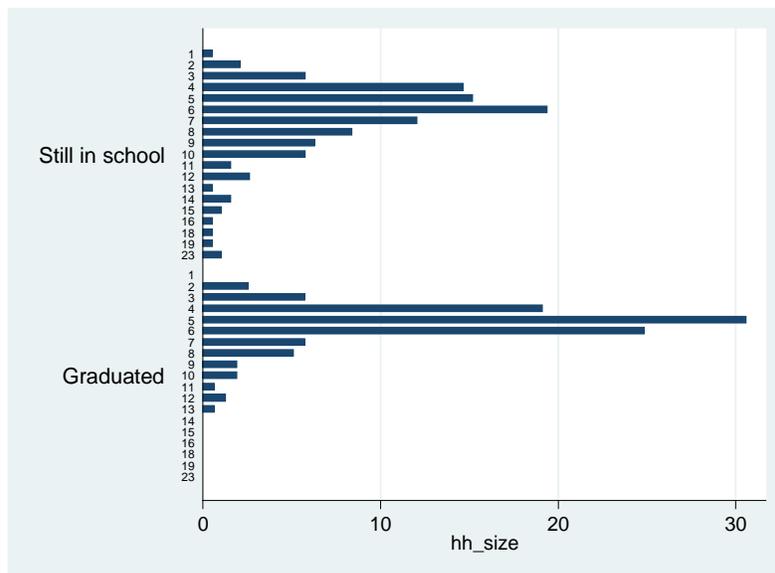


Figure 4 – Household size by group (%)



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Figure 5 – Marital status by group

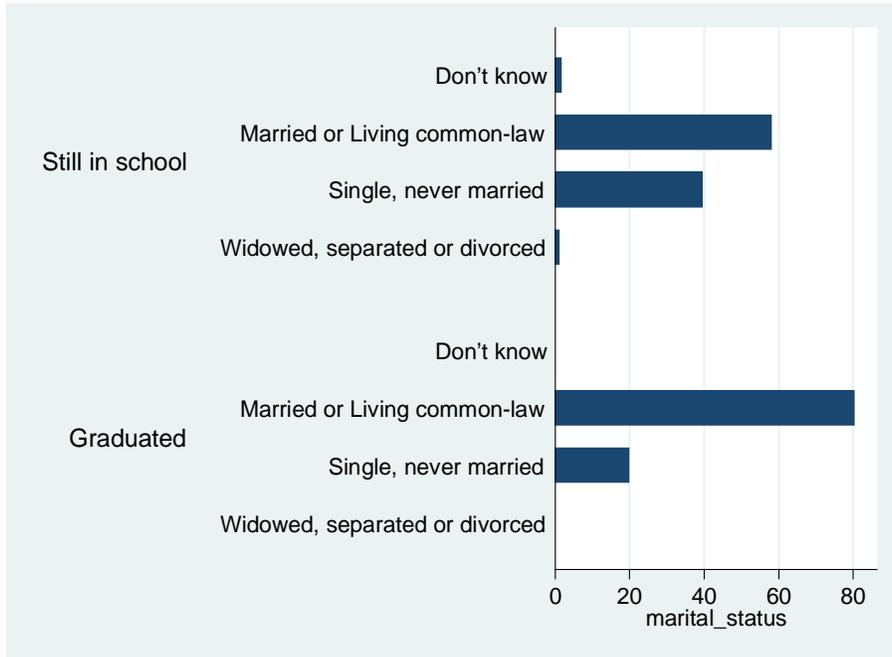
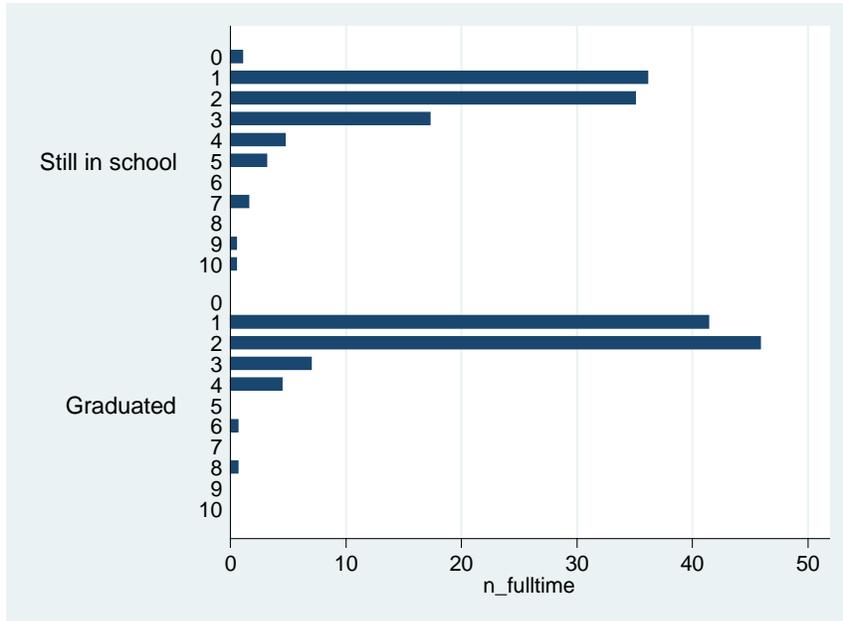
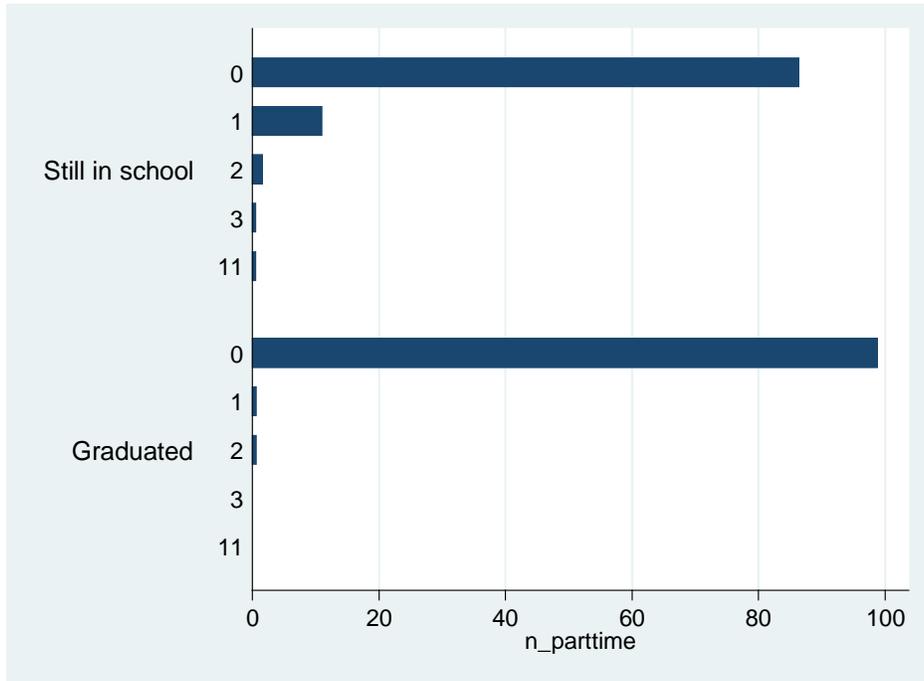


Figure 6 - Number of full-time workers in household by group



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Figure 7 - Number of part-time workers in household by group



### Dwelling

In terms of dwelling characteristics, the two groups are not very different with around 60% owning their dwelling without mortgage and 35% renting their dwelling.

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Figure 8 - Dwelling Status by group (%)

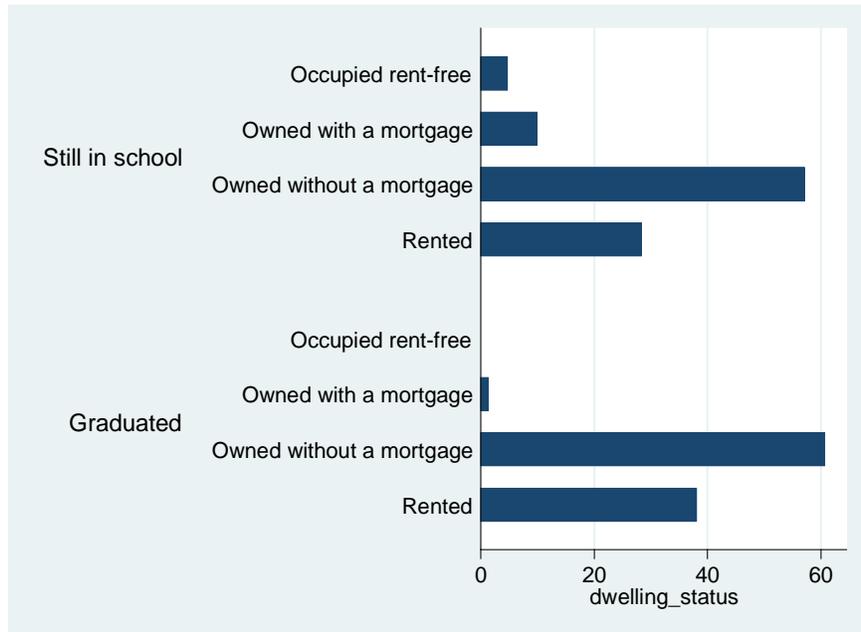
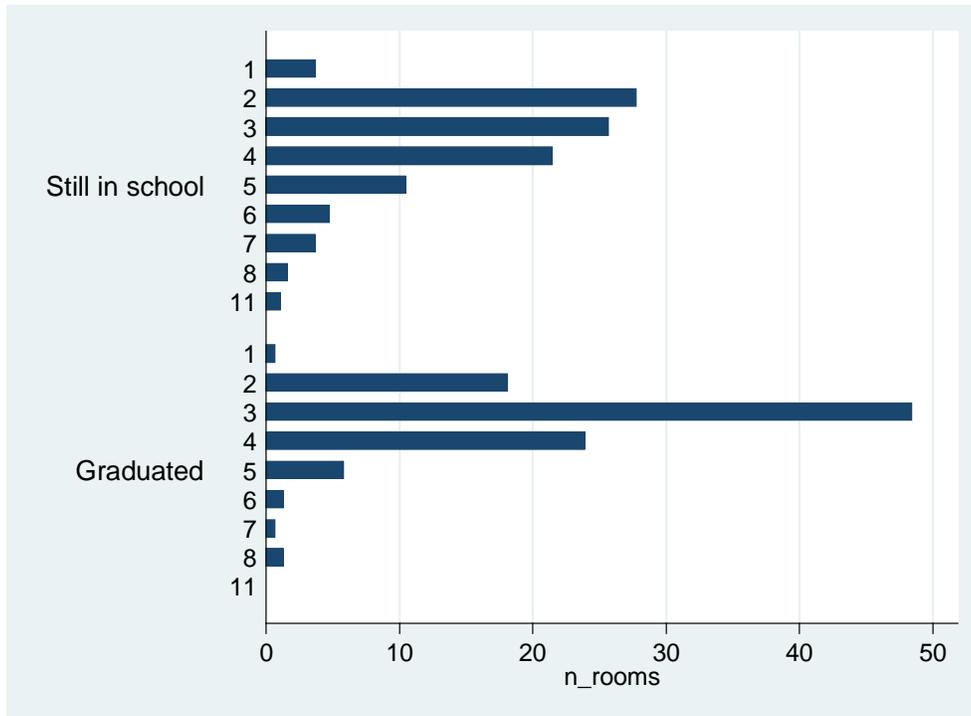


Figure 9 - Number of rooms in the household dwelling by group (%)



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## Schooling

Prior to starting CEMBA/MPA, more than 60% of respondents have completed bachelor's degree with the remaining spread in other master's programmes. Commerce and engineering were the most popular fields of study.

Table 5 - Schooling prior to CEMBA/MPA by group (%)

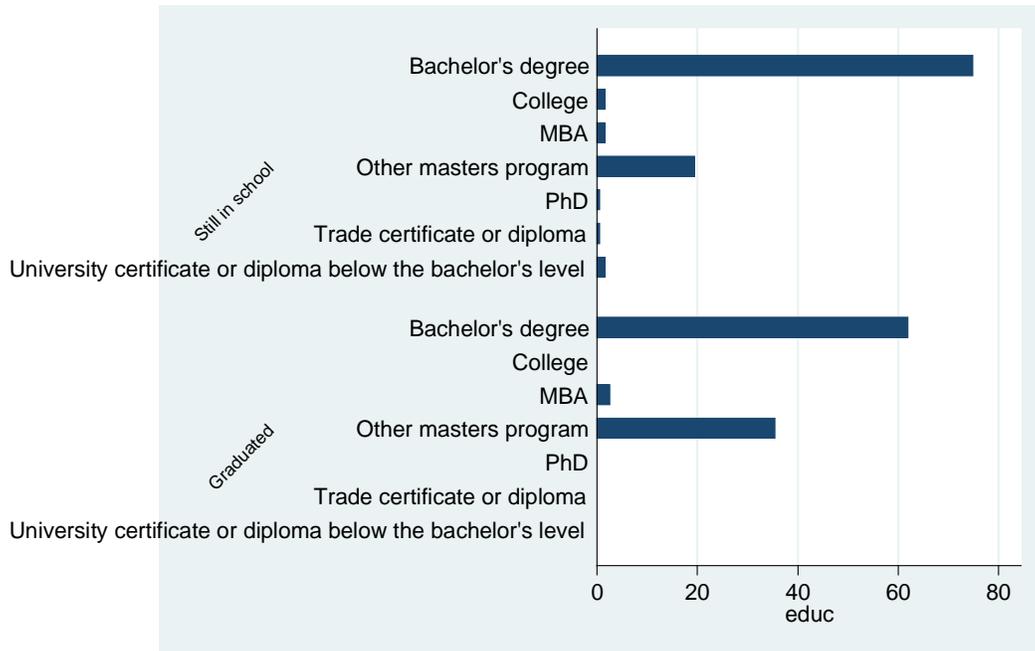
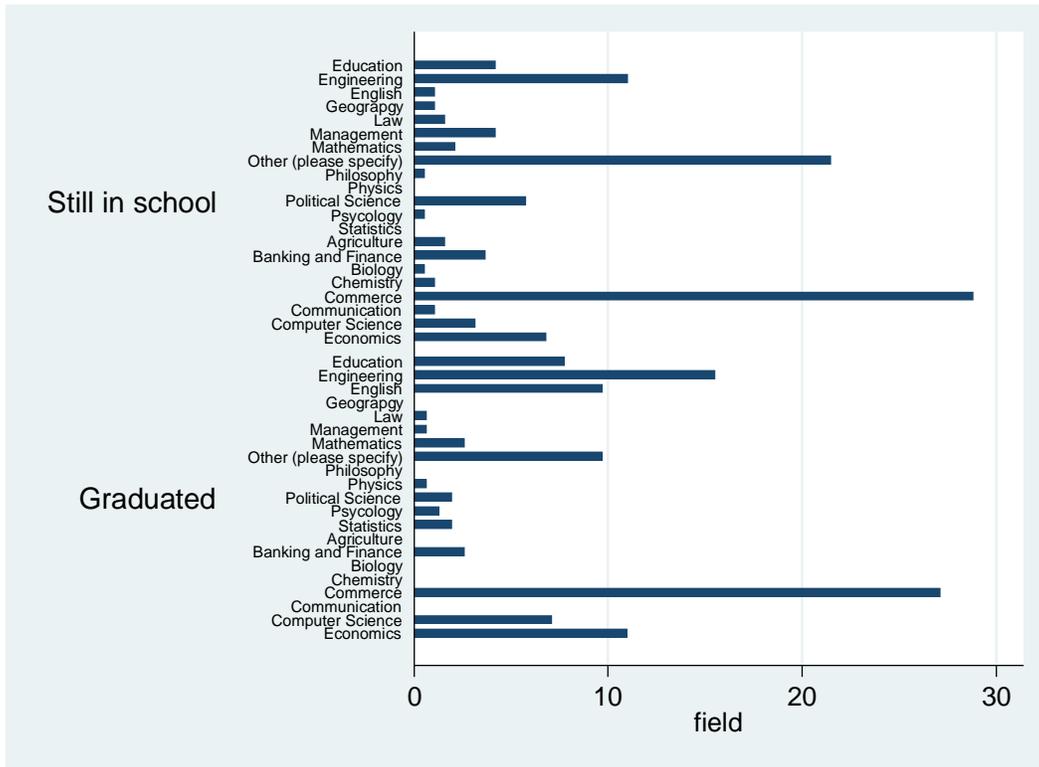


Table 6 – Field of studies prior to CEMBA/MPA



### Labour market

Figure and tables below show the distribution of reported occupations, industries, activities and sectors of the respondents in 2012. A considerable share of control group individuals was still in school or looking for work in 2012, while the almost all the treated were working on a job. This is concerning for the empirical analyzes as we are comparing the changes in outcomes for these two groups. For example, with a larger share of people not working in 2012, the change in earnings from 2012 to 2017 could be very high. Thus, in order to avoid having impact estimates driven by potential “outliers” in the control group, we also run the models with a sample that does not include non-employed individuals in 2012. Since employment is not an outcome of CEMBA/MPA (all students already work during the programme), considering a sample excluding the non-employed in 2012 should not create selection bias in our estimation.

A relevant difference between the two groups is displayed in the distribution of sector. While none of the graduated individuals were in a family business or farm, almost 30% of the respondents in the control group reported to be in this category in 2012.

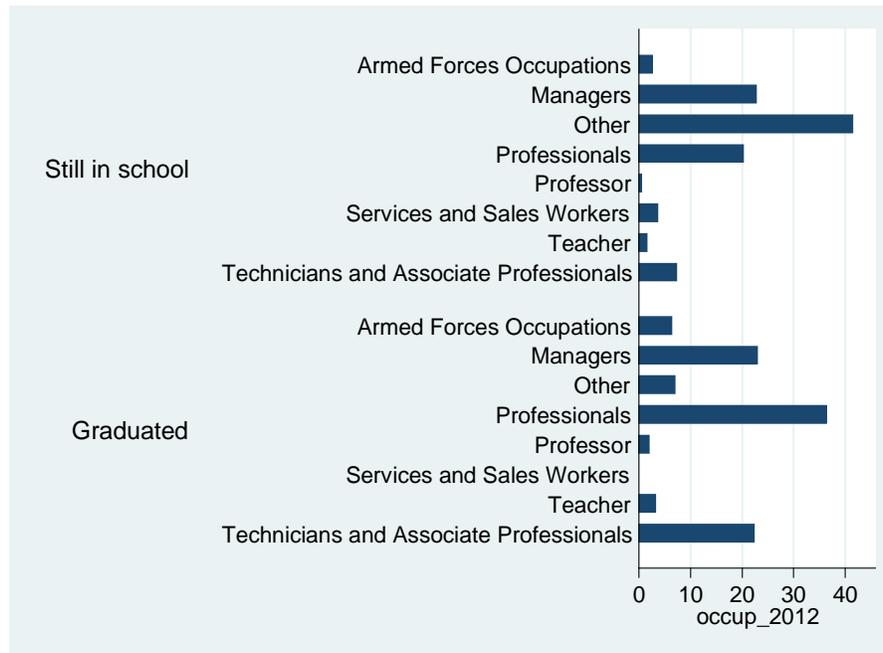
Figure 10 - Occupation<sup>6</sup> by group – 2012 (%)

Table 7 - Industry by group - 2012 (%)

Industry 2012	Still in school (%)	Graduated (%)
Activities of extraterritorial organizations	0.77	0
Activities of households as employers	0.77	0
Administrative and support service activities	3.85	2.8
Agriculture, forestry and fishing	1.54	0.7
Construction	2.31	2.1
Education	14.62	12.59
Electricity, gas, steam and air conditioning	12.31	6.99
Financial and insurance activities	13.08	15.38
Human health and social work activities	3.85	5.59
Information and communication	6.92	10.49
Manufacturing	15.38	10.49
Mining and quarrying	0	0.7
Other service activities	12.31	9.79
Professional, scientific and technical activities	1.54	0
Public administration and defense	7.69	13.29
Real estate activities	0.77	0
Transportation and storage	0	0.7

<sup>6</sup> Reported occupations were categorized in fewer groups so that they could be analyzed. For example, reported occupation titles such as the following were categorized in the group manager: "CEO", "president", "superintendent", "Manager", "head of", "director", "principal".

Water supply; sewerage, waste management	0	1.4
Wholesale and retail trade	2.31	6.99
Total	100	100

Figure 11 - Activity by group - 2012 (%)

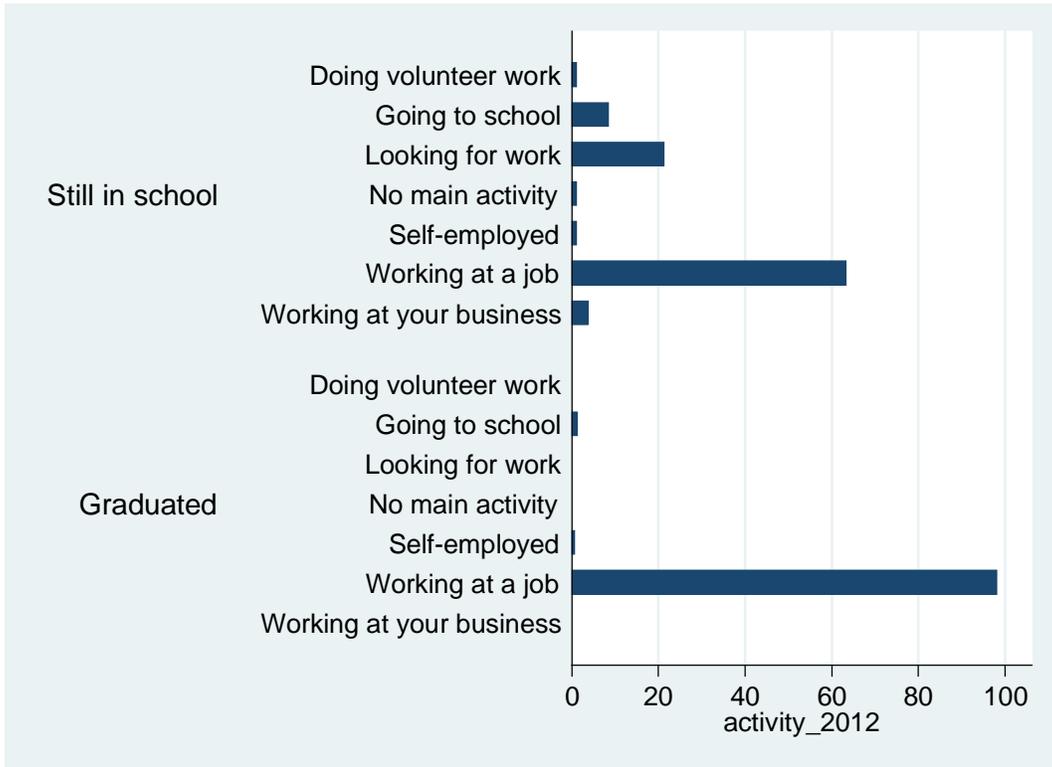


Figure 12 - Sector by group - 2012 (%)

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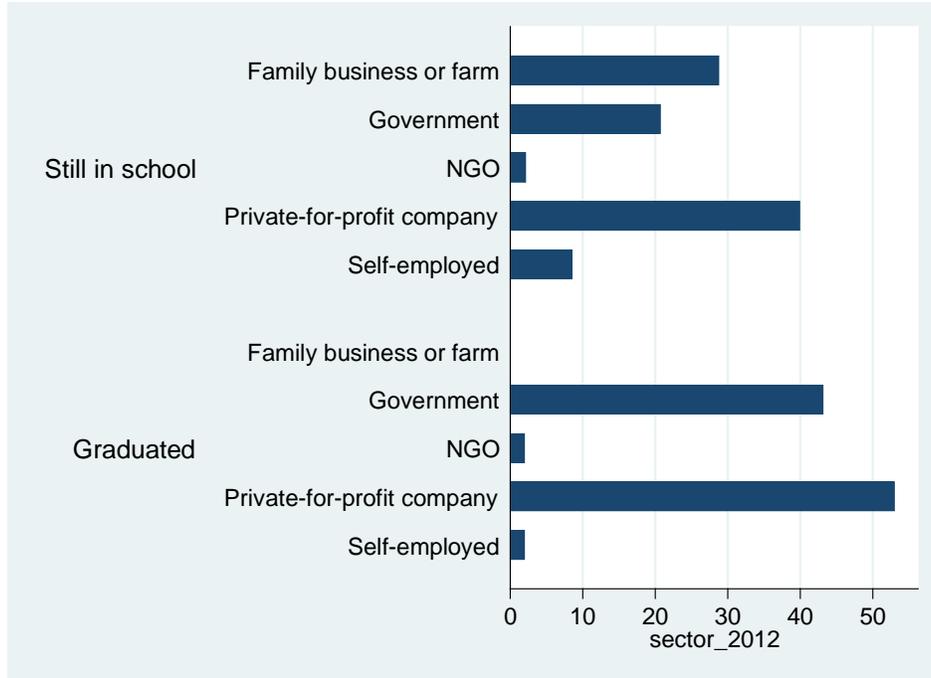


Table 8 reveals interesting trend of the changes of distribution of sectors from 2012 to 2017 for respondents still in school and graduated. While there is little change among the graduated, there is a dramatic decrease in the share of family business or farm sector together with the increase in the private-for-profit sector for the control group.

Table 8 - Sector by group and year (%)

Sector	Still in school		Graduated	
	2012	2017	2012	2017
Family business or farm	28.72	2.66	0	0
Government	20.74	23.4	42.36	43.06
NGO	2.13	4.26	2.08	2.08
Private-for-profit company	39.89	66.49	53.47	50
Self-employed	8.51	3.19	2.08	4.86
Total	100	100	100	100

Table 9 displays that while a considerable share of still in school respondents were looking for work in 2012, by 2017 almost all individuals were working either on a job or their own business.

Table 9 - Activity by group and year

Activity	Still in school		Graduated	
	2012	2017	2012	2017
Caring for family member	0	0	0	0.69

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Doing volunteer work	1.06	1.06	0	0
Going to school	8.51	0	1.39	0
Looking for work	21.28	0.53	0	0
No main activity	1.06	0.53	0	0
Self-employed	1.06	0	0.69	2.08
Working at a job	63.3	91.49	97.92	95.83
Working at your business	3.72	6.38	0	1.39
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

The most interesting change in table 10 is the almost 30 percentage points increase is the share of managers for the treated, in comparison to a 9 percentage point increase for the control group in the period from 2012 to 2017.

*Table 10 - Occupation by group and year*

Occupation	Still in school		Graduated	
	2012	2017	2012	2017
Armed Forces Occupations	2.59	2.59	6.76	6.08
Managers	22.8	31.09	20.95	50.68
No job	29.53	0	0	0
Other	11.92	11.92	7.43	4.73
Professionals	20.21	30.57	37.84	25.68
Professor	0.52	1.04	2.03	3.38
Services and Sales Workers	3.63	6.22	0	0
Teacher	1.55	4.66	2.7	2.7
Technicians and Associates	7.25	11.92	22.3	6.76
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

## 7. Results

### Estimation of impacts

The table below summarizes the results. Each row corresponds to a separate specification of the difference-in-difference regression model. For each outcome variable - ln(earnings), ln(income), full-time (months), work (hours), manager, ln(wage), own business, business payment, business incorporated - we have eight different specifications: the first four include the whole sample; the other four specifications only include the sample of individual who were employed in 2012 and 2017. The four specifications of each sample refer to models with different set of controls. Since there are some individuals from the control group that were not employed in 2012 and all CEMBA/MPA students are employed during the program, we wanted to run the models with a sample that only includes employed individuals in both periods to make sure that results are not driven by the unemployed control individuals in 2012. The estimated impact

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coefficients that are statistically significant to all the eight model specifications are robust and, thus, are the ones we use for our conclusions about the impact of graduating at CEMBA/MPA.

The coefficients estimated reported in the table below are interpreted as the change in the average outcome the treatment group experienced in addition to the change for the control group. If the parallel trends assumption hold, this estimated change in the treatment group is caused by the intervention and, thus, is interpreted as its impact. As described in the previous section, the control and treatment groups have different pre-existing characteristics, but as long as the characteristics that affect the outcomes are time-invariant or are related to tenure/work experience, our estimated coefficients are unbiased.

The results below show that graduating from CEMBA/MPA caused the following impacts on the treatment group:

- An increase of 37.6% on monthly earnings, which corresponds to approximately 19,588 PKR (or 222 CAD).
- An increase of 31.6% on annual income, which corresponds to approximately 160,405 PKR (or 1,819 CAD).
- An increase of 28.5 percentage points in the probability of having an occupation as manager<sup>7</sup>, which corresponds to more than twice that probability in 2012 for treatment group.
- An increase of 36.8% of wage<sup>8</sup> (earnings per hour).

We did not find robust evidence of impacts on labour supply (hours of work), probability of owning a business, probability of getting business profits, probability of incorporating a business.

Overall the impacts on labour market outcomes were very positive in terms of helping graduates to progress in their careers, increase their income and earnings, and achieve positions of leadership. The program was less successful in helping graduates to succeed in their entrepreneurial ventures.

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<sup>7</sup> The variable that describe the probability of being a manager was created based on the reported occupation titles of the respondents. Occupations that included titles such as the following were categorized as manager: “CEO”, “president”, “superintendent”, “Manager”, “head of”, “director”, “principal”.

<sup>8</sup> The variable wage was created as the monthly earnings divided by the average number of weeks in a month, divided by number of hours usually worked per week.

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Outcome Variable	Coefficient	Standard Error	Observations	R-squared	Covariate	Individual fixed effect	Sample
ln(earnings)	0.382***	(0.097)	601	0.460	All	No	All
ln(earnings)	0.382***	(0.046)	601	0.944	none	Yes	All
ln(earnings)	0.352***	(0.048)	601	0.945	tenure	Yes	All
ln(earnings)	0.360***	(0.046)	601	0.945	experience & tenure	Yes	All
ln(earnings)	0.422***	(0.097)	588	0.451	All	No	Only employed
ln(earnings)	0.409***	(0.045)	588	0.946	none	Yes	Only employed
ln(earnings)	0.376***	(0.048)	588	0.947	tenure	Yes	Only employed
ln(earnings)	0.377***	(0.047)	588	0.947	experience & tenure	Yes	Only employed
ln(income)	0.340***	(0.092)	601	0.429	All	No	All
ln(income)	0.312***	(0.054)	601	0.919	none	Yes	All
ln(income)	0.295***	(0.056)	601	0.920	tenure	Yes	All
ln(income)	0.300***	(0.055)	601	0.920	experience & tenure	Yes	All
ln(income)	0.376***	(0.092)	588	0.418	All	No	Only employed
ln(income)	0.334***	(0.055)	588	0.920	none	Yes	Only employed
ln(income)	0.317***	(0.057)	588	0.920	tenure	Yes	Only employed
ln(income)	0.316***	(0.057)	588	0.920	experience & tenure	Yes	Only employed
fulltime work (months)	-3.906***	(0.440)	664	0.311	All	No	All
fulltime work (months)	-3.587***	(0.423)	682	0.631	none	Yes	All
fulltime work (months)	-3.985***	(0.456)	664	0.642	tenure	Yes	All
fulltime work (months)	-2.808***	(0.482)	664	0.701	experience & tenure	Yes	All
fulltime work (months)	-0.074	(0.230)	591	0.019	All	No	Only employed
fulltime work (months)	-0.013	(0.189)	591	0.712	none	Yes	Only employed
fulltime work (months)	0.029	(0.200)	591	0.713	tenure	Yes	Only employed
fulltime work (months)	0.005	(0.209)	591	0.720	experience & tenure	Yes	Only employed
hours of work	-14.124***	(1.720)	664	0.295	All	No	All
hours of work	-13.488***	(1.571)	664	0.663	none	Yes	All
hours of work	-14.565***	(1.658)	664	0.670	tenure	Yes	All
hours of work	-10.062***	(1.721)	664	0.730	experience & tenure	Yes	All
hours of work	0.240	(0.998)	591	0.029	All	No	Only employed
hours of work	-0.042	(0.682)	591	0.817	none	Yes	Only employed
hours of work	0.162	(0.711)	591	0.818	tenure	Yes	Only employed
hours of work	0.099	(0.747)	591	0.821	experience & tenure	Yes	Only employed
manager	0.209***	(0.071)	664	0.104	All	No	All
manager	0.214***	(0.045)	682	0.823	none	Yes	All
manager	0.215***	(0.049)	664	0.822	tenure	Yes	All
manager	0.222***	(0.050)	664	0.822	experience & tenure	Yes	All
manager	0.329***	(0.080)	591	0.093	All	No	Only employed
manager	0.290***	(0.049)	591	0.855	none	Yes	Only employed
manager	0.286***	(0.054)	591	0.855	tenure	Yes	Only employed
manager	0.285***	(0.054)	591	0.855	experience & tenure	Yes	Only employed
ln(wage)	0.378***	(0.099)	597	0.448	All	No	All
ln(wage)	0.386***	(0.046)	597	0.947	none	Yes	All
ln(wage)	0.355***	(0.048)	597	0.948	tenure	Yes	All
ln(wage)	0.358***	(0.046)	597	0.948	experience & tenure	Yes	All
ln(wage)	0.407***	(0.100)	585	0.440	All	No	Only employed
ln(wage)	0.402***	(0.046)	585	0.947	none	Yes	Only employed

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Outcome Variable	Coefficient	Standard Error	Observations	R-squared	Covariate	Individual fixed effect	Sample
ln(wage)	0.366***	(0.049)	585	0.949	tenure	Yes	Only employed
ln(wage)	0.368***	(0.048)	585	0.949	experience & tenure	Yes	Only employed
business owner	0.003	(0.041)	664	0.041	All	No	All
business owner	0.010	(0.022)	664	0.863	none	Yes	All
business owner	0.011	(0.023)	664	0.863	tenure	Yes	All
business owner	0.019	(0.025)	664	0.864	experience & tenure	Yes	All
business owner	0.046	(0.049)	591	0.054	All	No	Only employed
business owner	0.035*	(0.020)	591	0.929	none	Yes	Only employed
business owner	0.034*	(0.020)	591	0.929	tenure	Yes	Only employed
business owner	0.036*	(0.020)	591	0.931	experience & tenure	Yes	Only employed
business payment	0.058	(0.184)	121	0.144	All	No	All
business payment	0.048	(0.114)	121	0.863	none	Yes	All
business payment	0.024	(0.103)	121	0.866	tenure	Yes	All
business payment	0.054	(0.100)	121	0.872	experience & tenure	Yes	All
business payment	0.189	(0.200)	104	0.194	All	No	Only employed
business payment	0.200*	(0.116)	104	0.952	none	Yes	Only employed
business payment	0.162*	(0.090)	104	0.962	tenure	Yes	Only employed
business payment	0.157*	(0.083)	104	0.965	experience & tenure	Yes	Only employed
business incorporated	0.206	(0.174)	112	0.264	All	No	All
business incorporated	0.178	(0.111)	112	0.896	none	Yes	All
business incorporated	0.152*	(0.089)	112	0.900	tenure	Yes	All
business incorporated	0.141	(0.084)	112	0.901	experience & tenure	Yes	All
business incorporated	0.241	(0.190)	96	0.249	All	No	Only employed
business incorporated	0.132	(0.125)	96	0.934	none	Yes	Only employed
business incorporated	0.104	(0.094)	96	0.941	tenure	Yes	Only employed
business incorporated	0.106	(0.095)	96	0.942	experience & tenure	Yes	Only employed

## Economic Return on Investment

To calculate the benefit of the program per student, we used the impact of the program on the average annual total personal income from all sources. While this impact does not take into account benefits of all possible outcomes, the impact on average income synthesizes in one many related outcomes (such as business creation, employment, labour supply and wages).

Regarding the costs per student, the table below reports the cost of CEMBA/MPA for each year. We did not include any sort of forgone income of going to school, because the students of CEMBA/MPA still work full time during their studies.

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*Table 11 – CEMBA/MPA costs per student in Pakistan Rupees*

Item	1st Year	2nd Year	Total Cost
Registration fees	200		200
Supplementary fees	700		700
Library facility fees	100		100
Tuition fees	61,360	46,020	107,380
Dissertation fee		7,660	7,660
Other Ancillary costs/fees	350		350
<b>Total Cost</b>	<b>62,710</b>	<b>53,680</b>	<b>116,390</b>

Since benefits and costs happen over time at potentially different periods, we created a cashflow including benefits and costs, and determined an intertemporal discount factor (typically a risk-free interest rate). Discounting reflects the idea that a given amount of real resources in the future is worth less today than the same amount is worth now. Since we do not know how long the impacts will actually last, we created scenarios regarding their duration. While some impacts can last a lifetime, others can be short-lived.

Return on investment (ROI), benefit-cost ratio (BCR), internal rate of return (IRR), net present value (NPV) are all options of measures for economic return that convey similar information in different forms. The choice of the appropriate measure depends on the audience so that the most transparent and clear message is reported. A summary of different measures of economic return is reported in the Appendix A.

The last step of an evaluation is to perform a sensitivity analysis in which the sensitivity (variation) of the results is tested when different parameter values are used. Since the calculation of the economic return of program is based on statistical methods, which are subject to errors, and parameters that are often arbitrarily defined, it is desirable to see how the return of a project changes in different scenarios. For example, would the ROI remain positive if the duration of the benefit is shorter, or if the intertemporal rate of return (discount rate) is higher, or if costs are greater, or if benefits are smaller?

We created various scenarios to represent the cashflow of costs and benefits by changing parameters of the calculation: the discount factor, the duration of the impact, the magnitude of the costs and benefits, the rate of decay of the impacts.

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Table 12 - Economic Return of CEMBA/MPA

	present benefit	present cost	NPV	IRR	BCR	ROI	duration of impact (yrs.)	discount rate	impact decay	cost	estimated impact
Scenario 1	712,828	-113,903	598,925	44%	6.3	526%	11	2.40%	20%	actual	actual
Scenario 2	374,751	-110,485	264,266	38%	3.4	239%	5	6%	30%	actual	actual
Scenario 3	211,156	-132,582	78,574	19%	1.6	59%	3	6%	40%	20% greater	20% smaller
Scenario 4	150,169	-159,098	-8,929	6%	0.9	-6%	2	6%	40%	20% greater	20% smaller

Note: NPV=net present value; IRR=internal rate of return; BCR=benefit-cost ratio; ROI=return on investment.

In our preferred scenario, number 2, for every dollar invested by a student in his/her education in CEMBA/MPA, there is a 3.4 dollars of return. That is, the program has a 239% rate of return. In our assessment, while the choice of parameters is somewhat arbitrary, this is the most realistic scenario in terms of the underlying assumptions. In the cashflow of this scenario, the costs are incurred in the first and third year, the impact starts in 2016 and ends five years later decaying 30% every year, the discount rate is 6% per year<sup>9</sup>. The high impact and the relatively low cost of the program explain the very high return figures reported in the table above.

In our most conservative/pessimistic scenario, number 4, the impacts last for two years decaying 40% after in the second year, the costs are 20% greater than reported, the annual impact is 20% smaller than estimated, and the discount rate is 6%. In this scenario, the program would have negative economic return such that for each one dollar invested, the student gets 90 cents back. This scenario assumes both the costs and benefits are mistakenly reported/estimated by 20% each which seems be too pessimistic. In the other scenarios, the program presents high economic return.

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<sup>9</sup> Which is approximately equivalent to the interest rate set by the central bank in Pakistan.

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## Appendix A

### *Net present value (NPV)*

Net present value = present total benefits – present total costs

$$NPV = \sum_{n=0}^N \frac{VFB_n}{(1+i)^n} - \sum_{n=0}^N \frac{VFC_n}{(1+i)^n}$$

Where, VFB is the value of future benefits; VFC is the value of future costs;  $i$  is the intertemporal discount factor;  $N$  is the total number of periods considered.

If the calculated NPV is positive, it indicates the investment/program is economically viable, as the benefits are greater than the costs. Analogously, if the NPV is negative, it means the costs are greater than the benefits and the investment generates a negative return.

### *Internal Rate of Return (IRR)*

The IRR is the implicit intertemporal discount rate of the project such that the present value of the benefits equals the present value of the costs. In other words, IRR is the rate of return that make the net present value of all cash flows from the program equal to zero. More formally,

$$NPV = \sum_{n=0}^N \frac{VFB_n}{(1+IRR)^n} - \sum_{n=0}^N \frac{VFC_n}{(1+IRR)^n} = 0$$

By comparing the IRR with the required rate of return (or RRR, which is the lowest acceptable rate of return of the investment), we can assess whether a project is viable or not. For example, if  $IRR > RRR$ , it means the returns of the program are greater than the lowest acceptable rate of return, which makes the program economically viable.

### *Benefit-Cost Ratio (BCR)*

This is perhaps the most intuitive measure of economic return as it is used on a regular basis by consumers when buying items and comparing goods' benefits to their costs. In the case of BCR for a program, the comparison has to be made between the present value of the benefits and the present value of the costs:

$$BCR = \frac{\sum_{n=0}^N \frac{VFB_n}{(1+i)^n}}{\sum_{n=0}^N \frac{VFC_n}{(1+i)^n}} = \frac{\text{Present total benefits}}{\text{Present total costs}}$$

The BCR shows the benefits generated by the program for each dollar invested in it. If the calculated BCR is greater than 1, the benefits outweigh the costs and the project is economically viable.

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### *Return on Investment*

In order to get a measure of economic return in percentage terms, we can use the return on investment (ROI):

$$ROI(\%) = (BCR - 1) \times 100$$

The ROI reports the amount of return of a program relative to its costs and, if positive, suggests the program is economically viable.

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## Appendix B

Table 13 - Sample means for treatment and control groups

Variable	Still in school		Graduated		Difference
	Obs	Mean	Obs	Mean	
Gender	193	0.11	148	0.28	0.17
Age	193	32.7	148	37.2	4.4
hh_size	191	6.8	148	5.5	-1.4
Prog	193	0.11	148	0.06	-0.05
n_fulltime	191	2.1	148	1.8	-0.3
n_parttime	191	0.2	148	0.0	-0.2
n_rooms	191	3.5	146	3.3	-0.2
n_age_0_4	191	0.9	148	0.7	-0.1
n_age_5_17	191	1.0	148	1.4	0.4
n_age_18_24	191	1.4	148	0.5	-0.9
n_age_25_65	191	3.6	148	3.0	-0.6
n_age_65m	191	0.1	148	0.0	0.0
Internet	191	0.84	146	0.97	0.12
employed_2012	188	0.65	144	0.99	0.34
employed_2017	188	0.99	144	0.97	-0.02
bizz_2012	188	0.09	144	0.03	-0.06
bizz_2017	188	0.12	144	0.07	-0.05
business payment_2012	44	0.34	16	0.13	-0.22
business payment_2017	45	0.47	16	0.31	-0.15
business incorporated_2012	43	0.33	13	0.08	-0.25
business incorporated_2017	43	0.30	13	0.23	-0.07
experience_2012	188	4.8	144	7.5	2.7
experience_2017	188	9.2	144	12.4	3.2
tenure_2012	188	4.0	144	7.0	3.0
tenure_2017	188	7.9	144	9.5	1.6
fulltime work (months)_2012	193	8.2	148	11.8	3.6
fulltime work (months)_2017	193	11.9	148	11.9	0.0
parttime_months_2012	193	0.4	148	0.4	0.0
parttime_months_2017	193	0.4	148	0.4	0.0
hours of work_2012	188	29.6	144	43.4	13.8
hours of work_2017	188	43.4	144	43.7	0.3
hours of work_oth_2012	188	0	144	0.2	0.2
hours of work_oth_2017	188	0	144	0.2	0.2
earnings_2012	188	33,941	144	52,097	18,156
earnings_2017	188	55,412	144	88,101	32,688
income_2012	188	378,612	144	507,611	128,999
income_2017	188	647,244	144	991,965	344,722