The Impact of the Mexican Training Program for Unemployed Workers on Re-employment Dynamics and on Earnings[1]

Angel Calderón-Madrid
(Project Director)
Centro de Estudios Económicos
El Colegio de México
email: acalde@colmex.mx

and

Belem Trejo
CIMAT, Aguascalientes
email: belem@cimat.mx

For years, the Mexican government has funded and administered a training program targeted at unemployed workers. This program, called PROBECAT (*Programa de Becas de Capacitación para Desempleados*), was initially launched to mitigate the impact on the labor market of the 1982 debt crisis; it was then continued in view of the major opening and deregulation of the economy during the last half of the eighties. After a yearly registration of less than 50 000 persons up until 1994, it was expanded eightfold when the country entered a major recession in 1995.

During the last half of the 1990s, PROBECAT continued to be the Mexican government's most important policy to improve the productivity and employability of the unemployed[2].

Training by PROBECAT is provided by institutions which differ in their degree of autonomy with respect to the central government, in their organizational resources and in their capacity to identify and adapt their training to the requirements of the area in which they are located.

---

[1]This paper presents the results of a research project coordinated by James Heckman (U. of Chicago) and Gustavo Marques (IDB, Washington) and sponsored by the Inter-American Development Bank research network project initiative "Evaluating Training Policies in Latin America and the Caribbean Countries". Skilful research assistance from Rafael Pérez Abreu, Arturo González Izquierdo and Gonzalo Rangel is acknowledged, as well as the helpful comments from the coordinators of this project and from Petra Todd and Jeffrey Smith.

[2]A record level of 580 000 trainees attended PROBECAT programs in the year 2000 –a figure equivalent to 24% of the average number of people registered as unemployed during the first quarter of that year.

In spite of these differences, previous evaluations of the effectiveness of the program have considered all training institutions as a single aggregate. In addition, although a primary concern of these studies is the effectiveness of this program in increasing the employability of individuals, only one factor was considered to assess if participants were able to reduce the time they spent without a job, relative to what would have been the case if they had not benefited from the services provided by PROBECAT: how quickly the unemployed individual is able to find a job after training[3].

Panel-based surveys of labor market participants in Mexico show that a significant percentage of workers experience more than one unemployment spell during a year because they cannot find jobs to which they can hold on to for a long period of time[4].

This stylized fact suggests that time spend looking for a job during a year might be underestimated by considering only how fast a person exits an initial unemployment spell. This variable might not be the most important indicator of the effectiveness of the program in reducing the total amount of time trainees spend outside employment. It might be important to examine how training affects the frequency or duration of subsequent employment spells, something previous studies have not considered.

It also suggests that cost benefit analysis of active labor policies targeted to unemployed workers in Mexico should consider not only the impact of the program on wages, but also if the program achieves a reduction in forgone income while unemployed and in the associated costs of job searches.

This paper evaluates the impact of the program on the re-employment dynamics of participants and on their income profile by extending previous work in two directions:

First, we consider the following question: once a participant finds a job, is he or she employed for a longer period of time thanks to the training offered by

[3]For previous evaluations that have assessed this question, *cfr.* Revenga *et. al*. (1994), STPSS (1995) and Aportela (1999).

[4]A number of stylized facts that characterize the dynamics of the labor market in Mexico, with emphasis on individuals with various numbers of transitions into and out of employment, have been highlighted and discussed in Calderón-Madrid (2000).

PROBECAT?[5] This requires evaluating not only the expected length of time a trainee holds on to the initial post-training job, but also evaluating whether, if he/she loses this job, another one can be found faster than it would have been if he/she had not participated in the program.

Second, we measure the impact of the program on the re-employment dynamics of trainees by geographic zones. Moreover, responding to the above-mentioned differences in institutions providing training, we grouped them in six different sets, which are not expected to be equally efficient in their services.

In order to provide a control group, we worked with the experiences of a group of eligible people that did not participate in the program. In view of the non-experimental nature of this evaluation, we relied on statistical matching techniques to pair members of participant and non-participant groups according to geographic zone, to a number of previous job status characteristics, to length of unemployment previous to the training and to personal features.

An evaluation revealing if and how PROBECAT modified the re-employment dynamics of its beneficiaries should provide policymakers with better feedback about the effectiveness of the different services that compose a training program. As suggested by Ham and Lalonde (1996), "[they] generally would prefer to combine a service that helps participants find jobs with one that helps them hold on to their jobs, as opposed to combining two services that each help trainees leave unemployment. Alternatively, policy makers may prefer to fund a program that lengthens employment durations as opposed to one that shortens unemployment durations, because the former program is likely to lead to more stable job histories and greater human capital accumulation."[6]

The remainder of this paper is structured as follows. The data sets used for the evaluation are described in section II, highlighting relevant information about re-employment dynamics on the one hand, and on the other one identifying the modalities of the program and the different institutions providing the services.

Section III explains the procedure which matches a person who benefited with the services offered by PROBECAT with a member of the non-participant group. This procedure, aimed at providing a sample of non-participants whose outcomes have the same distribution that participants would have experienced if

[5] A similar question has been addressed in the evaluation of active labor market policies in France by Bonnal et. al. (1997), in the U.S.A by Eberwein et al (1997) and in the Slovak republic by Van Ours (2000).
[6] *Op. Cit*. p.176.

they had not participated in the program, uses a rich set of conditioning variables. In view of the large number of variables used to pair individuals, we relied on the propensity score method variant of matching, which is also described in this part of the paper. This section also has an explanation of the statistical framework used in this evaluation, namely multivariate multispell proportional hazard models. Section IV presents the empirical results of the estimated models; section V presents an assessment of the impact of the program on the earnings of beneficiaries and a number of remarks on cost-benefit analysis as applied to this type of program. The conclusions are in the final section

II Relevant data from the surveys and characteristics of the program

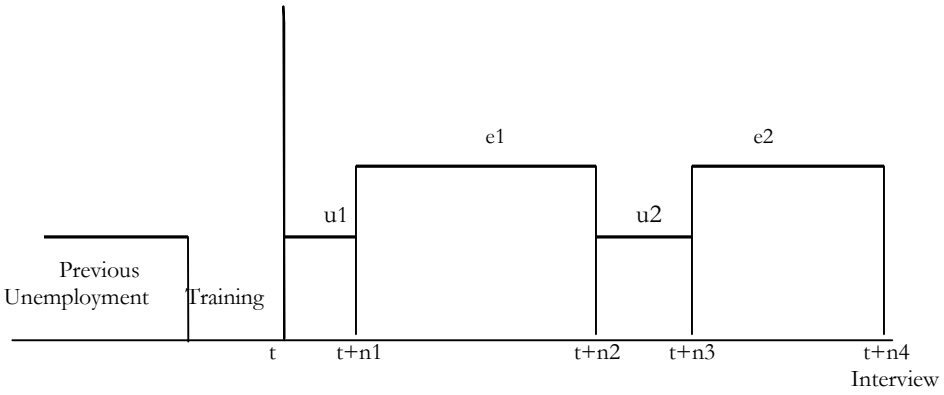
a) *The re-employment dynamics of trainees*

A survey applied to the cohort of PROBECAT trainees who began training in the first quarter of 1993 is the only one in existence that lends itself to a non-experimental evaluation of the impact on re-employment dynamics. On the one hand, it provides longitudinal data covering more than one episode of unemployment after the training of the respondent, as well as the duration of his/her employment spells. On the other hand, an appropriate comparison group is available. In order to obtain a control group, a survey was applied to a number of eligible individuals that did not participate in the program.

In addition to the time between the end of training and the beginning of employment, the survey applied to the beneficiaries of PROBECAT registered whether respondents were still in their first post-training job at the moment of the interview (September 1994). If that was not the case, it registered the length of time during which they kept that job. In turn, for those trainees with more than one employment spell after training, the survey registered the length of time required to leave their second unemployment spell.

This data enabled us to measure the job histories of participants. For example, we constructed re-employment dynamics, such as the one represented in figure 1. It corresponds to a hypothetical beneficiary of PROBECAT who was employed in a second post-training job on the day in which he/she was interviewed.

Figure 1
Re-employment dynamics of trainees



The individual represented in figure 1 experienced two unemployment spells between the end of the training (represented by point in time t) and the date of the interview (t+n4). The first unemployment spell, u1, had a duration of n1 weeks and the second one, u2, of n3-n2 weeks. He/she found an initial job, e1, left it after n2-n1 weeks, and at the time of the interview had been working in a second job for n4-n3 weeks. The figure also shows that, prior to joining the program, this person had already experienced a number of weeks of unemployment, information that is also provided by the surveys.

b) Modalities of the program:

The PROBECAT program is classified into two modalities, financed by the Ministry of Labor and administered through a network of state employment offices. Its beneficiaries receive training, which lasts two to three months, at one of many training institutions nationwide or on-the-job at private firms.

The first modality, which we will henceforth refer to as school-based training, consists of formal courses and training offered in institutions associated with either the Ministries of Education and Labor or with private industry organizations. The second, whom we will refer to as mixed training, consists of on-the job training in firms. In this modality the government pays the stipend, as well as related costs, while participating employers provide training and are required to hire at least 70% of trainees upon completion of the program.

During their training, participants are not allowed to hold a job and they do not need to be enrolled in the security program to be eligible. They receive allowances equivalent to one minimum wage while enrolled in the program, plus transportation and partial health insurance coverage[7].

The program was originally designed for displaced workers, but first-time job seekers are also allowed to participate[8].

c) Size of the trainees data set

The survey was applied to 2748 PROBECAT trainees. As shown in table 1, the majority of them had previous working experience, and participated in the school-based modality.

Table 1

PROBECAT trainees that responded to the survey

	Male			**Female**		
	With no previous Job	With working experience	Total	With no previous job	With working experience	Total
Mixed modality	21	127	148	89	169	258
School-based modality	271	1552	1823	146	373	519
Total	292	1679	1971	235	542	777

d) Survivor rates in employment and unemployment

We concentrate the analysis of this subsection on the subsample of individuals with previous working experience who were trained in the school-based modality[9].

[7]These features of the program, together with a recent evaluation that did not find a positive impact on post-training wages (Wodon and Minowa (1999)), has led an influential report to posit that the impact of PROBECAT corresponds more with that of an income support program, rather than to that of a program aimed at improving the income and employability of beneficiaries (World Bank (2000)). As is the case of other evaluations of the program, this study did not properly consider the impact of this program on the re-employment dynamics of trainees.

[8] Other important features of the program are described in Revenga *et al.* (1994) and STPSS (1994).

[9]The corresponding analyses for the other subsets of participants are relegated to the appendix.

Data on the time spent in each job status, by individuals with previous job experience that participated in the school-based modality of the program, revealed that, after finishing their training:

a) 34% of male participants had already found a job within a month,

b) one out of three of them was still unemployed by the end of the fourth month,

c) one out four remained unemployed by the middle of the year, and

d) 12% of them spent more than 360 days unemployed.

This is shown in the first column of table 2, which shows the proportion of men who remained unemployed after finishing their training.

In turn, figures in the second column of table 2 indicate that, while 76% of them stayed in their job for at least four months, only two out of three men lasted longer than six months in their first post-training job, and only half of them stayed for at least one year.

Finally, of those men who found employment but had left their first post-training job by the time of the interview, the following can be stated, based on the figures in the third column of table 2: at one extreme, 40% were already employed again within a month of loosing their job and, at the other extreme, 9% remained unemployed after a year.

In contrast, figures from the fourth and fifth columns show that the unemployment rates of the women with previous working experience who participated in the program were significantly higher during the periods examined. Barely half of these women had found a job within six months, and 32% remained unemployed a year after finishing the training. In addition, although employment retention rates for these women were similar in pattern to those of the men, the survival rates for each date were relatively lower for the women.

Table 2

Kaplan Meier Empirical Survivor Functions for Trainees
(Proportion remaining in each job status)

	Men with previous working experience	Women with previous working experience

Interval in days	Initial unemployment	Employment	Second unemployment	Initial unemployment	Employment	Second unemployment
0 30	0.66	0.95	0.56	0.79	0.94	0.65
30 60	0.48	0.90	0.42	0.71	0.88	0.50
60 90	0.39	0.85	0.32	0.66	0.82	0.41
90 120	0.33	0.76	0.26	0.60	0.73	0.31
120 150	0.29	0.71	0.23	0.56	0.67	0.25
150 180	0.25	0.68	0.17	0.53	0.64	0.19
180 210	0.21	0.65	0.14	0.49	0.62	0.19
210 240	0.19	0.62	0.10	0.47	0.57	0.11
240 270	0.17	0.59	0.08	0.43	0.56	0.08
270 300	0.16	0.57	0.06	0.40	0.52	0.06
300 330	0.14	0.54	0.04	0.37	0.49	0.02
330 360	0.12	0.51	0.03	0.33	0.46	0.01
360 365	0.11	0.51	0.03	0.32	0.46	0.01
Number of observations	1432	1369	666	354	268	118
Censored spells	161	773	21	114	153	1
Completed spells	1271	596	645	240	115	117

e) *Distribution of participants according to prior labor history*

Those individuals with previous working experience that were trained in the school-based modality were asked why they left their last job before joining the program and the length of time between leaving that job and joining the program. The number of possible answers to these questions, whose distribution is presented in table 3, is four for the former question and five for the latter.

Table 3
Participants in the School-based training modality
Individuals with prior working experience
Percentage of total

a) Classified according to reason for leaving previous job	Men	Women	b) Classified according to time spent unemployed before joining the program	Men	Women
Marriage or care of children or other relative	0.64	16.89	Less than one month	14.69	11.8
			Between one and two months	26.1	12.87

Market reasons (closure of working place, being fired and end of the job for which he/she was contracted)	43.23	31.1	More than two and up to three months	16.3	15.82
Dissatisfaction with the job or change of address	36.92	38.87	More than three and up to six months	26.93	27.35
To study	19.2	13.14	More than six months	15.98	32.17
Total	100	100	Total	100	100

f) Comparison group

The National Survey of Urban Employment (ENEU) is applied quarterly in Mexico and uses a rotation system, with groups of individuals remaining in the survey for five consecutive quarters.

A survey applied on the dates on which PROBECAT beneficiaries started their training provided a group of individuals that were eligible for the program, but did not participate in it (i.e. unemployed individuals looking for a job).

In order to accurately measure unemployment and employment spells, additional questions were included in the surveys[10] applied to persons in the rotation group during their five interviews, in order to provide a control group for the evaluation of PROBECAT.

The non-participants used in this evaluation included 584 people. Their distribution according to sex and previous working experience is presented in table 4.

Table 4
Elegible persons in the control group

	Men	Women	Total
With working experience	285	179	464
With no previous job	31	53	84

[10] In order to obtain the same information as that obtained from the survey of beneficiaries two procedures were necessary. On the one hand, two modules were appended to the ENEU survey. The first one was applied only during the first quarter of 1993 and the other applied from the second quarter of 1994 to the first quarter of 1995. On the other hand, most of the questions in the survey for PROBECAT trainees were taken from the ENEU survey. The 1990 cohort evaluation of PROBECAT by Revenga *et. al* (1994), which also used ENEU as a comparison group, did not have these modules appended. Because of this, impact on employment dynamics cannot be addressed as we do in this work.

Total	316	232	548

In turn, the empirical survivor functions (table 5) indicate the percentage of individuals that stay in each job status and can be interpreted in the same terms as the table corresponding to the trainees.

Table 5
Kaplan Meier Empirical Survival Functions for the non-participants

	Men with working experience			Women with working experience		
Interval in days	**Initial unemployment**	**Employment**	**Second unemployment**	**Initial unemployment**	**Employ Ment**	**Second unemployment**
0 30	0.80	0.96	0.90	0.87	0.98	0.86
30 60	0.63	0.95	0.77	0.73	0.97	0.76
60 90	0.42	0.89	0.74	0.64	0.93	0.72
90 120	0.35	0.82	0.66	0.61	0.86	0.68
120 150	0.31	0.76	0.51	0.54	0.75	0.63
150 180	0.27	0.67	0.37	0.48	0.71	0.51
180 210	0.23	0.64	0.37	0.45	0.63	0.51
210 240	0.21	0.60	0.37	0.41	0.57	0.51
240 270	0.18	0.55	0.31	0.40	0.56	0.51
270 300	0.17	0.51	0.31	0.37	0.54	-
300 330	0.14	0.49	-	0.35	0.44	-
330 360	0.13	0.42	-	0.34	0.44	-
360 365	0.13	0.41	-	0.34	-	-
Number of obs.	273	224	71	164	99	35
Completed spells	238	96	35	108	41	13
Censored spells	35	128	36	56	58	22

g) Institutions offering the program, and location of trainees by zones

The services of the school-based training modality are offered in official institutions associated with the Ministries of Education and Labor. The most important are the following four: CONALEP, CECATI, CETI, and CEBETI[11]. In addition to these, a number of private-sector training institutions exist, closely related to industry organizations, but regulated by the Ministry of Labor.

[11]CONALEP (Colegio Nacional de Educación Profesional Técnica) is a public decentralized body. Both CEBETI (Centros de Bachillerato Tecnológico Industrial y de Servicios) and CETI (Centros de Enseñanza Técnica Industrial) are coordinated by the General Directorate of Technological and Industrial Education of the Ministry of Education. Finally, CECATI (Centro de Educación para el Trabajo Industrial) are operated by state governments.

Taking into consideration similarities in labor markets and geographic proximity, we divided the country into six zones. These are: the West; the North, excluding in-bond (*maquiladora*) regions; the coast; the in-bond region on the northern border of Mexico; the South; and central Mexico, including Mexico City.

III The Matching Procedure and the Statistical Model

The answers provided by the members of the comparison group are needed to infer counterfactual outcomes for participants, namely what would the beneficiaries of the program have experienced had they not participated. In view of the non-experimental nature of this evaluation, we paired each participant with a member of the comparison group who had similar pre-program observable characteristics. Using statistical matching methods we adjusted away differences between characteristics of participants and non-participants.

The assumption that justifies the use of matching methods for an unbiased evaluation of the program is that, conditional on a vector of variables X, the outcomes of non-participants have the same distribution that participants would have experienced if they have not participated in the program. It has been shown that matching methods are far more effective in measuring treatment effects in non-experimental evaluations of training programs when treatment and control groups members do not differ much in their geographic economic environment. (Heckman *et al.* (1997) and (1999)).

a) The matching procedure

A number of variables were included in the model. The justification for inclusion of these variables is that the above-mentioned studies by Heckman *et al.* of (1997) and (1999) have also found that variables reflecting recent labor force status histories were important predictors of program participation and that matching estimators performed best when a rich set of conditioning variables was used.

We explicitly included geographic location as one of the relevant observable characteristics of the individual. This variable was constructed identifying the zone where trainees and non-participants were located[12].

[12] The *questionnaires* for both groups identified the 'municipality' in which their members were located. These refer to the municipalities into which Mexican states are divided.

Furthermore, gender, age, family position, education and civil status, were included as variables for the matching of participants and non-participants with previous working experience, as well as the following:

a) the time spent without a job before they started their training;
b) the characteristics of his/her previous job according to whether it was in formal or informal sector, whether it was part or full time and if the person was self-employed or wage earner;
c) reasons why the previous job was left –marriage, care of children or relative, market reasons, unsatisfied with the job and to study; and
d) occupation in their last job - ten different types.

In view of the large number of pre-treatment observable characteristics available to pair members of participant and comparison groups, we applied the propensity score method variant of matching (Rosenbaum and Rubin (1983)). This variant has the advantage of reducing the dimensionality of the matching problem down to matching on one scalar, while considering the importance of all pretreatment variables included in the analysis. This scalar is the propensity score, P(X), defined as the probability of participation in the program conditional on pretreatment variables.

We split data sets in two large groups according to whether individuals had prior work experience or not, and then estimated the propensity score for participants and non-participants with logit models. The predictor variables included in the logit model, together with the results of the logit-regression, are presented and detailed in the appendix.

To match an individual in the treatment group with one in the non-participant group we followed a *criterium* that required first, to be the same sex and second that the absolute differences in their propensity score values be no larger than .01. When there was more than one control candidate for a PROBECAT graduate, the matched person was randomly selected among non-participants fulfilling the *criterium*.

Based on this *criterium* we identified for each of the 1763 treatment group members a corresponding match from a set of 464 control group members.

Table 6
Participants in the School-based training modality
Individuals with prior working experience
Propensity Score of matched groups

Men

	obs	Mean	Median	Min	Max	Std. Dev.
Control Group	1390	0.889	0.938	0.065	0.986	0.132
Treatment Group	1390	0.891	0.940	0.065	0.996	0.133

Women

	obs	Mean	Median	Min	Max	Std. Dev.
Control Group	322	0.848	0.912	0.126	0.977	0.169
Treatment Group	322	0.849	0.911	0.123	0.986	0.169

Following this *criterium*, the number of trainees that could be included in our analysis was 89.5% men and 86.3% women, implying no significant "wastage" of information. Moreover, as shown in table 6, working with 1390 couples for men and 322 for women, we have treatment and control groups that are distributed almost as if they were obtained from a "balanced experiment", and we do not have to worry about biases caused by differences in the support of the distribution of P(X) for each group, or in the shape of the distribution over the common support.

A point worth stressing is that matching procedures require that members of treatment and comparison groups do not differ in their geographic economic environment. Evaluations that ignore this point might, for example, inadvertently introduce a bias in their results if women from the in-bond region in northern states are part of the comparison group. As shown in table 7, where the distribution of trainees is presented, no trainee from that zone was part of the treatment group.

Table 7
Participants in the school-based training modality with prior working experience

Men

	Zone 1 Western Region	Zone 2 Northern Region (excl. in-bond reg.)	Zone3 Coast of Mexico	Zone 4 In-bond region in Northern states	Zone 5 Southern States	Zone 6 Mexico City and Central region	Total
CONALEP	71	89	58	35	66	231	550
CECATI	73	68	109	28	21	39	338

CEBETI	38	14	70	7	26	6	161
PRIVATE	7	11	0	0	0	0	18
CETI	23	5	0	0	8	1	37
Other	26	47	81	6	54	72	286
Total	710	567	518	119	274	592	1390
				Women			
CONALEP	20	27	2		16	38	103
CECATI	52	7	15		8	0	82
CEBETI	14	8	24		0	0	46
PRIVATE	0	14	0		0	0	14
CETI	3	9	0		0	7	19
Other	8	1	5		32	12	58
Total	97	66	46		56	57	322

The same observation follows for the distribution of trainees that benefited from the mixed modality of the program which is presented in table 8.

Table 8
Participants in the mixed training modality with prior working experience, classified according to geographical zone

	Men	Women
Western Region	61	69
Northern Region (excl. in-bond regions)	33	46
Coast of Mexico	2	3
In-bond region in Northern states	-	-
Southern States	2	7
Mexico City and Central region	-	-
Total	127	169

b) Multispell proportional hazard models

With multispell mixed proportional hazard (MPH) models we estimate, in the following section, the impact of the training provided by PROBECAT on the re-employment dynamics of its beneficiaries. That is, we provide a quantitative measurement of the 'treatment on the treated' parameters of hazard rates out of

unemployment and employment. Next, we explain the characteristics of these kinds of models[13].

Hazard models take as the point of departure the definition of a nonnegative continuous random variable T, which represents the spell duration with a density function, f(t). This function f(t) has a corresponding survivor function, simply defined as 1-F(t), *i.e.* as the probability that duration will equal or exceed the value t (where F(t) is the distribution function). In turn, the hazard function, h(t), is given by:

$$h(t) = \left(\frac{f(t)}{1 - F(t)} \right) \tag{1}$$

In this relationship, h(t) can be interpreted as an exit rate or escape rate from the state, because it is the limit (as Δ tends to zero) of the probability that a spell terminates in interval (t, t+Δ), given that the spell has lasted t periods[14].

In turn, the Mixed Proportional Hazard (MPH) specification assumed in this study to estimate hazard rates from one job status to another has two parts: a 'baseline' hazard and a 'systematic part'. The former, $h_0(t)$, captures the common hazard among individuals in the population and the latter the individual heterogeneity through the effect of a set of covariates on the hazard rate. In addition, the systematic part is also composed of two parts: observed individual characteristics, X; and a dummy variable, Z, indicating whether or not the individual is in the treatment group.[15]

A further assumption adopted here is that the 'systematic part' of the hazard takes form of an exponential function. Thus, the hazard rate is multiplicative in all the separate elements of the covariates, *viz*[16]*:*

---

[13] *Cfr.* Van den Berg (1999) for a survey.

[14] Some people who started a spell of employment/unemployment in a given job status may still have been in the same status when they were last interviewed. Data for these people are called censored, and they would constitute a problem for a standard regression model where the dependent variable was the length of the spell. If we exclude people with unfinished spells, we throw away part of the data set and introduce a serious bias against people with longer and more recent spells in each of the job statuses. Duration models have the distinct advantage of being able to handle censored data effectively (Kiefer (1988)).

[15] This assumes that the different services provided by the multidimensional nature of the training program are adequately captured by a single binary variable.

[16] $h_0(t)$ gives the shape of the hazard function for any given individual and the level of the hazard function is allowed to differ across individuals.

$$h(t|X,Z)=h_0(t)\exp(X\beta+Z\gamma) \quad (2)$$

From (1) and the survivor function corresponding to (2), it follows that the conditional density function of the realized t (duration of leaving the state), conditional on X and Z, t|X,Z, can be represented by:

$$f(t|X,Z)=h(t|X,Z)\exp\left(-\int_0^t h(s|X,Z)ds\right) \quad (3)$$

By construction, the duration of the first post-training job, t_e, starts after the moment at which the first spell of unemployment t_{u1} is realized. Multispell MPH models enable us to capture the dependence between states by including t_{u1} as an additional covariate in the hazard for t_e.

In turn, the dependence between the length of the second spell of unemployment after training (t_{u2}) and the duration of the previous two states, t_e and t_{u1}, can also be captured. This is achieved by including these two duration variables as additional covariates of the systematic part in the estimation of the hazard rate of exiting the second period of unemployment.

Hence, in the subsequent section we present the results of the following three models:

$$h_{u1}(t_{u1}|X,Z) = h_{0u1}(t)\exp(X\beta+Z\gamma_0) \quad (4)$$

$$h_e(t_e|X,Z,t_{u1}) = h_{0e}(t)\exp(X\beta+\alpha_0 t_u+Z\gamma_1) \quad (5)$$

$$h_{u2}(t_{u2}|X,Z,t_e,t_{u1}) = h_{0u2}(t)\exp(X\beta+\alpha_1 t_e+\alpha_2 t_{u1}+Z\gamma_2) \quad (6)$$

where $h_{u1}(t|X,Z)$, $h_e(t_e|X,Z,t_{u1})$ and $h_{u2}(t|X,Z,t_e,t_{u1})$ state, respectively, for the hazard rates out of: a) first unemployment to employment, b) first post-training job to unemployment and c) second unemployment to employment.

The covariates of the systematic part in the estimation of the hazard rate, X, include individual characteristics such as head of household, level of formal education, age, sex and marital status, as well as time spent without a job before the date in which training programs started; characteristics of his/her previous job according to whether it was in formal or informal sector, whether it was part

or full time and if the person was self-employed or wage earner; and type of occupation; and reasons why the previous job was left[17].

In turn, the parameters α_i capture dependence between the time the individual requires to exit one state and that required to exit the previous one(s).

The parameters that capture the effect of PROBECAT on the re-employment dynamics of beneficiaries are γ_0, γ_1 and γ_2.

For the subsample of individuals registered in the school-based modality of the program, we measure how this effect differs among sets of institutions providing the training. Given that they have branches across the country we further classified them by geographic zones.

Hence, the binary variable Z (where zero indicates no participation in training program and unity indicates participation) is included together with two interactive dummy variables: one associated with the type of institution in which the training was offered and the other with the geographic zone in which the institution was located. For the subsample trained in the mixed modality of the program, only the binary variable corresponding to participation and the interactive dummy that captures differences in impacts across zones are included[18].

We divided the group of paired individuals with previous work experience into two sets depending on program modality (school-based or mixed). For each modality we estimated the hazard models (4)-(6) separately for men and women.

IV Empirical Results of Proportional Hazard Models

Proportional hazard models (4), (5) and (6) were estimated separately for men and women with previous job experience and the results for the school-based modality case are presented in tables 9 and 10 and for the mixed modality in table 11[19].

[17]These are presented and detailed in the appendix.

[18]As mentioned above, the mixed modality consists of in-service training in firms. Therefore, no institution is associated with this modality.

[19] The only group that was large enough to estimate hazard rates out of the second unemployment spell was the group of men in the school-based modality. Because of this, the results of the hazard function for h_{u2} of this group are the only ones presented and discussed here.

From the specification of these models it follows that the larger the parameter exp(β), the higher the hazard rate out of the state. (that is, the more probable it is that the individual will exit the job status, given that the spell has lasted t periods).

In order to facilitate the interpretation that follows, explanatory variables related to the effects of the program, to the age of the participant, or to the time dependence between states appear in the second half of these tables with their corresponding β coefficient. The other covariates included in the hazard model appear in the first half of these tables with the parameter corresponding to the (natural base) exponential of their β coefficient.

The indicator function for participating in the school-based modality is included in the model together with two interactive dummy variables (as mentioned above). This implies that a quantitative calculation of the geographic effect of each type of institution affiliated with PROBECAT requires combining three of the coefficients estimated in the hazard function (two for the mixed modality). Thus, the value of these parameters, and not their exponential values, appear in the last rows of tables 9 and 11. The quantitative calculation of the effect of school-based training appears in tables 12-16 and the interpretation of the effect of mixed training is presented in the following subsections.

Table 9

Men in the school-based training modality with prior working experience
Estimated parameters of proportional hazard models

Variables	h_{u1}	h_e	h_{u2}
	$\exp(\beta_i)$	$\exp(\beta_i)$	$\exp(\beta_i)$
Left job due to marriage or care of relative	1.125	3.32	1.4755
	(0.357)	(2.953)	(0.913)
Left job due market reasons	1.152	1.29	0.9974
	(1.771)	(2.224)	(-0.017)
Left job voluntarily due to dissatisfaction or change of address	1.426	0.99	1.1774
	(4.506)	(-0.017)	(1.116)
zone2	0.853	0.77	5.9327
	(-1.774)	(-2.098)	(7.377)
zone3	0.806	0.78	4.2038
	(-2.011)	(-1.571)	(4.914)
zone4	0.72	1.49	0.5549
	(-1.729)	(1.801)	(-0.573)

zone5	0.427	3.02	0.0418
	(-5.746)	(5.482)	(-15.609)
zone6	0.981	0.74	9.6288
	(-0.203)	(-1.899)	(8.936)
Head of household	1.313	0.72	1.1609
	(3.650)	(-3.040)	(0.997)
Single	0.791	0.79	0.5945
	(-3.085)	(-2.159)	(0.997)
Unempl. betw. one and 2 months	0.979	0.77	1.1021
	(-0.298)	(-2.518)	(0.670)
Unempl. betw.2 and 3 months	0.926	0.63	1.4825
	(-0.929)	(-3.818)	(2.362)
Unempl. between 3 and 6 months	0.913	1.06	1.2925
	(-1.281)	(0.644)	(1.731)
Unempl. more than six months	0.603	1.3	0.8662
	(-5.708)	(2.243)	(-0.786)
Full time wage-earner, formal sector	1.159	1.31	1.0319
	(1.305)	(1.486)	(0.134)
Part time wage-earner	0.677	1.25	1.0463
	(-2.607)	(0.995)	(0.155)
Full time self employed	1.02	1.32	0.9331
	(0.163)	(1.511)	(-0.276)
Full time wage-earner, informal sector	1.301	0.92	1.0761
	(2.229)	(-0.431)	(0.303)
Education (5 categories)**			
Previous job occupation(9 types)**			
	Coef(β)	Coef(β)	Coef(β)
Age	0.048	-0.009	-0.034
	(2.733)	(-0.325)	(-0.955)
Age Squared	-0.001	0.000	0.000
	(-3.966)	(0.018)	(0.318)
t_{u1}		0.003	0.004
		(6.849)	(5.745)
t_e			0.003
			(5.012)
Dummy for being in PROBECAT,Z	0.045	-0.785	2.20769
	(0.398)	(-4.704)	(8.5123)
Z:zone2	-0.079	0.426	-1.940
	(-0.583)	(2.287)	(-6.766)
Z:zone3	0.057	0.457	-1.489
	(0.397)	(2.249)	(-4.510)
Z:zone4	0.226	-0.138	0.931
	(0.945)	(-0.461)	(0.885)
Z:zone5	0.894	-1.340	NA
	(4.874)	(-5.149)	
Z:zone6	-0.156	0.269	-2.661
	(-1.148)	(1.291)	(-8.807)
Z:CONALEP	-0.159	0.135	0.131
	(-2.013)	(1.146)	(0.918)

Z:CECATI	-0.092	0.240	-0.478
	(-1.031)	(1.829)	(-3.006)
Z:CEBETI	0.217	0.306	-0.181
	(2.067)	(2.058)	(-1.004)
Z:PRIVATE	0.118	0.154	-0.566
	(0.460)	(0.411)	(-1.166)
Z:CETI	-0.670	-0.246	-0.580
	(-3.255)	(-0.651)	(-0.962)
Log Likelihood ratio test	596	553	506

Notes:

*The statistic 'z' value is presented in parenthesis, states for the value of the coefficient divided by its standard error. When its value is within ± 1.96, it implies that the co-variant is significant at the 5% confidence level. Note that if one of the co-variates belonging to a nested subset is significant, then the related ones are as well, even if their 'z' values are above the critical value.

**Tables 26 in the appendix present estimated coefficients for these covariates and corresponding standard errors.

Table 10

Women in the school-based training modality with prior working experience

Estimated parameters of Proportional hazard models

	h_{u1}	h_e
	$\exp(\beta_i)$	$\exp(\beta_l)$
Left job due to marriage or care of relative	0.361	0.2121
	(-3.806)	(-2.995)
Left job due market reasons	1.088	0.1491
	(0.412)	(-4.195)
Left job voluntarily due to dissatisfaction or change of address	0.963	0.2058
	(-0.200)	(-3.778)
zone2	0.406	0.6866
	(-3.020)	(-0.825)
zone3	0.382	0.2512
	(-3.299)	(-3.205)
zone5	0.192	0.5038
	(-4.476)	(-0.941)
zone6	0.394	0.8212
	(-3.411)	(-0.418)
Head of household	2.116	4.9063
	(3.626)	(3.979)
Daughter	1.725	2.2452
	(2.192)	(1.778)
Single	1.115	0.7515
	(.520)	(-0.801)
Unempl. between one and two months	1.479	0.516
	(.871)	(-1.662)
Unempl. between two and three months	0.911	1.4015
	(0.417)	(0.939)
Unempl. between three six months	0.849	0.9215
	(0.820)	(-0.208)
Unempl. more than six months	0.605	1.1492

	(-2.325)	(0.362)
Full time wage-earner, formal sector	1.818	1.3053
	(2.461)	(0.667)
Part time wage-earners	0.833	1.5714
	(-0.669)	(0.934)
Full time self employed	1.358	0.4677
	(0.913)	(-1.290)
Full time wage-earner, informal sector	1.325	1.3018
	(1.148)	(0.643)
Education (five different categories)**		
Previous job occupation (nine different types)**		
	Coef(β)	Coef(β)
t_{u1}		0.0013
		(0.985)
Age	0.112	0.215
	(2.215)	(2.480)
Age Squared	-0.0014	-0.0037
	(-1.887)	(-2.738)
Dummy for being in PROBECAT, Z	-1.065	-0.714
	(-3.1477)	(-1.323)
Z:zone2	0.798	0.71
	(2.13)	(1.184)
Z:zone3	0.916	1.839
	(2.461)	(1.184)
Z:zone5	1.393	-0.302
	(3.145)	(-0.36)
Z:zone6	0.352	-0.37
	(0.948)	(-0.532)
Z:CONALEP	0.062	0.273
	(0.236)	(0.611)
Z:CECATI	0.067	-0.823
	(0.247)	(-1.841)
Z:CEBETI	-0.308	-1.459
	(-0.96)	(-2.756)
Z:PRIVATE	0.089	-0.94
	(0.199)	(-1.393)
Z:CETI	0.042	-0.229
	(0.105)	(-0.337)
Likelihood ratio	295	145

Notes:
*The statistic 'z' value is presented in parenthesis, states for the value of the coefficient divided by its standard error. When its value is within ± 1.96, it implies that the co-variant is significant at the 5% confidence level. Note that if one of the co-variates belonging to a nested subset is significant, then the related ones are as well, even if their 'z' values are above the critical value.
**Tables 26 in the appendix present estimated coefficients for these covariates and corresponding standard errors.

Table 11
Participants in the Mixed training modality

Estimated parameters of Proportional hazard models

Variables	Men with prior working experience		Women with prior working experience	
	h_{u1} exp(β_i)	h_e exp(β_i)	h_{u1} exp(β_i)	h_e exp(β_i)
Left job due to marriage or care of relative	n.a.		0.803 (-0.3937)	0.2483 (-1.1735)
Left job due market reasons	0.549 (-1.401)	1.641 (0.7599)	7.054 (3.6027)	0.0304 (-3.0746)
Left job voluntarily due to dissatisfaction or change of address	0.737 (-0.729)	0.553 (-0.9209)	5.501 (3.4332)	0.1218 (-1.9415)
zone2	0.783 (-0.655)	0.483 (-1.8646)	2.032 (1.2715)	1.8225 (0.7956)
zone3	0.562 (-1.246)	1.185 (0.2924)	0.712 (-0.8923)	0.9352 (-0.1051)
zone5	0.319 (-1.421)	2.597 (1.407)	0.515 (-1.4518)	0.6111 (-0.6359)
Head of household	1.659 (1.551)	1.557 (1.0005)	0.808 (-0.6925)	1.2275 (0.3544)
Daughter			0.548 (-1.0464)	1.0232 (0.0296)
Unempl. between 1 and 2 months	0.96 (-0.146)	0.42 (-1.8271)	1.236 (0.609)	1.5483 (0.6679)
Unempl. between 2 and 3 months	1.18 (0.464)	2.063 (1.4351)	0.786 (-0.6389)	9.0593 (3.2609)
Unempl. between 3 and 6 months	1.268 (0.823)	1.991 (1.5095)	0.952 (-0.1464)	1.0296 (0.0401)
Unempl. more than 6 months	0.395 (-2.229)	0.984 (-0.0269)	0.664 (-1.0193)	1.0975 (0.1274)
Single	1.172 (0.494)	0.675 (-0.9847)	3.098 (2.0246)	0.2369 (-2.4432)
Full time wage-earner, formal sector	1.553 (0.637)	2.352 (1.2157)	2.069 (0.9446)	0.191 (-1.4324)
Part time wage-earners	0.338 (-1.09)	4.296 (1.5449)	0.775 (-0.3187)	0.0769 (-1.9692)
Full time self employed	1.341 (0.398)	3.203 (1.5172)	2.177 (0.9312)	0.1702 (-1.2993)
Full time wage-earner, informal sector	2.538 (1.288)	1.578 (0.6425)	2.147 (1.0107)	0.2772 (-1.2321)
Education				

(five different categories)** Previous job occupation (nine different types)**				
	Coef(β)	Coef(β)	Coef(β)	Coef(β)
Age	0.112	-0.352	0.0343	-0.176
	(1.366)	(-2.8741)	(0.3758)	(-1.1205)
Age Squared	-0.001	0.004	-0.0001	0.003
	(-1.306)	(2.5526)	(-0.0989)	(1.4948)
t_{u1}		0.002		0.004
		(1.3551)		(3.2691)
Dummy for being in PROBECAT,Z	0.418	-1.146	-1.288196	1.862
	(1.496)	(-3.11)	(-1.6355)	(1.4909)
Z:zone2	-0.153	0.558	0.746	-3.254
	(-0.317)	(0.9905)	(0.7808)	(-2.2158)
Z:zone3	0.134	0.213	1.325	-3.367
	(0.144)	(0.1995)	(1.5967)	(-2.3041)
Z:zone5	2.170	-1.020	-0.572	NA
	(1.851)	(-0.7562)	(-0.5313)	
Log likelihood ratio test	103	103	188	130

*The statistic 'z' value is presented in parenthesis, states for the value of the coefficient divided by its standard error. When its value is within ± 1.96, it implies that the co-variant is significant at the 5% confidence level. Note that if one of the co-variates belonging to a nested subset is significant, then the related ones are as well, even if their 'z' values are above the critical value.

**Tables 27 in the appendix present estimated coefficients for these covariates and corresponding standard errors.

a) Pre-treatment observable characteristics as explanatory variables of unemployment and employment spells

The results in the first three rows of the first column of table 7 show that men who left their previous job because they were dissatisfied with it -or because they moved to another address- found a job faster than the rest.

These individuals also stay more time in a job, once they find it, as shown in corresponding rows of the second column. That is, they hold on to their jobs for a relatively longer period, when compared to those that left their job due to market reasons, to marry, to take care of relatives, or to study (which does not appear in the table, because it is the reference variable).

In contrast, as follows from corresponding figures in table 10, women who left their previous job because of marriage or to take care of a relative took longer to exit unemployment. However, once they were employed, this group did not leave their job faster than the rest.

The relatively frequency of movements in and out of jobs that characterizes the labor force in each region of the country has been captured by the covariates corresponding to geographic zones. For example, estimates presented in table 9 indicate that it takes more than twice as long for a man to find a job in the southwestern region of Mexico (Zone 5), compared to in the western zone (Zone 1, which is the reference).[20]

In turn, once they find it, the worker in the western zone will last three times longer in that job, relative to a worker in the West. Moreover male workers in zone 5 not only have lower transition rates out of their initial unemployment state, and lower job retention rates: as follows from rows four to eight in the column corresponding to h_{u2}, they also have to spend longer looking for another job, if they loose their first job.

Considering how time already spent looking for a job affects exit rates out of a state, results in table 9 indicate that the hazard rate out of unemployment of a man that has been unemployed for six months or more is lower than that of a man who has spent less than one month looking for a job (which is the reference variable): it takes the former more than twice as long as the latter to find a job. In addition, when those men with more than six months unemployed did find a job, they held on to it for less time.

As expected, heads of household, whichever the gender, spend less time finding a job and married men exit unemployment faster and stay in their jobs longer.

Men and women with previous work experience as part time wage-earners require more time to find a job compared to full-time wage earners and self-employed individuals, but only the women in this group have higher hazard rates out of employment.

The parameters corresponding to level of education and type of occupation in previous job were also calculated, but were relegated to the appendix. They turned out to be statistically significant, but presented no distinguishable pattern.

20Note that one minus the inverse of the coefficient exp(β) provides an indicator of the percentage reduction in time required to find a job, relative to the reference group. For example, when exp(β) is 1.15 the expected time is approximately 1/1.15=0.869, that is there is a reduction of approximately 14% in time with respect to the reference. On the other hand, when exp(β) is .047, the approximated expected time is 1/0.47=2.12, which implies an increase of 112% -*viz* the double- in time with respect to the reference.

For women and men hazard rates out of unemployment increase with age up to a threshold at which the event of finding a job becomes less likely. For women, this threshold is 40 years[21].

As explained in the previous subsection, in view of the multispell nature of the estimation of the hazards, the duration of the initial unemployment spell and of the first employment spell appear as a co-variates in the hazard function out of the second unemployment spell.

The positive and significant value for the covariate time spent in the post-training job, t_e, has an important implication for the assessment of the indirect effects of PROBECAT: it indicates that individuals that benefit from training programs by holding on to their job for longer, also benefit in that they find another job faster when they leave their first post-training job. The value of this coefficient (.003) implies that an additional month employed reduces by 10% the time spent looking for new employment, when that job is lost.

In turn, the positive effect of the unemployment spell variable t_{u1} could be interpreted as suggesting that if the individual researches prospective jobs more intensively in the first episode, then less time is required to find another job in the event of a second unemployment spell, since the individual is more familiar with the job market.

b) The impact of PROBECAT on transitions out of unemployment and employment

The cells in tables 12–16 present the exponential value of the sum of the β coefficients corresponding to the indicator function for being in the treatment group and to the interactive dummies for zone and type of institution (*viz*, the coefficients of corresponding covariates in the hazard functions in tables 9 and 10). Therefore they summarize the effect of the training of each set of institutions on re-employment dynamics, according to the geographic zone in which they are located.

In the tables showing hazard rates out unemployment, values larger than one indicate that the training offered by that institution is effective. The larger the value, the more effective the program is in speeding up the job search process. Moreover, for effective institutions, calculating one minus the inverse of the coefficient which appears in each of the cells of the table indicates the

[21] For men the results imply a threshold of 24 years.

percentage reduction in the number of days required to find a job (relative to the counterfactual of having not received the training provided by PROBECAT).

In turn, in the tables representing hazard rates out employment, values below one imply that the institution providing the training is effective in improving the employment dynamics of their trainees. The inverse of the coefficient indicates the percentage increase in the amount of time that they hold on to their jobs, as a result of participation in the program.

c) Hazard rates out of unemployment: the effects of the school-based modality by zone and type of institution

Previous evaluations of the impact of PROBECAT in reducing the time required to leave unemployment concluded that the school-based modality was ineffective for men and effective for women (*e.g.* Aportela (1999)). However, these studies considered only the impact of the program at a national level, aggregating all institutions providing this service. Thus, their conclusions are applicable only on average, and they would be incorrect in concluding, without further analysis, that the program was useless for men and effective for women.

We show here that the impact of the program differed in magnitude and in most cases also in sign, according to the geographic area and the type of institution providing the training.

Figures in table 12 show that men trained in CONALEP, CECATI and CETI were not able to find a job more quickly in zones 1, 2 and 6[22]. This result coincides with what was pointed out in previous evaluations. However, this table also shows that contrary to these previous evaluations, men trained in the other zones of the country experienced a positive impact. Results in fourth and fifth columns indicate that, in general, in the southern states of Mexico (zone 5) and in the in-bond northern region (zone 4)[23] men took less time to find a job if they joined the program, no matter what institution trained them[24].

Also, results for men with working experience trained by institutions run by the private sector and by CEBETI show the importance of capturing effects by type

[22] Except for the case of CECATI, this is also the case in zone 3, whereas in zone 4 CETI was also ineffective.
[23] With the exception of CETI.
[24] It is in zone 5 where CEBETI had the biggest impact: men in this zone required 67% less time to find a job relative to what would have been the case if they had not received the services provided by PROBECAT.

of institutions. These training institutions were effective in all the zones examined, as shown in the first and fourth rows of table 12.

Table 12
Transition rates out of initial unemployment
The effect of the school-based modality on men with prior working experience
Computed parameters of proportional hazard models

Type of Institution	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6
PRIVATE	1.20	1.09	1.31	1.50	2.87	1.02
CONALEP	0.90	0.81	0.98	1.12	2.15	0.76
CECATI	0.95	0.86	1.03	1.18	2.27	0.80
CEBETI	1.28	1.16	1.39	1.60	3.06	1.09
CETI	0.54	0.49	0.59	0.68	1.29	0.46
Other	1.05	0.95	1.14	1.31	2.51	0.89

Table 13
Transition rates out of employment
The effect of the school-based modality on men with prior working experience
Computed parameters of proportional hazard models

Type of Institution	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6
PRIVATE	0.54	0.82	0.90	0.47	0.14	0.70
CONALEP	0.52	0.79	0.88	0.46	0.14	0.68
CECATI	0.58	0.88	0.97	0.51	0.15	0.75
CEBETI	0.62	0.94	1.04	0.54	0.16	0.81
CETI	0.37	0.56	0.62	0.33	0.10	0.48
Other	0.46	0.69	0.77	0.40	0.12	0.60

Table 14
Transition rates out of second unemployment
The effect of the school-based modality on men with prior working experience
Computed parameters of proportional hazard models

Type of Institution	Zone1	Zone2	zone3	zone4	zone5	zone6
PRIVATE	6.88	0.86	1.71	16.67	16.85	0.50
CONALEP	13.17	1.65	3.28	31.93	32.28	0.95
CECATI	7.43	0.93	1.85	18.00	18.20	0.53
CEBETI	10.01	1.25	2.49	24.27	24.53	0.72
CETI	15.53	1.95	3.87	37.64	38.05	1.12
Other	12.26	1.54	3.05	29.71	30.04	0.88

Table 15
transition rates out of initial unemployment
The effect of the school-based modality on women with prior working experience
Computed parameters of proportional hazard models

Type of Institution	Zone1	Zone2	Zone3	Zone5	Zone6

PRIVATE	0.38	0.84	0.94	1.52	0.54
CONALEP	0.37	0.81	0.92	1.48	0.52
CECATI	0.37	0.82	0.92	1.48	0.52
CEBETI	0.25	0.56	0.63	1.02	0.36
CETI	0.36	0.80	0.90	1.45	0.51
Other	0.34	0.77	0.86	1.39	0.49

Table 16
Transition rates out of employment
The effect of the school-based modality on for women with prior working experience
Computed parameters of proportional hazard models

Type of Institution	zone1	Zone2	zone3	zone5	zone6
PRIVATE	0.19	0.39	1.20	0.14	0.13
CONALEP	0.64	1.31	4.04	0.48	0.44
CECATI	0.21	0.44	1.35	0.16	0.15
CEBETI	0.11	0.23	0.72	0.08	0.08
CETI	0.39	0.79	2.45	0.29	0.27
Other	0.49	1.00	3.08	0.36	0.34

As it was the case for men, table 15 indicates that all institutions providing PROBECAT services in zone 5 helped women with prior working experience find a job faster. *Per contra*, in the rest of the country none of the institutions were able to improve employment prospects for women with previous working experience.

d) The impact of the school-based modality on hazard rates out of employment and out of a second unemployment spell by zones and type of institution.

In the western region of the country (zone 1), men trained in CONALEP or in CECATI would have found a job faster without the services received from these institutions. Based only on this result, which appears in the second and third rows of table 12, it would seem that the training programs provided in the western region of Mexico are not effective in improving the job prospects of men with previous working experience.

However, figures in the cells of the second and third rows of the first column of tables 13 and 14 indicate that this is not the case: in net terms, the impact of the program on men's re-employment dynamics is positive and important. Men trained by these institutions in zone 1 held on to their jobs for a longer period of time, and those that left their job found another one relatively faster. These two effects caused participants to work more days during a year than non-

participants, and more than compensated for the fact the participants took longer to exit the initial post-training unemployment state.

This example illustrates that the impact of PROBECAT on reemployment dynamics must explicitly consider two questions, in addition to how quickly individuals find a job after their training. First, were they able to increase the time employed in their first post-training job? Second, did they need less time to find another job, if the first post-training job was lost?

This example also shows that evaluations should consider which services that compose a training programs help participants finds jobs and which ones helps them to hold on to their jobs. Training provided to men by CEBETI in Zone 3 illustrates the same point: although the training provided by this institution was unable to extend the time that its trainees spent employed, it was effective in reducing both unemployment spells.

Our results show that the program was overall effective in improving men's employability prospects in only a few cases. By overall effective, we mean that men not only found jobs faster than they would have had they not joined the training program, but also that they remained employed for longer and found another one relatively faster if that job was not retained, compared to individuals who did not benefit from the services provided by PROBECAT.

The overall effective institutions included all institutions in the in-bond (*maquiladora*) region on the northern border and in the south of Mexico (*i.e.* in zones 4 and 5[25]); the CEBETI institutions in the West and North of the country (zones 1 and 2); and private institutions in zones 1 and 3. In the other cases, the impact of the program on employment retention was positive but most of them did not achieve the aim of helping beneficiaries find a job faster.

As was the case with men, we found that the impact of PROBECAT on the women who participated in the program differed widely, depending the institution offering the training, and the region in which the training was offered. However, we found that the most efficient institutions, and the zones in which they were most efficient, were not the same for the women as for the men.

We found that women with previous job experience trained in CONALEP in zone 2 did not benefit from the school-based modality of PROBECAT. This is

[25] With the exception of transition rates out of initial unemployment if trained in CETI in zone 4.

also the case for women in the states along the east coast of Mexico (zone 3), with the exception of those who participated in the CEBETI program, whose net effect is ambiguous because of a positive effect on employment retention counteracting an adverse effect on helping to find a job faster.

It is only in the southern states of Mexico (zone 5), where we can unambiguously conclude that all institutions offering the services of PROBECAT to women are effective in helping their trainees reduce the time required to find a job as well as in increasing the time they hold on to their job.

The women trained in the rest of the country benefited from the program by holding on to their jobs for longer, but not by finding a job faster.

e) Interactive effects according to pre treatment characteristics

In this subsection we further investigate the extent to which individuals with a given pre-treatment characteristic benefited from PROBECAT training, relative to another beneficiary without this characteristic.

For this purpose, we present the results of alternative variants of our estimated hazard functions for the school-based modality. These variants differ with respect to the ones presented in tables 9 and 10 in their inclusion, together with the indicator function for being in the treatment group and the interactive dummies for zone, of another interactive dummy with a pre-treatment observable characteristic of interest[26].

This additional step enables us to consider if, after a decade of training unemployed workers, PROBECAT still responds to the original aim to which this program was designed. This aim was to upgrade the skills of workers who lost their jobs because of a macroeconomic crisis or because of structural changes.

The persecution of this aim suggests that services provided by the school-based modality of PROBECAT would be less likely to benefit two types of trainees: a) male trainees with more than six months in unemployment before joining the program and b) women who left their previous job because they married or to take care of children or relatives[27].

[26] The corresponding tables are not included in the text and are available upon request from the authors.
[27] The table 3 in section II shows that the majority of trainees spent less than six months without a job before entering the program (84% of men and 77% of women). It also reveals that 31% of women that participated in the program left their previous job due to market reasons.

In the previous subsection we concluded that institutions located in zones 4 and 5 were effective in increasing the hazard rates out of unemployment of men participating in the program. We can further assess this result in view of figures in table 17. This table presents the effect of PROBECAT training on men once the variables representing duration in unemployment before joining the program enter as interactive dummies in hazard functions, together with the indicator function for participating in the program.

These figures indicate that, although all the participants of zones 4 and 5 benefited from the program, men who had been unemployed for more than six months before joining the program benefited most with the services provided by PROBECAT.

This result is further substantiated when we consider what happened with men trained in zones 1, 2, 3 and 6. Table 17 reveals the following result: while men who were unemployed for less than six months took longer to find a job than their counterparts who did not participate in the program, men who were unemployed for more six months before joining the program found a job relatively faster than what would have been the case if they have not participated in PROBECAT.

In addition, those that had been unemployed for more than six months before joining the program benefited most in terms of staying in their new jobs for longer. This result is shown in table 18. Figures in this table also show that, in four out of six zones, male participants that had been unemployed for one to two months did not benefit in terms of holding on to their jobs for longer.

Table 17
Transition rates out of unemployment
The effect of the school-based modality on men with prior working experience
Computed parameters of proportional hazard models

Length of unemployment before beginning their training	zone1	zone2	Zone3	zone4	zone5	zone6
Unempl. for less than one month	0.99	0.96	1.06	1.31	2.43	0.85
Unempl. between one and two months	0.95	0.92	1.02	1.26	2.33	0.82
Unempl. between two and three months	0.87	0.84	0.93	1.15	2.14	0.75

Unempl. between three and six months	0.80	0.77	0.86	1.06	1.96	0.69
Unempl. more than six months	1.39	1.35	1.49	1.84	3.42	1.20

Table 18
Transition rates out of employment
The effect of the school-based modality on men with prior working experience
Computed parameters of proportional hazard models

Length of unemployment before beginning their training	Zone1	Zone2	zone3	zone4	zone5	zone6
Unempl. for less than one month	0.42	0.73	0.95	0.46	0.12	0.54
Unempl. between one and two months	0.94	1.66	2.17	1.03	0.28	1.22
Unempl. between two and three months	0.77	1.35	1.76	0.84	0.23	0.99
Unempl. between three and six months	0.32	0.57	0.74	0.36	0.10	0.42
Unempl. More than six months	0.21	0.37	0.49	0.23	0.06	0.27

Tables 19 and 20 present, in turn, the effect on women of including variables representing reason for leaving last job as interactive dummies in hazard functions, together with the indicator function for participating in the program.

In contrast to what would have been expected, they highlight the negative effect of PROBECAT on the re-employment dynamics of women who left their job because of market reasons. Figures in the second row of these tables indicate that they were not able either to find a job faster or to hold on to a job for longer period.

Per contra, the women that benefited in both cases were those that left their job because of marriage or to take care of their children and other relatives.

Table 19
Transition rates out of unemployment
The effect of the school-based modality on women with prior working experience
Computed parameters of proportional hazard models

Reasons for leaving previous job	Zone1	zone2	zone3	Zone5	Zone6

Marriage or care of children or other relative	3.31	8.19	7.05	11.02	3.71
Market reasons	0.28	0.69	0.59	0.92	0.31
Dissatisfaction with job or change of address	0.23	0.57	0.49	0.77	0.26
To study	0.76	1.88	1.62	2.53	0.85

Table 20
Transition rates out of Employment
The effect of the school-based modality on women with prior working experience
Computed parameters of proportional hazard models

Reasons for leaving previous job	Zone1	zone2	zone3	Zone5	Zone6
Marriage or care of children or other relative	0.14	0.17	0.48	0.14	0.22
Market reasons	1.26	1.51	4.40	1.27	1.97
Dissatisfaction with job or change of address	0.20	0.24	0.69	0.20	0.31
To study	0.03	0.04	0.11	0.03	0.05

f) The treatment effect by zones of the mixed modality.

As in the case of school-based modality, we matched participants and non-participants with working experience using the procedure and *criterium* described in section II.

As shown in table 21, the mixed modality of PROBECAT was overall effective in improving the re-employment dynamics of men with working experience. The positive effects of the program were most pronounced in zone 5.

Table 21
Training effect of mixed modality of PROBECAT
Computed parameters of proportional hazard models
Men with working experience

	transition rates out of unemployment	transition rates out of employment
Zone 1	1.59	0.317
Zone 2	1.30	0.555

Zone 3	1.78	0.393
Zone 5	13.31	0.114

Table 22

Training effect of mixed modality of PROBECAT

Computed parameters of proportional hazard models

Women with working experience

	transition rates out of unemployment	transition rates out of employment
Zone 1	0.58	0.25
Zone 2	1.04	0.22
Zone 3	0.15	n.a.
Zone 5	0.27	6.44

In turn, table 22 shows that women that participated in the mixed training modality of PROBECAT in zones 1 and 2 (where 93% of respondents were located) benefited by increasing the time they hold on to their jobs. It is only in zone 2 where they benefit as well by getting a job relatively faster than would have been the case if they have not joined the program.

g) Predicting the effect of the program beyond the sampling frame

The distribution of trainees of school-based modality by zones was presented in table 7. It showed that private institutions offered training services only in zones 1 and 2 to PROBECAT male participants. In spite of this, tables 12-14 contain an assessment of the impact of the program offered by these types of institutions in zones 3, 4, 5 and 6.

That is, results in cells corresponding to performance of private institutions in zones 3-6 do not state the actual performance of this type of institution in that part of the country. They must rather be understood to provide a quantitative answer to the following question: how would the services provided by an institution with these characteristics perform in that part of the country?

Our estimates predict that private institutions in zones 4 and 5 would have performed effectively and would have achieved better results than they did in zones 1 and 2. In addition, they would have outperformed CECATI and CEBETI in helping men find a job faster and in keeping it for a longer period.

This interpretation follows because the parameters in these cells were obtained from the hazard models of table 9, which constitute useful models to predict the effect of the program beyond the sampling frame.

V Impact on Wages of Trainees and Cost Benefit Analysis of the Program

To assess the effect of PROBECAT on the income of the beneficiaries, one of the questions that must be addressed is: what would wages of trainees have been, if they had not participated in the program? The other question concerns the number of additional days a person is employed during the year, relative to what would have been the case if they had not participated in PROBECAT. The combined effect of these two components, and not only one of them, must be measured to assess benefits attributed to a training program for unemployed workers.

In the subsections that follow we estimate the impact of PROBECAT on wages of participants in the school based modality using two different methods.

In the first one we use pre and post treatment levels of hourly wages, while in the second one we only compare post-treatment levels of hourly wages.

For the first method, we matched data from both participants and non-participants of the program, based on the same procedure explained in section II, i.e. on the basis of pre-treatment characteristics. For the second one we used Heckit regressions[28].

The assumption that selection into a program does not occur on the basis of unobservable gains from it can be crucial for this type of analysis. Unlike the first method, the second one does not rely on this assumption.

In the last part of this section, we discuss how the impact of the program on duration of a job and on reducing the number of days spent searching for one can be measured using the estimates of hazard models.

a) Use of the difference-in-difference matching estimator to evaluate counterfactual post-training wages of participants

[28] Both methods implicitly assume that the program has no effect on reservation wages of individuals that did not work. That is, we only consider post-training wages if the person had a job.

Following the procedure explained in section II and based on his or her propensity score, each member of the participant group was again matched with a member of the non-participant group[29].

For each pair of matched individuals we calculated two results. On the one hand, we calculated the difference between the level of hourly wages of a trainee a year after he (she) finished the program and the corresponding level of his (her) match in the non-participant group. On the other hand, for the same pair of individuals, we calculated the differences between the level of hourly wages earned in the job held prior to the beginning of the program[30] and the corresponding level of the other person.

The average of these results for all pairs in the sample was then obtained and the difference-in-difference matching estimator[31] was finally calculated. This estimator was obtained by subtracting from the averaged-out difference in levels of post-training hourly wages the averaged-out differences in pre-training levels of hourly wages.

The difference-in-difference matching estimator was negative for men with previous working experience and positive for women with working experience. This indicates that only for women did the program have a positive impact on post-training hourly wages.

To calculate what the average level of wages of trainees would have been, a year after the program started, if they had not participated in PROBECAT, we added the value of the difference-in-difference matching estimator to the average post-training hourly wages of participants[32]. Tables 23 and 24 present these results.

The first row of table 23 shows that the post-training levels of hourly wages of men with working experience are, on average, below what participants would have earned if they had not received the services from PROBECAT. When the same calculations are made by type of institution, the conclusion is not

[29] The number of couples totaled 1307 for men and 187 for women.
[30] It was possible to approximate the data to the same point in time in spite of the fact that treatment group had longitudinal data while for the control group had repeated cross section data.
[31] *Cfr*. Todd, P. (1999).
[32] This is just another way of stating that each participant of the program would have registered the same change in hourly wages as his or her corresponding matched individual, even if their pre-treatment levels differed from each other.

modified, with one exception: men trained in CETI, who registered a small benefit from the program.

In contrast, as shown in table 24, the average effect on the post-training hourly wages of women with working experience is positive: the mean gain is 12% relative to their hypothetical earnings if they had not participated in the program.

When the impact of the program on women is calculated by type of institution, the result is that three institutions (CONALEP, CECATI and CEBETI) have a positive impact on hourly wages of trainees, private institutions have no impact, and CETI and other institutions have a negative impact.

Table 23
Levels of Hourly Wages in Mexican Pesos for Men with Previous Work Experience
Difference-in-difference matching estimators method

	Pre-treatment	One year after training	One year after if trainee had not participated
Total Sample	4.17	4.63	4.99
CONALEP	4.30	4.76	5.36
CECATI	4.24	4.70	4.82
CEBETI	3.84	4.09	4.43
PRIVATE INST.	4.61	5.32	6.00
CETI	3.88	4.46	4.41
OTHER INST	4.02	4.57	4.38

Table 24

Levels of Hourly Wages in Mexican Pesos for Women with Previous Working Experience

Difference-in-difference matching estimators method

	Pre-treatment	One year after training	One year later if the trainee had not participated
Total Sample	3.64	5.24	4.43
CONALEP	3.61	6.16	4.50
CECATI	3.21	4.71	4.46
CEBETI	3.93	4.06	4.01
PRIVATE INST.	3.42	3.76	3.76
CETI	7.19	5.22	9.50
OTHER	3.08	6.38	3.25

b) Use of selection-bias correction models to evaluate counterfactual post-training wages of participants

The procedure used above to assess the impact effect of the school-based modality of PROBECAT on hourly wages is based on the assumption that, conditional on a set of pre-treatment observable characteristics, the outcomes of non-participants have the same distribution that participants would have experienced if they have not participated in the program. It depends on the assumption that enrollment in the program does not occur on the basis of unobservable gains from it.

Using this procedure, we found that, on average, the hourly wages of men with working experience were 7% below what would have been if they have not participated in the school based modality of the program. In order to consider the robustness of this result, in this subsection we use different assumptions to recalculate the impact of training on wages of male participants with working experience. This procedure is based on the so-called Roy's model of potential-outcome approach to causality[33].

This model allows for selection into the program on the basis of unobserved components of outcomes. It assumes two mutually exclusive "states" or "sectors": participate or not in the program, and then postulates a function that determines hourly-wages on the basis of a vector of variables for each sector. In turn, a selection equation is specified to determine which outcome is observed. The equations of the model are specified as follows:

$$y_0 = \alpha_0 + X\beta_0 + u_0 \tag{7}$$

$$y_1 = \alpha_1 + X\beta_1 + u_1 \tag{8}$$

$$d^* = Z_i\delta + \varepsilon \quad d = \begin{cases} 1 & d^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{9}$$

The variable y represents the logarithm of hourly wage earned by workers a year after the training program started. Subscripts 1 and 0 denote, respectively, outcomes in two mutually exclusive "states" or "sectors": participate or not in

[33] This model states that the causal effect of treatment on the treated can be identified by comparing the actual results of the program on individuals with the results that would have obtained if they had not participated in the program.

the program[34]. In turn, u_0 and u_1 represent the unobservable components of each equation.

The variable *d** is a latent variable which generates the observed participation decision variable *d* (*d*=1 denotes participation in the training program and *d*=0 denotes non-participation). *Z* denotes a vector that determines participation in the program[35].

The vector *X* of observed characteristics determining the log of hourly-wages is constituted by: years of accumulated working experience, its square value, six variables representing levels of education, and eight variables representing type of occupation a year after the program finished. The vector in the selection equation *Z* includes, in addition to experience and level of education, type of occupation in last job held before the program started.

To calculate the effect of PROBECAT on wages of trainees a year after the program finished, we estimated the average gain from receiving PROBECAT services for those that actually participate in the program, a parameter identified as Treatment on the Treated (TT). In terms of the model, it corresponds to the expected log hourly-wage gain for participating, as opposed to not participating, given characteristics X, *viz,* $E(y_1\text{-}y_0 \mid X)$.

If it is assumed that the vector (u_0, u_1, ε) is independent of X and Z, then the parameter TT can be algebraically represented by[36]:

$$TT(x,z,D(z)=1)=\alpha_1-\alpha_0+x(\beta_1-\beta_0)+E(U^1-U^0 \mid z\delta+\varepsilon\geq 0) \qquad (10)$$

Under the following normality assumption:

$$\begin{pmatrix} u_0 \\ u_1 \\ \varepsilon \end{pmatrix} \rightarrow N(0,\Sigma_3) \qquad \text{w here} \qquad \sum\nolimits_3 = \begin{pmatrix} \sigma_0^2 & \sigma_{01} & \sigma_{0\varepsilon} \\ \sigma_{01} & \sigma_1^2 & \sigma_{1\varepsilon} \\ \sigma_{0\varepsilon} & \sigma_{1\varepsilon} & 1 \end{pmatrix}$$

[34]Either y_0 or y_1 is observed for each person but not both. Therefore, the observed logarithm of hourly wages can be expressed by: $y=dy_1 + (1\text{-}d)y_0$.

[35]An exclusion restriction, that there is at least one element of Z that is not contained in X, is required. It implies that at least one variable affects the program participation decision without affecting the post-program earnings.

[36] This is shown in Heckman, Tobias and Vytlacil (2000).

equations (7) and (8) can be restated by:

$$y_0 = \alpha_0 + X\beta_0 + \rho_1\sigma_1(z\delta)/\Phi(z\delta) + u_0^{'} \quad (7a)$$

$$y_1 = \alpha_1 + X\beta_1 + \rho_0\sigma_0\phi(z\delta)/[1-\Phi(z\delta)] + u_1^{'} \quad (8a)$$

where $\rho_0 \equiv \text{corr}(u_0,\varepsilon)$, $\rho_1 \equiv \text{corr}(u_1,\varepsilon)$ *and* $\phi(z\delta)/\Phi(z\delta)$ is the so-called inverse of the "mills ratio". In turn, $u_0^{'}$ and $u_1^{'}$ have a normal distribution.

It is with (7a) and (8a) that the unbiased estimates of vectors β_1 and β_2 in (7) and (8) $_{can}$ be obtained.

In turn, the expression for treatment on the treated, TT becomes:

$$TT(x,z,D(z)=1) = \alpha_1 - \alpha_0 + x(\beta_1 - \beta_0) + (\rho_1\sigma_1 - \rho_0\sigma_0)\phi(z\delta)/\Phi(z\delta) \quad (10a)$$

With a two-step Heckit procedure we obtained point estimates of the treatment-on-the-treated parameter, represented algebraically by (10a).

The independent variables in the outcome equations (7) and (8) were: experience and its squared value, six different levels of formal education, marital status and occupation in the job a year after the program began.

By means of a probit regression we estimated (9) with the vector Z composed by years of job experience, six different levels of formal education, the time spent without a job before they started their training; the characteristics of his/her previous job according to whether it was in formal or informal sector, whether it was part or full time and if the person was self-employed or wage earner; reasons why the previous job was left –marriage, care of children or relative, market reasons, unsatisfied with the job and to study; and occupation in their last job prior to the program - ten different types.

We computed the appropriate selection correction terms for equations (7a) and (8a), namely $\phi(z\delta)/\Phi(z\delta)$ for the former and $\phi(z\delta)/[1-\Phi(z\delta)]$ for the latter, evaluated at the estimated values of δ. The 'mills ratio' was statistically significant at a 5% level, indicating that it is not possible to reject the assumption that individuals select into the program on the basis of unobservable gains from it.

The estimated parameters ρ_0, σ_0, ρ_1, σ_1 are presented in table 25 and the probit and outcome regressions (9), (7a) and (8a) are relegated to the appendix, to tables 28 and 29.

Table 25
Roy model of Potential Outcomes

ρ_0	0.393
σ_0	0.414
ρ_1	-0.345
σ_1	0.369
Treatment on the treated	–24%

Estimated with results presented in tables 28 and 29 in the appendix

For given values of X and Z and using the unbiased vectors β_1 and β_2 parameters presented in table 31, we obtained -as suggested in Heckman, Tobias and Vytlacil (2000)- point estimates of the treatment-on-the-treated parameter, represented algebraically by (10a).

The result obtained with this procedure was that those men who chose to participate in PROBECAT ended up a year after they made this decision with an hourly wage which was on average 24 percent below what they would have earned had they not participated.

Thus, despite the different assumptions about selection into the program, this procedure comes to the same conclusion as the previous one, and we cannot reject the fact that the impact of PROBECAT on the post-training hourly wages of male trainees is negative. That is, they would have earned a higher hourly wage if they have not participated in the program.

c) Remarks on the discrepancy in results due to the use of different methods to estimate the impact of the program on hourly wages

Although the conclusion of a negative impact on post-training wages is a robust one, the magnitude of the TT parameter turned out to be much larger using the second procedure. Two possible explanations for this large discrepancy in magnitude of the parameter of interest can be suggested.

The first one is that the statistical properties of the comparison group differed substantially from those that would be obtained from an experimental evaluation, because selection into the program occurs on the basis of unobservable gains. If this were the case, then the procedure based on the Roy model would be more reliable because of its robustness to violations of the assumption that there is no self-selection by individuals into PROBECAT.

The other possible explanation would point out that the difference-in-difference matching estimator is a more reliable result than the other one. This could have occurred because the magnitude of the parameter obtained with the Roy model postulated here did not allow for time-invariant unobservable differences, while the other one does. That is, unlike the matching method of difference-in-differences in the level of wages, the model postulated here does not explicitly refer to post-treatment relative to pre-treatment level of hourly wages.

An alternative version of the Roy model could be postulated to obtain the treatment-on-the-treated parameter corresponding to proportional changes in the level of hourly wages. That is, one that postulates for each sector an equation that determines the difference between the logarithm of post-training level of wages and the logarithm of pre-treatment level of wages.

It is worth mentioning that this procedure would refer to proportional changes in level of wages, while the result presented in table 23 refers to comparison in its levels.

However, to consider this kinds of model one must explicitly address the question of why the members of comparison group could have pre-treatment level of wages below those of the treatment group and what is the implication of this for the different methods of evaluating the impact of the program[37].

d) Cost benefit analysis of the program when income profile considers effect on re-employment dynamics

In cost-benefit analysis of training programs, the net cost of training per participant, which we assume is incurred in year 0, is compared with benefits attributed to them. These benefits are assumed to occur within a certain time

[37]It must be pointed out that if the difference-in-difference matching estimator which was used to obtain the results in table 23 is divided by pre-treatment level of hourly wages of participants and the actual proportional change in hourly wages is subtracted from this result, the impact of the program becomes positive.

span (*e.g.* in a year or a number of years). If the data indicates that the program had a negative effect on earnings, a negative rate of return is assigned. Thus we obtain "a rough sense of whether the government has made a good investment in the training program."[38]

The effect that a program for unemployed workers has on the earnings of its beneficiaries must not be measured exclusively in terms of its short-term impact on wages[39]. Thus, the impact that PROBECAT might have on the yearly earnings of its beneficiaries, due to a reduction in time spent searching for a job and an increase in the time they hold on to their jobs, can imply a positive and high rate of return of the program. This will be the case even when the program does not have a positive impact on hourly wages of trainees within a year.

That is, if improving the job prospects of unemployed workers is one of the objectives of the program, then an integral cost-benefit analysis must quantify the effects of the program on earning due to changes in number of days an individual worked during a year, relative to what would have been the case if they have not joined the program, as well as on wages. It must also quantify the reduction in cost of job searches, when jobs are found faster.

The results of the hazard rates models presented in section IV provide the estimates required for quantitative measurements of the impact of the program on job duration and on reducing the length of job searches. In our interpretation of the results of tables 12-16 and 21-22 in that section, we stated that if the value that captured the effect of the program on hazard rates out of unemployment (employment) was above (below) unity, it implied a positive impact on re-employment dynamics. We further stated that we could deduce from this parameter the percentage reduction (increase) in time searching for a job (in a job), relative to what would have been the case if the individual had not received the training provided by PROBECAT. We can therefore calculate the number of additional days that an individual worked during the year due to participation in the program.

For hazard rates out of unemployment, we can calculate the percentage reduction (or increment) in the time required to find a job. Multiplying this figure by the average number of days that matched non-participants spend

[38] Friedlander *et. al.* (1997) p. 1832.

[39] By lowering transition rates out of unemployment and increasing transition rates out of employment, a program might indirectly achieve the objective of improving human capital with trainees exposed to the skill improving activities associated to working –once they finished their training- for longer periods of time. This indirect effect might only be reflected in time periods of more than a year.

looking for a job, we obtain the gain in days of employment attributable to the program.

In turn, for the case of hazard functions out of employment, it is possible to calculate the increase in the number of days during which participants were able to retain their jobs. For this purpose, we can multiply the inverse of the parameter that captures the effect of the program in the hazard function by the average number of days that matched non-participants spend in their first employment.

With the number of additional days worked due to participation in the program, it is possible to calculate the net change in the income earnings of a participant during the first year of the program for a given (negative) impact of the program on hourly wages[40].

VI Conclusions

We estimated the effect on the re-employment dynamics of its beneficiaries of training provided by PROBECAT in its two modalities: school-based and mixed.

We extended previous work by considering the possibility that once an unemployed worker finds a job, he or she might be employed for a longer period of time thanks to the training offered by PROBECAT. We were able to show that, in a large number of cases, by increasing the length of employment of participants, the net effect of the program on re-employment dynamics is positive, in spite of the fact that participants generally took longer to find a job, compared to non-participants.

We showed that it is important to differentiate effects according to both geographic areas and institutions providing the school-based modality of the program.

Only in the southern states of Mexico the six sets in which we grouped the training institutions offering this modality of the program were overall effective

40The number of hours worked during a day is another variable that could be considered as an outcome of the evaluation and incorporated in the estimation of net income effects of the program.

in improving employability prospects of male and female trainees[41]. Unemployed individuals with working experience trained there not only found jobs faster than what would have been the case had they not joined the program, but they also remained employed for a longer period of time. Moreover, our estimates showed that male workers that were not able to retain their job for longer, still found another one relatively faster than what would have been the case, had they not benefited from the services provided by PROBECAT. In the rest of the country the institution CEBETI and those centers run by the private sector also had an overall positive impact on re-employment dynamics of men with working experience.

As was the case with men, we found that the impact of PROBECAT on the women who participated in the program differed widely, depending the institution offering the training, and the region in which the training was offered.
We found that women with previous job experience trained in CONALEP in the Northern region of the country (excluding in bond zones) did not benefit from the school-based modality of PROBECAT. This is also the case for women in the states along the east coast of Mexico, with the exception of those who participated in the CEBETI program, whose net effect is ambiguous because of a positive effect on employment retention counteracting an adverse effect on helping to find a job faster.

Evaluating the impact on re-employment dynamics with extended model specifications to consider if effects were the same with groups of trainees with different pre-treatment characteristics, we obtained results that suggest that the school based modality of the program might no longer be most helpful in achieving the aim for which it was created more than fifteen years ago, namely to help workers who lost their jobs because of a recent macroeconomic recession or structural changes in the economy. We found that male trainees unemployed for more than six months, and women who left their previous job because they married or to take care of children or of relatives, benefited most from the services provided by PROBECAT.

Overall, the mixed modality of PROBECAT was effective in improving re-employment dynamics of men with working experience in all the regions in which the country was divided. The positive impact of this modality of the program was especially strong in the southern states.

[41] This was also the case for male trained in the in-bond zones in the northern states, where no female participants were available for this evaluation.

In the western and northern regions of the country (excluding in-bond zones) women benefited by increasing the time they hold on to their jobs, relative to what it would be the case if they have not participated in the mixed modality of PROBECAT. It was only in the northern regions where they benefited as well by getting a job relatively faster than would have been the case if they have not joined the program.

The econometric framework deployed in this paper allowed us to use our estimates to predict the effect of PROBECAT beyond the sampling frame. Among other predictions of performance of training institutions where no trainee was registered, we concluded that those run by the private sector would have outperformed CECATI and CEBETI in helping men find a job faster and in keeping it for a longer period.

The evidence on hourly wages was different for man and women. On the one hand, we found that the hourly wages of women with working experience a year after training in the school-based modality were on average 12% greater than the estimated levels they would have attained had they not participated in the program. On the other had, the evidence from two different methods used to measure the impact on wages of males with previous working experience indicated that their hourly wages a year after receiving their training in this modality would have been higher had they not participated in the program.

These results help illustrate the fact that an integral cost-benefit analysis of programs for unemployed workers must quantify, along with effects on wages, effects on earnings due to changes in number of days participants worked during a year, relative to what would have been the case if they had not joined the program.

Once these effects are included, the impact of the program in most cases becomes positive. For some cases, such as for women in the southern states of Mexico trained in the school-based modality of the program, the rate of return on earnings of its beneficiaries remains unambiguously positive and its value would have been underestimated if the effects on re-employment dynamics had not been considered. In the case of men trained there, earnings increased as well. However, this was because in net terms the increase in earnings due to the additional days they worked during the year more than compensated lower earnings attributed to the negative impact of the program on their hourly wages.

References

Bonnal, L. *et al.* (1997) "Evaluating the Impact of French Employment Policies on Individual Labour Market Histories". Review of Economic Studies 64, p.683-713.

Calderón-Madrid, A. (2000) "Job Stability and Labor Mobility in Mexico: a Study based on Duration Models and Transition Analysis". IDB Research Network Working Papers. November 2000. R419.
(http://www.iadb.org/res/32.htm)

Eberwein, C. Ham, J. and Lalonde, R. (1997) "The Impact of Being Offered and Receiving Classroom training on Employment Stories." Review of Economic Studies.

Friedlander, D., D. Greenberg and P. Robins (1997) "Evaluating Government Training Programs for the Economically Disadvantaged". Journal of Economic Literature. Vol. XXXV December. P. 1809-1855.

Ham, J. and R. Lalonde (1996) "The Effect of Sample Selection and Initial Conditions in Duration Models: Evidence From Experimental Data on Training." Econometrica, 64, pp.175-205.

Heckman, J., H. Ichimura, and P. Todd (1997) "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program". Review of Economic Studies 64 (4), pp. 605-654.

Heckman, J., J. Lalonde, and J. Smith (1999) "The Economics and Econometrics of Active Labor Market Programs" *Handbook of Labor Economics, Volume III*. O. Ashenfelter and D. Card, editors. Amsterdam: North-Holland.

Heckman, J., J.L. Tobias and E. Vytlacil (2000) "Simple Estimators for Treatment Parameters in a Latent Variable Framework with an Application to Estimating Returns to Schooling" NBER Working Paper 7950. October 2000.

Kieffer, N. M. (1988) "Economic Duration Data and Hazard Functions". Journal of Economic Literature, vol. 26, June.

Lancaster, T. (1990) "The Econometric Analysis of Transition Data". Cambridge University Press.

Rosenbaum, P. and D. Rubin, (1983) "The Central Role of the Propensity Score in Observational Studies for Causal Effects". Biometrica, vol. 70, pp. 45-55.

Revenga, A, M. Riboud and H. Tan (1994) "The Impact of Mexico's Retraining Program on Employment and Wages." The World Bank Economic Review, Vol. 8, No. 2, pp.247-278.

Rosenbaum, P. and D. Rubin (1983) "The Central Role of the Propensity Score in Observational Studies for Causal Effects". Biometrika, vol. 70, pp. 41-55.

STPS (1995) "Evaluación del Programa de Becas de Capacitación para Desempleados". Dirección General de Empleo. Secretaría de Trabajo y Previsión Social. Mexico City. August

Van Ours, J. (2000) "Do Active Labor Market Policies Help Unemployed Workers to Find and Keep Regular Jobs?" Discussion Paper no. 0010, Center for Economic Research, Tilburg University.

Van den Berg, Gerard (2000). "Duration Models: Specification, Identification, and Multiple Durations" (Prepared for the Handbook of Econometrics, Vol. V, to appear in 2001)

Wodon, Q. and M. Minowa (1999) "Training for the Urban Unemployed: A Reevaluation of Mexico's Probecat". Government Programs and Poverty in Mexico, report no. 19214-ME. Washington D. C.: World Bank.

World Bank (2000) "Securing Our Future in a Global Economy". World Bank Latin American and Caribbean Studies. Washington, D. C.

APPENDIX

TABLE 25

Variables used as determinants of the probability of program participation functions and as co-variates in the multispell models

Reasons why the previous job was left

Marriage, childbearing care of children or other relative, equals 1, zero otherwise.

Left their job due to market reasons (fired, end of contract), equals 1, zero otherwise.

Left their job voluntarily because of a change of address or job dissatisfaction, equals 1, zero otherwise.

Left their job to study, equals 1, zero otherwise.

Geographic Region[42]

zone 1: In Western region of Mexico, equals 1 zero otherwise.

zone 2: In Northern region of Mexico, equals 1 for persons zero otherwise.

zone 3: In the Coast of Mexico, equals 1 for persons zero otherwise.

zone 4: In Bond (*maquiladora*) Northern Region of Mexico, equals 1 for persons zero otherwise.

zone 5. In the South states of Mexico, equals 1 for persons zero otherwise.

zone 6: In Mexico City and Central Area of Mexico, equals 1 for persons zero otherwise.

Unemployment duration before the beginning of the training program

Less than one month equals 1, zero otherwise.

Between one and two months, equals 1, zero otherwise.

More than two and up to three months equals 1, zero otherwise.

More than three and up to six months equals 1, zero otherwise.

More than six months equals 1, zero otherwise.

Characteristics of previous job

formal sector43, wage earner and worked more than 35 hours: equals 1, zero otherwise.

---

[42] The 'municpalities' that constitute each region are available from the authors upon request.

[43] Defined as having social security insurance registration, called *Seguro Social*. and *ISSTE* in Mexico.

formal sector, wage earner and worked less than 35 hours: equals 1, zero otherwise.
formal sector, non-wage earner (i.e. self-employed) and worked less than 35 hours: equals 1, zero otherwise.
informal sector, wage earner and worked less than 35 hours: equals 1, zero otherwise.
informal sector, non-wage earner (i.e. self employed) and worked less than 35 hours: equals 1, zero otherwise.
formal or informal sector, non-wage earner (i.e. self-employed) and worked less than 35 hours: equals 1, zero otherwise.

Gender: Equals one if female, zero if male

Age: units of this variable is in years divided by ten.

Family position
Head of household: equals one, zero otherwise.
Second salary in household: equals one, zero otherwise.
Son, daughter or other position different from the above: equals one, zero otherwise.

Civil Status
Single: equals one, zero otherwise.
married or 'free union'; equals one, zero otherwise
divorced or widow: equals one, zero otherwise.

Education
-Desc1: incomplete primary equals one, zero otherwise.
-Desc2: complete primary school and incomplete secondary education equals one, zero otherwise.
-Desc3: post-primary courses equals one, zero otherwise.
-Desc4. incomplete secondary school education equals one, zero otherwise.
-Desc5: complete secondary education equals one, zero otherwise.
-Desc6: incomplete post-secondary school training courses equals one, zero otherwise.
-Desc7: complete post-secondary school training courses equals one, zero otherwise.
-Desc8: incomplete high school education equals one, zero otherwise.
-Desc9: complete high school education equals one, zero otherwise.
-Desc10: education above the previous one equals one, zero otherwise.

Occupation in previous job

Ocu1: technician equals one, zero otherwise.
Ocu2: agricultural activities equals one, zero otherwise.
Ocu3: handicraft and repairing activities equals one, zero otherwise.
Ocu4: fix machinery operator equals one, zero otherwise.
Ocu5: assistant in repairing and maintenance activities equals one, zero otherwise.
Ocu6: drivers and assistant of machinery handling equals one, zero otherwise.
Ocu7: administrative activities equals one, zero otherwise.
Ocu8: trade and selling activities equals one, zero otherwise.
Ocu9: personal services in established places equals one, zero otherwise.
Ocu10: domestic services equals one, zero otherwise.

Table 26

LOGIT Results for the matching procedure
Participants in the School-based training modality
Individuals with prior working experience.

Variables	Coef	Z
Left job due to marriage or care of relative	-1.81	-4.70
Left job due market reasons	-2.02	-7.87
Left job voluntarily due to unsatisfaction or change of address	-1.21	-4.74
Zone1	1.73	5.77
Zone2	0.61	2.12
Zone3	0.32	1.10
zone5	1.91	5.44
zone6	1.15	3.79
Head of household	0.25	0.87
Son/Daughter	-0.04	-0.11
Single	-0.58	-2.44
Un. between one and two months	0.18	0.87
Un. more than two and up to three months	0.34	1.44
Un. more than three and up to six months	0.75	3.48
Un. more than six months	0.47	2.12
Full time wage-earner, formal sector f.f.m35	1.80	8.06
Part time wage-earners	1.65	5.29
Full time self employed	1.74	6.24
Full time wage-earner, informal sector i.f.m35	1.61	6.76
Education (5 categories)		

Previous job occupation (9 types)		
Sex	-.40	-2.25
Age	0.41	8.45
Age Squared	-0.005	-7.98
Desc2	1.33	4.84
Desc3	0.87	1.44
Desc4	2.19	6.94
Desc5	2.66	9.34
Desc6	2.13	4.02
Desc7	0.67	2.02
Desc8	2.42	6.91
Desc9	2.70	7.56
Desc10	0.33	1.01
ocu1	0.33	1.06
ocu2	2.90	4.98
ocu3	1.01	4.38
ocu4	1.57	4.87
ocu5	1.50	6.09
Ocu6	0.23	0.64
Ocu7	0.81	3.23
Ocu8	1.35	5.13
Ocu9	1.24	4.33
Ocu10	1.61	3.58
Constant	-8.80	-8.51

Number of obs = 2685
LR chi2(41) = 792.76
Prob > chi2 = 0.0000
Log likelihood = -839.57331
Pseudo R2 = 0.3207

Table 26

	(Supplement to table 9) **Men in the school-based training modality with prior working experience Estimated parameters of proportional hazard models**			**(Supplement to table10)** **Women in the school-based training modality with prior working experience Estimated parameters of Proportional hazard models**	
Variables	h_{u1}	h_e	h_{u2}	h_{u1}	h_e
Desc2	0.74	2.31	0.87	1.51	1.40

	(-2.59)	(3.99)	(-0.44)	(1.35)	(0.53)
Desc3	0.47 (-2.16)	0.77 (-0.26)	n.a.	0.58 (-1.16)	3.58 (1.34)
Desc4	0.80 (-1.92)	2.70 (4.78)	0.80 (-0.71)	1.65 (1.43)	5.74 (2.62)
desc5	0.76 (-2.53)	1.72 (2.61)	1.41 (1.12)	1.23 (0.64)	0.87 (-0.23)
desc6	0.26 (-6.62)	2.29 (2.56)	1.32 (0.58)	1.89 (1.05)	1.78 (0.62)
desc7	0.61 (-2.56)	2.03 (2.40)	1.26 (0.59)	1.15 (0.42)	0.43 (-1.32)
desc8	0.75 (-2.26)	2.36 (3.80)	1.39 (1.01)	1.49 (0.98)	0.63 (-0.58)
desc9	0.62 (-3.69)	2.22 (3.56)	0.83 (-0.54)	0.61 (-1.19)	1.72 (0.69)
desc10	0.62 (-3.25)	1.13 (0.46)	0.38 (-2.33)	0.47 (-1.69)	0.61 (-0.40)
ocu1	1.13 (0.91)	1.43 (2.09)	0.74 (-0.96)	0.86 (-0.32)	n.a
ocu2	0.61 (-3.10)	n.a.	n.a.	0.99 (-0.01)	n.a
ocu3	0.94 (-0.75)	1.50 (3.66)	0.91 (-0.56)	1.23 (0.83)	1.08 (0.18)
ocu4	1.00 (0.01)	1.54 (2.97)	1.80 (2.98)	1.07 (0.25)	3.12 (2.56)
ocu5	0.63 (-4.91)	2.32 (7.36)	1.59 (2.95)	0.57 (-1.71)	0.09 (-2.99)
ocu6	0.88 (-1.02)	n.a.	n.a.	0.24 (-1.34)	n.a
ocu7	0.90 (-1.01)	0.64 (-2.58)	0.73 (-1.25)	0.65 (-1.96)	2.44 (2.32)
ocu8	0.97 (-0.33)	1.31 (1.98)	1.25 (1.21)	0.65 (-1.86)	3.29 (3.21)
ocu9	0.98 (-0.19)	2.42 (6.23)	1.17 (0.82)	0.33 (-4.54)	0.70 (-0.73)
ocu10	0.87 (-0.50)	n.a.	n.a.	(-0.82)	1.66 (0.94)

*The statistic 'z' value is presented in parentesis, states for the value of the coefficient divided by its standard error. When its value is within ± 1.96, it implies that the co-variant is significant at the 5% confidence level. Note that if one of the co-variates belonging to a nested subset is significant, then the related ones are as well, even if their 'z' values are above the critical value.

Table 27

(Supplement to table 11)

Participants in the Mixed-based training modality

Estimated parameters of Proportional hazard models

	Men with prior working experience				**Women with prior working experience**			
Variables	h_{u1} exp(β_i)	Z*	h_e exp(β_i)	Z*	h_{u1} exp(β_i)	Z*	h_e exp(β_i)	
Desc2					2.92	2.60	2.27	1.02
Desc3					6.64	1.45	NA	NA

Desc4	1.69	1.75	1.52	0.99	4.96	3.37	9.73	2.75
Desc56	1.52	1.57	1.14	0.33	1.98	1.59	5.92	2.12
Desc7	0.42	-1.02	0.97	-0.03	1.02	0.04	50.65	3.46
Desc8	2.03	1.63	0.99	-0.02	0.67	-0.61	52.31	3.29
Desc9	1.62	1.15	1.36	0.60	0.49	-0.99	2.43	0.82
Desc10	0.83	-0.28	1.71	0.48	1.60	0.50	162.05	2.30
Ocu1					1.37	0.40	0.01	-2.25
Ocu2					0.33	-1.20	NA	NA
Ocu3	1.26	0.74	0.97	-0.06	0.56	-1.05	0.93	-0.08
Ocu4	2.11	1.93	0.80	-0.39	0.77	-0.46	5.95	1.90
Ocu5	0.69	-1.18	1.49	0.87	0.29	-2.09	4.42	1.41
Ocu7	1.10	0.26	0.37	-1.69	0.55	-1.10	5.07	1.77
Ocu8	1.68	1.32	1.74	1.11	0.46	-1.48	12.88	2.81
Ocu9					0.21	-2.80	8.79	
Ocu10	1.54	1.09	4.48	2.77	0.72	-0.58	9.62	1.96

*The statistic 'z' value is presented in parentesis, states for the value of the coefficient divided by its standard error. When its value is within ± 1.96, it implies that the co-variant is significant at the 5% confidence level. Note that if one of the co-variates belonging to a nested subset is significant, then the related ones are as well, even if their 'z' values are above the critical value.

Table 28

PROBIT Results for the Heckman selection model for two-step estimates
Participants in the School-based training modality
Men with prior working experience

Variables	Coef	Z
Work experience	0.15	5.90
Work experience squared	0.00	-5.33
Left job due market reasons	-1.72	-4.98
Left job voluntarily due to dissatisfaction or change of address	-1.32	-3.78
Zone 1	0.36	1.18
Zone2	-0.28	-0.96
Zone3	-0.17	-0.57
Zone5	1.39	3.21
Zone6	0.27	0.90
Head of household	0.25	0.87
Son/Daughter	-0.04	-0.11
Single	-0.58	-2.44
Un. between one and two months	0.15	0.84
Un. more than two and up to three months	0.14	0.65
Un. more than three and up to six months	0.25	1.32
Un. more than six months	0.56	2.2
Full time wage-earner, formal sector	0.07	0.21
Part time wage-earners	0.07	0.17
Full time self employed	0.41	0.11

Full time wage-earner, informal sector	-0.14	-0.39
Desc23	0.87	3.42
Desc4	1.85	6.06
Desc5	2.06	7.44
Desc67	1.62	4.20
Desc8	2.46	6.91
Desc9	2.26	6.81
ocu1	-0.27	-0.77
ocu2	1.25	2.03
ocu3	0.09	0.38
ocu4	0.43	1.31
ocu5	0.40	1.63
ocu6	-0.31	-0.90
ocu7	-0.26	-0.87
ocu8	0.25	0.77
Ocu9	0.20	0.67
Constant	-0.74	-1.11
Number of obs =	1170	
Censored obs =	119	
Uncensored obs =	1051	
Wald chi2(36) =	214.97	

Table 29

Roy's model of potential outcomes Dependent variable logarithm of post-training wages

	$y_0 = \alpha_0 + X\beta_0 + u_0$		$y_0 = \alpha_0 + X\beta_0 + u_0$	
	Coef.	Std. Err.	Coef.	Std. Err.
Work Experience	0.027	0.006	0.023	0.018
Work Experience^2	-0.001	0.000	0.000	0.000
Desc23	0.038	0.079	0.145	0.132
Desc4	0.170	0.085	0.328	0.212
Desc5	0.141	0.082	0.271	0.207
Desc67	0.163	0.106	0.295	0.225
Desc8	0.287	0.094	0.420	0.259*
Desc9	0.314	0.090	0.271	0.243
Single	-0.084	0.031	-0.164	0.100*
ocu1	-0.147	0.086	0.151	0.200
ocu2	-0.225	0.063	0.022	0.390
ocu3	0.017	0.049	-0.104	0.139
ocu4	-0.048	0.062	0.142	0.201
ocu5	-0.066	0.050	-0.184	0.152
ocu6	-0.017	0.072	-0.033	0.191
ocu7	-0.001	0.067	-0.047	0.167
ocu8	-0.150	0.063	-0.436	0.186**

ocu9	-0.167	0.063	0.006	0.176
_constant	1.124	0.118	1.400	0.241

Mills ratio	0.163	0.086**

**significant at 5% confidence level
* significant at 10% confidence level