

Job training through turmoil*

Felipe Barrera-Osorio, *Vanderbilt University*
Adriana Kugler, *Georgetown University, NBER, CEPR, and IZA*
Mikko Silliman, *Harvard University*

February 23, 2022

Abstract

We follow the labor market outcomes of applicants who were randomized into job training in Colombia a year and a half before the pandemic through the subsequent economic turmoil that resulted from COVID-19. Despite persistently improved labor market outcomes of training participants prior to March 2020, we show that job losses resulting from the pandemic washed away all the benefits of the program. A year and a half after the initial scars of the pandemic, there are no visible signs of the labor market benefits reappearing. We show that these effects are likely due to the fact that the training program pushed people into the service sector – the sector hardest hit by the COVID-19 pandemic.

JEL: J20

Keywords: job-training, COVID-19, economic shocks

*Corresponding author: Mikko Silliman (silliman@g.harvard.edu). We thank Layane Alhorr, Shaun Dougherty, Robert French, Charles Gale, Ramin Izadi, Martti Kaila, and Hanna Virtanen for helpful comments.

A primary goal of job training programs is to move people from precarious and informal work to more stable jobs. Several job training programs succeed in improving employment outcomes in the short term.¹ Still, a common fear is that the benefits of such training programs may disappear during economic crises. For example, Hanushek et al. (2017) explain that if training programs are too job-specific, the skills they provide may be insufficient to help adapt to shocks to the labor market.

Assessing such hypotheses empirically, however, is challenging since researchers need to tackle two problems of selection. First, people select into education and training programs. Second, exit from jobs, too, typically results from selection. Overcoming these issues requires a set of two instruments – for both training and for job loss – as well as a longitudinal data-set spanning both the training program and the economic shock.

In this paper we study whether a pre-pandemic job training program targeting young low-income adults is able to sustain its employment benefits through the COVID-19 pandemic. We link applicants randomly allocated into a job training program focused primarily on service sectors in Cali, Colombia that ended in December 2018 to monthly administrative records on employment that include both the initial COVID-19 shock as well as subsequent periods.

In earlier work, Barrera-Osorio et al. (2021) show that the job training program we study succeeded in shifting people to formal employment, paying for itself in just eight months. In this new paper we show that, despite persistent pre-pandemic benefits to earnings (15.81 USD or 18 percent) and employment (8 p.p. or 27 percent), nearly all the benefits of the program disappear just months into the pandemic: those randomly assigned to job training no longer experience any benefits in the labor market. In fact, given the higher pre-pandemic outcomes of applicants assigned to treatment, treated individuals experience negative effects which are almost twice as large as their comparison group counterparts. By August 2021, a year and a half into the pandemic, the situation is no better, with our results indicating no employment recovery.

Our results bring some of the first empirical evidence to bear on the resilience of education and training programs to the effects of economic shocks. Field et al. (2019) study the effects of a formal vocational training program in Mongolia for cohorts who graduate at different points in the business cycle.² They find that cohorts who graduate when the economy is strong receive a premium for their training, while those who graduate in a recession

¹In Colombia, see for example, Attanasio et al. (2011; 2015), Kugler et al., (2022) or Barrera-Osorio et al. (2021). For recent evaluations of job training programs outside Colombia, see for example, Alfonsi et al. (2020), Chakravarty et al. (2019).

²There is also a broader established literature that finds that graduating in a recession tends to diminish the returns to education (see, for example, Oreopolous et al., (2012) or Kahn (2010)).

experience few benefits. Focusing on general education rather than job training program, Beuermann et al. (2021) also study the dynamics of educational returns through COVID-19 and find a contrasting set of results: the returns to education persist in spite of the pandemic related job loss. Though they do not focus explicitly on economic shocks, other papers in both Colombia and elsewhere find vocational programs to provide sustained benefits through the 2008 economic crisis (Kugler et al., 2022; Silliman and Virtanen, 2021).

We consider a number of mechanisms to explain the loss of benefits from training during recessions. In particular, we show that the job training program pushed applicants into the service sector, and that it is specifically treated applicants who enter the service sector who exhibit the burden of the effects of the COVID-19 pandemic. This finding aligns with prior work showing that the effects of COVID-19 were most severe for workers in service occupations (Montenovo et al., 2021; Moehring et al., 2021). These results, thus, suggest that applicants randomized to job training lose out on the benefits of the program due to the sectoral focus of the training program. Given that many programs focus on providing skills for service sector jobs, future programs may need to broaden the focus of training to other sectors to avoid cyclical losses in the benefits of training.

Our findings also extend existing research on heterogeneity in the costs of economic shocks. For example, Farber et al. (2011, 2015) study the 2008 recession and document that economic shocks tend to be most disruptive for people with the lowest levels of education. Likewise, Kauhanen and Riukula (2019) find that people working in jobs with routine tasks have higher costs of job loss than people working in socially intensive roles. We find that, relative to pre-pandemic employment, the costs of job-loss (employment and earnings) were higher for applicants who entered the formal sector as a result of job training than for other applicants. One reason for this is that compared to their peers in the comparison group, individuals randomized to job training had better pre-pandemic outcomes: they had farther to fall. This suggests that the qualitative nature of or the reasons for economic shocks may come with disparate effects.

These results highlight the enormous economic costs of the COVID-19 pandemic, suggesting that even active labor market and social programs that functioned well before the pandemic may require rethinking in the post-pandemic world.

1 Context

Our study is situated in Cali, the third largest city in Colombia with a population of 2.2 million people. We focus on applicants to an oversubscribed job-training program that took place between June and December 2018. In total, this program provided 18 classes,

each lasting 160 hours, in 8 different areas of the service sector: sales and client services, general services, surveillance and security services, cashiers, quality control assistant, cooking assistant, delivery assistant and storage assistant.³ Unlike other training programs, this program did not provide on-the-job training through internships, but like other programs, it did provide a certificate at the end of the training.⁴

This job training program in Cali, Colombia is a little longer than the program in Egypt studied by Osman and Speer (2022) targeting college graduates, which lasted 120 hours. It is slightly shorter than programs lasting between three to six months targeting low income youth in the Dominican Republic (Card et al., (2011), Colombia (Attanasio et al., 2011, 2015; Kugler et al., 2022), Turkey (Hirshleifer et al., 2014), and Uganda (Alfonsi et al., 2020). It is substantially shorter than more formal vocational programs such as those studied by Field et al., (2019) in Mongolia or Hicks et al., (2013) in Kenya.

Applicants registered voluntarily into classes in response to a call for registrations by the Carvajal Foundation.⁵ The Foundation established this program to help the poorest in the community access jobs. Thus, the foundation reaches broadly to enroll participants through radio, social media, loud-speakers in cars that go through poor neighborhoods, flyers, and through the public employment office and offices that provide other public services to the poor. As reported in the next section, most individuals who registered for these courses were in the lowest socio-economic strata according to the Census of the Poor in Colombia.

Individuals who were interested in registering for the classes attended an informational meeting and registered for the specific classes they wanted to take. Each class had between 23 and 31 spots and registration in each class ranged from 28 to 47 registrations per class. Given over-subscription in the classes, the foundation randomly selected individuals to either receive a spot or not receive a spot in the course. The lotteries for each course were recorded by video to ensure everyone knew people were allocated into the courses by luck. Those who did not win a spot in the training courses through the lottery were in the control group and were not provided other services by the Carvajal Foundation for an entire year following registration. As shown in the next section, the randomization divided people into groups that were very similar on average in terms of their characteristics, thus giving credibility

³The program offered two of each of these types of courses, except for 4 courses in General Services. These courses varied in duration from between 4 and 10 weeks depending on the daily number of hours (between 5 and 8) of training. While one course ended in July and one in August of 2018, the vast majority ended in the Fall of 2018 (4 in September, 2 in October, 8 in November and 2 in December).

⁴The certificate was not approved by the Ministry of Labor, but like certificates in other programs, it was provided by the organization providing the training.

⁵The Carvajal Foundation is a non-profit foundation devoted to help with social programs in Cali including programs to support entrepreneurship, education initiatives, training, and employment programs. We partnered with the Carvajal Foundation who ran and implemented the program.

that the lottery worked well in terms of randomly assigning individuals into and out of the classes. There were initially 663 people who registered in the courses and of these, 451 were randomly assigned to the training and 212 were assigned to the control group.⁶ Given that some people in the control group were taken off wait-lists, and not everyone who was assigned to treatment enrolled in the program, randomization to the treatment group increased enrollment in the training program by 60 percentage points.

2 Descriptive data

The primary data for this project come from Colombian Social Security Records, and contain information on monthly days of formal employment and earned income. In addition to using a measure of days of employment, we create a measure of whether or not individuals were employed at all each month. The administrative data span the time period from June 2017 to August 2021. The benefits of the administrative data are that it allows for monthly data-points on individual level data, and that there is no attrition; the downside of the administrative data is that it does not include informal employment, and is limited to only a few variables which we are unable to link to survey data.

Descriptive graphs detailing each of these three outcomes for the period between June 2017 and August 2021 are shown in Figure 1. These graphs suggest that the outcomes of applicants to job training receiving spots in the training programs and those who did not are parallel prior to random assignment. In the period after the end of job training (second red dotted line), applicants admitted to job training experience markedly improved outcomes compared to other applicants. Further, in March 2020, all applicants appear to lose ground in the labor market. Soon after the beginning of the pandemic-induced shock, workers admitted to job training no longer maintain their advantage compared to their peers wait-listed for job training. Finally, there are no signs that applicants admitted to the job training program regain their advantages in the recovery period following the pandemic. Appendix Figure A1 shows the unemployment rate in Cali, Colombia for the years 2017-2021; after relatively stable unemployment rates hovering around 13 percent in prior years, the unemployment rate grew to 30 percent by April 2020 after the COVID-19 induced economic shock, and fell to under 20 percent by August 2020. While the employment in Cali never returned to pre-pandemic levels during the period shown in Appendix Figure A1, the figure suggests marked improvement already four months after the initial economic losses. It is also worth noting that Colombia's COVID-19 related restrictions set off a wave of mass protests beginning in

⁶Although they are not the focus of this paper, the full underlying experimental design included further treatment branches that varied the emphasis on social or technical skills (see Barrera-Osorio et al., 2021).

April 2021, which may have further slowed economic recovery. Still, since these protests began at the end of April 2021, there were already several months of pre-protest economic recovery we are able to study.

To assess balance between admitted and other workers prior to random assignment, we complement the administrative data with baseline survey data collected prior to random assignment to job training (see Table 1). Column 1 of this table shows the descriptive statistics detailing the population in the comparison group. The table suggests that the majority of participants in our sample are from quite disadvantaged backgrounds, and two thirds of the participants are female. For more information on all the baseline and endline survey measures collected prior to the pandemic, see Barrera-Osorio et al. (2021).

3 Empirical approach

We ask three related questions: i) How does admission to job-training affect pre-pandemic employment and earnings?; ii) How does the Covid-19 induced economic shock affect workers?; iii) How does exposure to job-training affect employment in the recovery period following the initial economic shock?

Before estimating any effects of the program, we use survey data collected at baseline to check for balance between treated and comparison individuals. Since we are unable to include course fixed effects in our analysis with the administrative data, we check for balance across all variables also without the inclusion of course fixed effects (Table 1, Column 3).

To estimate the effect of job-training on pre- and post- pandemic employment and earnings, we take advantage of random assignment to oversubscribed job-training programs (see Section 1). This approach is operationalized through the following equation, using data from December 2018 to February 2020 (pre-period, Panel A of Table 2) and from April 2020 to August 2021 (post-period, Panel B of Table 2):

$$Y_{it} = \alpha_0 + \alpha_1 D_i + \pi_t + \eta_{it} \tag{1}$$

This equation estimates the relationship between outcomes (Y_{it}) for individual i in month t and their random assignment into job-training (D_i). The variable D takes the value of 1 for applicants randomized to receive job training lasting until December 2018. The equation includes month fixed effects. The coefficient α_1 measures the effects of job-training on labor market outcomes. Standard errors are clustered by person in all the analysis.

Randomization to treatment increased enrollment in the job training program by 60 percentage points (Barrera-Osorio et al., 2021). For simplicity, all analysis in this paper

focuses on a reduced form analysis of the effects of the program. To estimate treatment effects on treated individuals, we can divide all effects by 0.6 to scale the effects by enrollment.

Next, we estimate the magnitude of the COVID-19-induced economic shock for both treatment and control groups by examining the labor market outcomes of applicants to job training in the initial four months following March 2020 compared to the prior twelve months (See Panel C in Table 2). According to the Colombian statistical agency, Departamento Administrativo Nacional de Estadística - DANE (2021a, 2021b), the national economy contracted 16 percent in the second quarter of 2020 and the unemployment rate in Cali grew from 13 to 29 percent, before declining to 19 percent already by August 2020.⁷

$$Y_{it} = \beta_0 + \beta_1 COVID_t + \beta_2(D_i * COVID_t) + \beta_3 Months_t + \beta_4(Months_t * D_i) + \lambda_i + v_{it} \quad (2)$$

In this equation the term $COVID_t$ is a binary variable given the value of zero for the period before March 2020 and 1 for the period up to four months afterwards. By interacting randomization into job training with the economic shock, we allow for the economic consequences of COVID-19 to be different for treated and untreated workers. Given that there looks like there is a linear trend in outcomes over this period, we include a linear time variable, months. We interact months with treatment status so that treated and untreated individuals are allowed to have different labor market trajectories. We also include individual fixed effects so that all the variation comes from within individuals over time. The term β_1 measures the effect of the pandemic for untreated workers and β_2 measures the differential effect of the pandemic on workers randomized to receive job training (Panel C in Table 2). The linear combination of β_1 and β_2 measures the effects of the pandemic for workers randomized to receive job training.

Additionally, we estimate the effects of job training on the recovery following the initial pandemic-induced shock. In this approach we focus on the months from March 2020 to August 2021 (through this entire period, D_i takes the value of one for the treated group). We define the initial period of the shock as the first four months after March 2020 (the period of the deepest economic shock), and the following months as the recovery period. The variables $MonthsPost$ measures the number of months after the first four months of the pandemic. After June 2020, the employment rate in Cali began to improve considerably (Appendix Figure A1); and by 2021, the economy began to experience large growth, growing by 27 percent in the second quarter of 2021 (DANE, 2021a).

⁷While the causes of an economic shock may occur before the economic shock itself, in the case of COVID-19, the economy experienced a shock almost as soon as the world was beginning to learn about its health effects.

$$Y_{it} = \gamma_0 + \gamma_1 \text{MonthsPost}_t + \gamma_2 (D_i * \text{MonthsPost}_t) + \delta_i + \omega_t + \tau_{it} \quad (3)$$

In this equation the coefficient of interest is γ_2 , which measures the monthly improvement in labor market outcomes for individuals receiving job training compared to their peers in the comparison group (Table 2, Panel D). The linear combination of γ_1 and γ_2 measures the effects of the pandemic for workers randomized to receive job training.

We complement these estimates of the effects visually with monthly event-study style estimates of the differences in outcomes for individuals randomized into job training and their peers in the comparison group. These are estimated using the following equation:

$$Y_{it} = \sum_{t=1}^T \delta_t D_i + \psi_t + \xi_{it} \quad (4)$$

This equation is estimated using all months of data in the full sample. The variable ψ_t is a vector of month dummy variables, and takes out all temporal variation in the control group. Here the variable D_i takes the value of 1 for individuals assigned to the treatment group already prior to randomization into job training. This is useful for measuring the differences in outcomes by treatment status each month both prior to the job training program as well as through the pandemic.

4 Results

Table 2 and Figure 2 present the three above estimates for the three outcomes: days of formal employment, months of formal employment, and monthly SS contributions (a proxy of labor income). The results follow closely the descriptive trends displayed in Figure 1. Prior to randomization individuals applying to job training were on parallel trajectories regardless of treatment status. Post training, individuals enrolled in job training outperform their peers once they enter the labor market (Panel A). Their gains show no signs of dissipating through the period prior to the COVID-19 pandemic. After March 2020, both treated and untreated applicants experience negative shocks to their labor market trajectories (Panel C). After these shocks, there appears to be no differential recovery between treated and untreated individuals.

Assignment to job training improved all outcomes observed in the administrative data prior to the pandemic by about 20 percent compared to the comparison group in the same period (Table 2, Panel A). Formal employment increased by 1.8 days a month, with people being 8 percentage points more likely to work each month. Monthly earnings increased by 15.81 USD.

After the COVID-19 induced economic shock after March of 2020, the benefits of the job training program disappear altogether (Panel B). In fact, compared to the twelve months prior to the pandemic, applicants assigned to job training end up experiencing nearly twice the losses as applicants in the comparison group (Panel C). These negative shocks are bigger for applicants who gained entry to job training, potentially because they had farther to fall.

Finally, compared to applicants in the comparison group, applicants assigned to job training experience no relative improvements after the initial negative COVID-19 induced shock (Panel D).

5 Mechanisms

There are several mechanisms that may explain why the benefits of the job training program in Cali are washed away by the pandemic. The first of these is the enormity of the COVID-19 induced economic shock – nearly half of families surveyed in Latin America reported a family member losing a job (Bottan et al., 2020). Second, the returns to the program may last longer if the skills taught in the program are general rather than firm-specific (or industry-specific) (Deming and Noray, 2021; Hanushek et al., 2017; Acemoglu and Autor, 2011). Third, another reason that the benefits may be washed away is if the duration of the program itself is shorter compared to longer-term educational investments such as those studied by Beuermann et al. (2021). Fourth, the job losses experienced by participants in the Cali job training program may be due to the fact that the service sector – the most common sector for training – was hardest hit by the COVID-19 pandemic (Montenovo et al., 2021; Moehring et al., 2021). Fifth, since employees had no more than a year and half of tenure in their firms, these losses may result from labor market institutions by which the last employees into a firm are most likely to be the first employees out of the firm (Buhai et al., 2014). Sixth, the benefits of the program may not have returned due to the mass protests in Cali, Colombia in April 2021.

The last three of the potential mechanisms above can be tested empirically. In Table 3 we show that prior to COVID-19, individuals randomized to job training were more likely to work in the service sector (Panel B).⁸ Moreover, we show that this shift into the service sector drops by half after the COVID-19 pandemic, while other industry-specific shifts by treatment status do not coincide with the pandemic. These results suggest that the effects of job training disappear because workers are pushed into the service sector – the sector

⁸The results in Table 3 are from administrative data, but we find similar results using survey data collected in February 2019. These survey results show similar effects on industrial composition immediately after the job training ended (Table A1). This data also suggests that treated individuals ended up working in larger firms.

hardest hit by the pandemic.

We also study whether or not job training resulted in people being weakly attached to their employers. In Table A2 we show that, if anything, job training increases the tenure of workers in their places of employment (Panels A and B). Panel C of Table A2 also suggests that in the case of workers in our estimation sample, recent hires do not bear the brunt of the COVID-19 shock. Given that training prolongs tenure, these results suggest that the disappearance of the effects of job training are not explained by shorter employment tenure amongst treated applicants.

Finally, we show that the mass protests against COVID-19 restrictions in Cali, Colombia in April 2021 are unlikely to explain our results. First of all, these protests occur in almost eight months after the severity of the crisis began to ease in August 2020. Still, we examine whether individuals experience a negative shock in employment resulting from the mass protests, and whether any effects are different for individuals randomized into treatment. Table A3 shows that, though generally negative, the effects of the April 2021 protests on employment outcomes are small, and statistically indistinguishable between treated and untreated individuals.

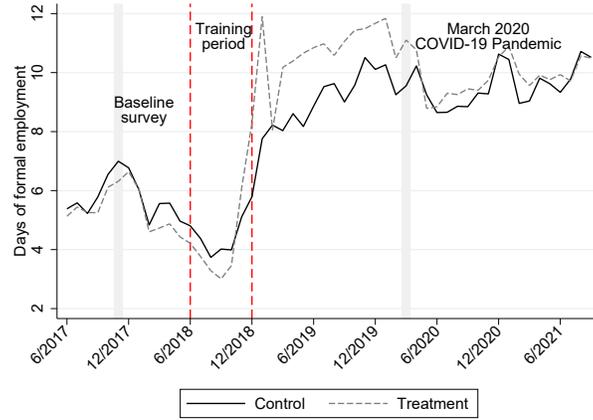
While we cannot address the first mechanisms directly, we note that the benefit from training does not bounce back even as the depth of the crisis eased in August 2020. We also note that training was of more general rather than firm-specific, did not involve an internship with a firm, and included training in generally applicable soft skills. On the other hand, the shorter duration of the training program may have contributed to the benefits of training being shorter lived.

6 Discussion

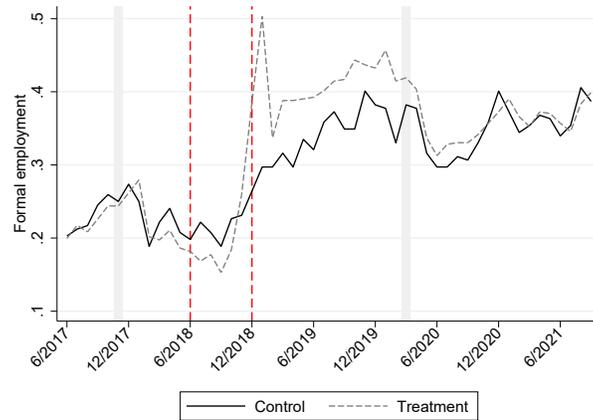
In this paper, we study the effects of a job training program through the period before and after the COVID-19 induced economic crisis. The program, in Cali, Colombia, improves pre-pandemic formal sector earnings and employment by about twenty percent. Despite these marked improvements in the outcomes of applicants assigned to the job training program prior to March 2020, all benefits of the program disappear with the onset of the pandemic-induced crisis. Moreover, participants in job training appear to experience no relative improvements in the subsequent recovery period after the initial economic shock. The results suggest that the large loss in the returns and lack of recovery of these returns through the COVID-19 recessions and later are due to the focus on service sectors of the training. Many training programs tend to emphasize training for service sector jobs. Future programs would do well to offer training that provides skills for sectors beyond the service sector to

avoid cyclical losses in the benefits of training.

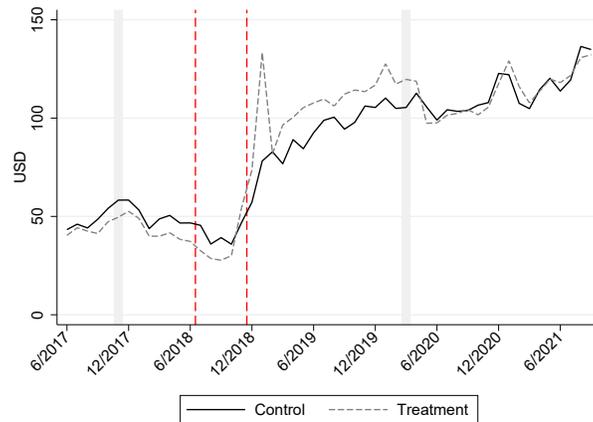
Figure 1: Descriptive trends for estimation sample



(a) Days of employment



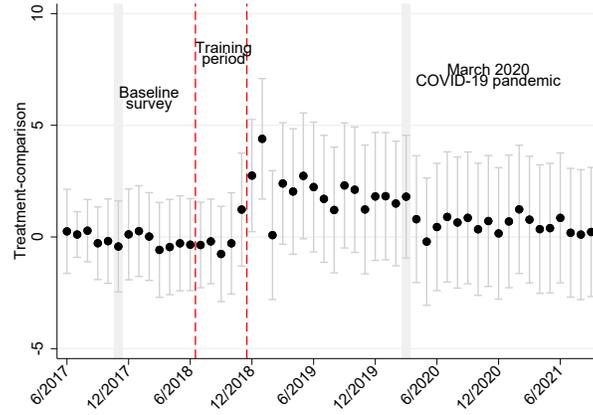
(b) Employment



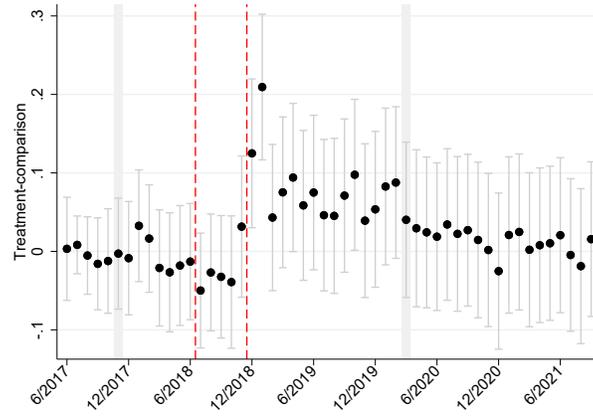
(c) Contributions

Notes: Figure 1 displays mean outcomes by treatment status. As shown in Figure 1(a), the gray vertical regions mark the baseline data collection and March 2020 – the first shock of the Covid-19 pandemic, and the red vertical lines indicate the beginning and end of the treatment periods.

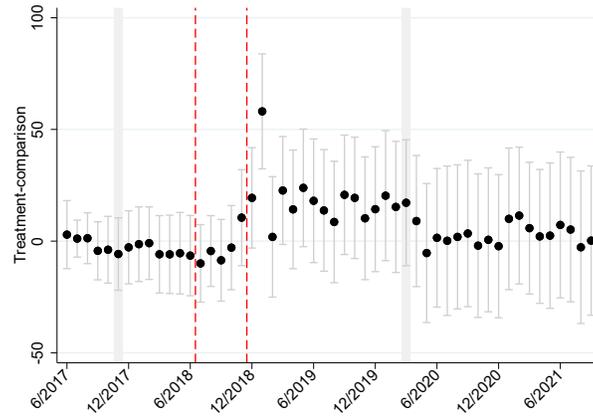
Figure 2: Treatment-comparison differences in monthly outcomes



(a) Days of employment



(b) Employment



(c) Contributions

Notes: Figure 3 displays mean monthly differences between the treatment and comparison group. As shown in Figure 2(a), the gray vertical regions mark the baseline data collection and March 2020 – the first shock of the Covid-19 pandemic, and the red vertical lines indicate the beginning and end of the treatment periods.

Table 1: Covariate balance check

		Treatment-comparison difference	Difference without course FE
Male	0.34 (0.03)	0.01 (0.03)	0.03 (0.04)
Age	26.21 (0.44)	-0.23 (0.51)	-0.25 (0.51)
Years of education	11.31 (0.11)	-0.01 (0.13)	-0.01 (0.14)
Black	0.55 (0.03)	0.01 (0.04)	0.01 (0.04)
Mestizo	0.17 (0.03)	-0.01 (0.03)	-0.01 (0.03)
Indigenous	0.03 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Disability	0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Primary education	0.99 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Secondary education	0.94 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Technical higher education	0.29 (0.03)	0.02 (0.04)	0.02 (0.04)
Professional higher education	0.02 (0.01)	0.00 (0.01)	0.01 (0.01)
Enrolled in school	0.07 (0.02)	-0.01 (0.02)	-0.01 (0.02)
Using Public Employment Service	0.37 (0.03)	-0.03 (0.04)	-0.04 (0.04)
Household size	4.45 (0.13)	0.11 (0.15)	0.10 (0.15)
HH income per day (USD)	19.23 (4.25)	2.57 (5.64)	2.84 (5.65)
HH with electricity	1.00 (0.00)	-0.01 (0.01)	-0.01 (0.01)
HH with water	0.99 (0.01)	0.00 (0.01)	0.00 (0.01)
HH with sanitation	0.98 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Joint significance		F-test = 0.75 p-val = 0.7549	F-test = 0.59 p-val = 0.91
Course/Stratification FE	No	Yes	No
Observations	212	663	663

Notes: The table reports the control mean and differences between treatment and control groups, along with standard errors. All comparisons between treatment and control groups are within stratification group. Significance levels (* = 0.10, ** = 0.05, *** = 0.01).

Table 2: Main results

	Days of formal employment	Months of formal employment	Monthly SS contributions
<i>Panel A: Effects of job training before March 2020</i>			
Treated	1.77 ** (0.85)	0.08 *** (0.03)	15.81 * (9.12)
<i>Panel B: Effects of job training after March 2020</i>			
Treated	0.28 (0.96)	0.01 (0.03)	-0.21 (12.13)
<i>Panel C: COVID-19 induced economic shock</i>			
Untreated	-1.06 (0.87)	-0.07 ** (0.03)	-7.52 (10.04)
Treated	-2.04 *** (0.53)	-0.10 *** (0.02)	-21.40 *** (5.56)
Difference	-0.98 (1.01)	-0.03 (0.03)	-13.87 (11.47)
<i>Panel D: Recovery from COVID-19 shock</i>			
Untreated	0.07 (0.07)	0.00 (0.00)	1.67 * (0.89)
Treated	0.04 (0.04)	0.00 (0.00)	1.60 *** (0.56)
Difference	-0.03 (0.08)	-0.00 (0.00)	-0.07 (1.05)
Observations	663	663	663

Notes: The same individuals are followed through all three periods we study: job training, the COVID-19 induced economic shock, and the recovery period after COVID-19. The estimates in Panel A are based on data from the months between June 2017 and March 2020; those in Panel B are based on data from the 12 months prior to March 2020 as well as the four first months of COVID-19 induced job loss; the estimates in Panel C span the periods in Panels A and B; the estimates in Panel D are based on data after March 2020. Significance levels (* = 0.10, ** = 0.05, *** = 0.01).

Table 3: Effects of job training on employment and industry before and after COVID-19

	Control mean	Treatment effect	(s.e)
<i>Panel A: Main results, Before March 2020</i>			
Days of employment	8.89	1.77**	(0.85)
Employment	0.34	0.08***	(0.03)
Contributions	91.95	15.81*	(9.12)
<i>Panel B: Industry, Before March 2020</i>			
Sales or commerce	0.02	0.06***	(0.01)
Construction	0.01	-0.00	(0.01)
Hospitality	0.02	-0.00	(0.01)
Manufacturing	0.03	0.01	(0.01)
Transportation	0.00	-0.00	(0.00)
Administrative and security	0.08	0.02	(0.02)
<i>Panel C: Main results, After March 2020</i>			
Days of employment	9.55	0.28	(0.96)
Employment	0.35	0.01	(0.03)
Contributions	113.31	-0.21	(12.13)
<i>Panel D: Industry, After March 2020</i>			
Sales or commerce	0.01	0.03***	(0.01)
Construction	0.01	0.00	(0.00)
Hospitality	0.02	-0.00	(0.01)
Manufacturing	0.03	0.00	(0.01)
Transportation	0.01	-0.01	(0.00)
Administrative and security	0.07	0.02	(0.02)
Observations	212	663	663

Notes: This table uses our administrative data to study the effects of job training on labor market outcomes and industry of employment. Panel A reports the same results as those in Panel A of Table 2; Panel C reports the same results as those in Panel B of Table 2. The results reported in Panels B and D use the same specification to estimate the effects of job training on industry before and after the COVID-19 shock (* = 0.10, ** = 0.05, *** = 0.01).

References

Acemoglu, Daron and Autor, David. 2011. "Skills, Tasks and Technologies: Implications for Employment and Earnings," in *Handbook of Labor Economics*, Volume 4, pp. 1043-1171. Elsevier.

Alfonsi, L., Bandiera, O., Bassi, V., Burgess, R., Rasul, I., Sulaiman, M. and Vitali, A. 2020. "Tackling youth unemployment: Evidence from a labor market experiment in Uganda," *Econometrica*, 88(6), pp.2369-2414.

Attanasio, O., Kugler, A. and Meghir, C. 2011. "Subsidizing vocational training for disadvantaged youth in Colombia: Evidence from a randomized trial," *American Economic Journal: Applied Economics*, 3(3), pp.188-220.

Attanasio, O., Guarin, A., Medina, C. and Meghir, C., 2015. Long term impacts of vouchers for vocational training: experimental evidence for Colombia (No. w21390). National Bureau of Economic Research.

Barrera-Osorio, F., Kugler, A.D. and Silliman, M.I. 2020. Hard and soft skills in vocational training: Experimental evidence from Colombia. NBER Working Paper No. 27548. Cambridge, MA. National Bureau of Economic Research.

Beuermann, D.W., Bottan, N.L., Hoffmann, B., Jackson, C.K. and Cossio, D.A.V. 2021. Does Education Prevent Job Loss During Downturns? Evidence from Exogenous School Assignments and COVID-19 in Barbados. NBER Working Paper No. 29231. Cambridge, MA. National Bureau of Economic Research.

Buhai, I.S., Portela, M.A., Teulings, C.N. and Van Vuuren, A. 2014. "Returns to tenure or seniority?," *Econometrica*, 82(2), pp.705-730.

Card, D., Ibarrraran, P., Regalia, F., Rosas-Shady, D. and Soares, Y., 2011. The labor market impacts of youth training in the Dominican Republic. *Journal of Labor Economics*, 29(2), pp.267-300.

Chakravarty, S., Lundberg, M., Nikolov, P. and Zenker, J. 2019. "Vocational training programs and youth labor market outcomes: Evidence from Nepal," *Journal of Development Economics*, 136, pp.71-110.

Departamento Administrativo Nacional de Estadística - DANE, 2021a. Precios corrientes grandes ramas de actividades económicas.

Departamento Administrativo Nacional de Estadística - DANE, 2021b. Mercado Laboral. Cali A.M. Noviembre-2020-enero 2021.

- Deming, D.J. and Noray, K. 2020. "Earnings dynamics, changing job skills, and STEM careers," *The Quarterly Journal of Economics*, 135(4), pp.1965-2005.
- Farber, H.S. 2011. Job loss in the Great Recession: Historical perspective from the displaced workers survey, 1984-2010. NBER Working Paper No. 17040. National Bureau of Economic Research.
- Farber, H.S. 2015. Job loss in the Great Recession and its aftermath: US evidence from the displaced workers survey. NBER Working Paper No. 21216. National Bureau of Economic Research.
- Field, E.M., Linden, L.L., Malamud, O., Rubenson, D. and Wang, S.Y. 2019. Does vocational education work? Evidence from a randomized experiment in Mongolia. NBER Working Paper No. 26092. National Bureau of Economic Research.
- Hanushek, E.A., Schwerdt, G., Woessmann, L. and Zhang, L. 2017. "General education, vocational education, and labor-market outcomes over the lifecycle," *Journal of Human Resources*, 52(1), pp.48-87.
- Hicks, J.H., Kremer, M., Mbiti, I. and Miguel, E., 2013. Vocational education in Kenya: Evidence from a randomized evaluation among youth. *Nashville, TN: Vanderbilt University*.
- Hirshleifer, S., McKenzie, D., Almeida, R. and Ridao-Cano, C., 2016. The impact of vocational training for the unemployed: experimental evidence from Turkey. *The Economic Journal*, 126(597), pp.2115-2146.
- Kahn, L.B., 2010. The long-term labor market consequences of graduating from college in a bad economy. *Labour economics*, 17(2), pp.303-316.
- Kauhanen, A. and Riukula, K. 2019. The Costs of Job Loss and Task Usage. ETLA Working Paper No. 73. Helsinki, Finland. ETLA Research.
- Kugler, A., Kugler, M., Saavedra, J.E. and Herrera-Prada, L.O., 2022. Long-Term Educational Consequences of Vocational Training in Colombia Impacts on Young Trainees and Their Relatives. *Journal of Human Resources*, 57(1), pp.178-216.
- Moehring, K., Weiland, A., Reifenscheid, M., Naumann, E., Wenz, A., Rettig, T., Krieger, U., Fikel, M., Cornesse, C. and Blom, A.G. 2021. *Inequality in employment trajectories and their socio-economic consequences during the early phase of the COVID-19 pandemic in Germany*.

Montenovo, L., Jiang, X., Rojas, F.L., Schmutte, I.M., Simon, K.I., Weinberg, B.A. and Wing, C., 2020. Determinants of disparities in COVID-19 job losses. NBER Working Paper No. 27132. National Bureau of Economic Research.

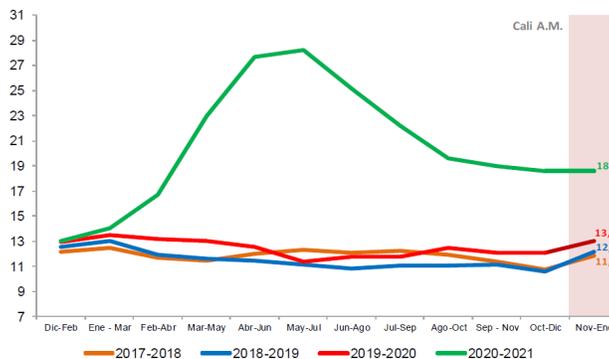
Oreopoulos, P., Von Wachter, T. and Heisz, A., 2012. The short-and long-term career effects of graduating in a recession. *American Economic Journal: Applied Economics*, 4(1), pp.1-29.

Osman, A. and Speer, J.D., 2022. Are Soft Skills Enough? Experimental Evidence on Skill Complementary for College Graduates. *Unpublished manuscript*.

Silliman, M. and Virtanen, H. 2021. Labor market returns to vocational secondary education. *American Economic Journal: Applied Economics*, 14(1): pp.197-224.

Appendix

Figure A.1: Unemployment rate, Cali



Notes: This Figure, from the Colombian National Statistical System (DANE, 2021b), reports the three-month moving average of the monthly unemployment rate in Cali for the years 2017-2021.

Table A.1: Effects of job training on employment characteristics

	Control mean	Treatment effect	(s.e)
<i>Panel A: Type of employment</i>			
Domestic labor	0.02	-0.01	(0.01)
Formal sector	0.17	0.12***	(0.04)
Informal sector	0.11	-0.01	(0.03)
Independent contractor	0.09	-0.03	(0.02)
<i>Panel B: Industry</i>			
Sales or commerce	0.07	0.07**	(0.03)
Construction	0.04	0.01	(0.02)
Hospitality	0.07	-0.02	(0.02)
Manufacturing	0.06	-0.02	(0.02)
Transportation	0.01	0.01	(0.01)
<i>Panel C: Firm size</i>			
Medium to large firm	0.16	0.06*	(0.03)
Small firm	0.25	0.02	(0.04)
Observations	212	663	663

Notes: This table uses survey data collected in February 2019, after the end of the job training program. The first column reports the mean for the control group, the second column reports the effects of job training from a regression including course fixed effects. All individuals whose response is missing are coded as zeros (* = 0.10, ** = 0.05, *** = 0.01).

Table A.2: Training, job-tenure, and COVID-19 shocks

<i>Panel A: Effects of job training on job tenure</i>			
	Control mean	Effect of training	Obs.
Job tenure prior to COVID (months)	1.56 (0.27)	0.57* (0.32)	663
Recent hire (tenure less than 4 months)	0.83 (0.03)	-0.04 (0.03)	663
<i>Panel B: Effects of job training on job tenure, conditional on employment</i>			
	Control mean	Effect of training	Obs.
Job tenure prior to COVID (months)	4.01 (0.53)	0.51 (0.62)	286
Recent hire (tenure less than 4 months)	0.57 (0.06)	-0.01 (0.07)	286
<i>Panel C: Effects of COVID-19 shock by job tenure, conditional on employment</i>			
	COVID-19 shock	COVID-19 shock for recent hires	Obs.
Days of employment	-9.61*** (1.27)	-6.82*** (0.90)	286
Employment	-0.36*** (0.04)	-0.30*** (0.03)	286
Contributions	-98.35*** (13.98)	-71.66*** (9.75)	286

Notes: This table reports the relationships between job training and pre-COVID-19 job-tenure (Panels A and B) as well as the effects of COVID-19 on labor market outcomes by job tenure (Panel C). Panel A reports the effects of job training on job tenure (measured in months) as well as the likelihood of being a recent hire (tenure less than 4 months); this regression includes everyone in the estimation sample, with people without employment receiving zeros for their measure of job tenure and recency. Panel B reports these same effects, but restricts the sample to those who are employed – while this sample restriction makes it difficult to interpret the effects of training as causal, it allows us to gauge whether the effects in Panel A are driven by employment at the extensive margin. Panel C reports the effects of COVID-19 for people employed in the months prior to March 2020, split by whether or not they were a recent hire in their pre-pandemic place of employment (* = 0.10, ** = 0.05, *** = 0.01).

Table A.3: The effects of the April 2021 protests

	Days of formal employment	Months of formal employment	Monthly SS contributions
Untreated	-0.18 (0.77)	-0.03 (0.03)	1.64 (8.53)
Treated	-0.78 (0.47)	-0.02 (0.02)	-4.92 (5.54)
Difference	-0.60 (0.91)	0.01 (0.03)	-6.56 (10.17)
Observations	663	663	663

Notes: This table studies the possible relationship between the protests in Cali and Colombia in April 2021 on labor market outcomes by treatment status. This is estimated by comparing the outcomes of individuals in the months prior to the mass protests to their outcomes after the protests using exactly the same specification as in Panel C in Table 2, only replacing the COVID-19 shock with the protest shock. (* = 0.10, ** = 0.05, *** = 0.01).