The Impact of Mexico's Retraining Program on Employment and Wages

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This article analyzes the impact and effectiveness of the Mexican labor retraining program for unemployed and displaced workers—Programa de Becas de Capacitación para Trabajadores (PROBECAT). The strategy followed is to compare the post-training labor market experiences of trainees with those of a comparison group—a matched sample of unemployed individuals who were eligible for, but did not participate in, PROBECAT. The results of this exercise suggest that participation in PROBECAT reduced the mean duration of unemployment for both men and women trainees and increased the monthly earnings of men, but not of women. The results also indicate that the post-training earnings effect varied systematically by level of education attained, with the largest earnings increases (of about 28 to 37 percent) found for men with six to twelve years of education.

In 1984, as a response to a growing economic crisis, the government of Mexico established a labor retraining program for unemployed and displaced workers—Programa de Becas de Capacitación para Trabajadores, or PROBECAT. Its objective was to dampen the social costs of major economic restructuring and rising unemployment. As adjustment efforts accelerated during the latter half of the decade, the need for policies targeting the unemployed and facilitating their reemployment became more pressing. As a result, in 1987 the retraining program was strengthened and its scope and coverage expanded. Since then, PROBECAT has provided short-term vocational training to more than 250,000 unemployed people.

The Mexican government is currently considering an extension of PROBECAT for several reasons. First, and most important, is concern about the impact of the North America Free Trade Agreement (NAFTA) on migration flows, especially from rural areas, and on unemployment. Second, although the adjustment

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process to date has taken place with relatively little effect on observed levels of unemployment, substantial labor reallocation between expanding and contracting sectors is likely to occur with further liberalization and privatization of the Mexican economy. Third, PROBECAT is the only unemployment program currently in place in Mexico.

In making decisions about the future of PROBECAT, policymakers in Mexico will need improved information about the labor market impacts of retraining on target populations as well as information about the cost-effectiveness of the program. Although evaluating the impact of such a program is an accepted practice in many industrial countries, it is less common among developing countries. A notable exception is the evaluation of Colombia's Servicio Nacional de Aprendizaje training program by Jimenez and Kugler (1987). In part, the lack of evaluation may be due to a paucity of relevant data and to lack of familiarity with program evaluation methodologies. For Mexico, the availability of longitudinal data on both a cohort of PROBECAT trainees and a comparison group of unemployed offers a unique opportunity to study the impact of retraining programs in a developing country.

The purpose of this article is to evaluate the impact of PROBECAT on the employment and incomes of trainees. We seek to address four key questions. First, what is the impact of training on the subsequent employment experiences of trainees? Second, does training increase the speed with which trainees move from unemployment to employment? Third, conditional upon finding employment, what effect does training have on the monthly earnings, work hours per week, and hourly wages of trainees? Fourth, do the monetary benefits from program participation outweigh the costs of providing retraining for the unemployed?

We address these issues by comparing the post-training labor market experiences of PROBECAT trainees with those of a comparison group—a sample of unemployed individuals who were eligible for, but did not participate in, PROBECAT. For the trainees, we use detailed data on the post-training experiences of the 1990 trainee cohort elicited in a retrospective survey conducted by the Secretaría del Trabajo y Previsión Social in 1992. For the comparison group, we use panel data on a random sample of unemployed individuals drawn from the 1990–91 quarterly urban labor force survey Encuesta Nacional de Empleo Urbano (ENEU).

This approach improves on previous evaluations of PROBECAT (see, for example, the reports by the Secretaría de Trabajo y Previsión Social 1988, 1989, and 1990 and Carlson 1991). Earlier studies were subject to several data and methodological limitations. One limitation was the crudeness of wage data. Earnings information was bracketed and reported only in reference to the minimum wage. Another limitation was that there were no comparison groups; the outcomes for training completers six months after completion of the training program were compared with the outcomes for training dropouts three months after dropping out. Both limitations have been overcome in our evaluation.

We use a statistical methodology to account for selection bias arising from the nonrandom selection of individuals into PROBECAT. An alternative, experimental evaluation methodology is to randomly assign individuals into two groups: participants and nonparticipants. Because random assignment avoids the issue of selection bias, the impact of the program can be evaluated by simply comparing outcomes for the two groups. The use of statistical methods for evaluating the programs has both detractors and supporters; several studies suggest that nonexperimental methods may be subject to misspecification error, whereas other studies question whether experimental evaluations are really necessary. LaLonde (1984) and Fraker and Maynard (1985) critique nonexperimental evaluation methodologies; Heckman and Hotz (1987, 1989) defend the statistical evaluation approach; and Levitan (1992) summarizes the advantages and disadvantages of both statistical and experimental approaches to program evaluation. We acknowledge that the statistical methods used here are not immune to criticism, and we therefore caution that the results be interpreted with care—more as initial estimates than as a definitive evaluation of PROBECAT. Nonetheless, we note that the experimental evaluation approach is both politically and practically difficult to implement and thus is not a viable option for many developing countries. In these countries, improving both the quality of data and methodologies used in program evaluation may result in greater payoffs.

Section I provides a broad overview of unemployment in Mexico and of PROBECAT. It also describes several surveys we have used in comparing trainees and unemployed individuals who did not participate in training. Section II discusses several methodological issues that arise in training program evaluations and describes our approach to resolving them. Sections III and IV report our estimates of the effects of training on the probabilities of employment, time to first job, monthly earnings, work hours per week, and hourly wages. Section V presents initial estimates of the cost-benefit ratios of PROBECAT training for men and women participants. We conclude by summarizing the most important findings and discussing their implications.

I. UNEMPLOYMENT AND PROBECAT

According to official statistics, the open unemployment rate in Mexico is relatively low. In 1992 it stood at 2.9 percent of the labor force, and even in the worst years of the adjustment crisis it did not rise beyond 6.1 percent. However, these figures have several shortcomings. First, they refer only to urban unemployment and thus exclude the sizable fraction of the Mexican population living in rural areas. Second, they are based on a loose definition of employment, in which an individual who works at least one hour a week is counted as employed. Third, they include only those individuals who are actively searching for a job. This last point is important because research suggests that the distinction between "unemployed" and "not in the labor force" based on intensity of search is usually very weak (see Clark and Summers 1979 and Summers 1986). This is

Table 1. *Distribution of the Unemployed by Age, Mexico, 1988*

	Men		*Women*
Age	*Standard definition*	*Expanded definition*	*Standard definition*
12–15	4.2	10.7	2.5
16–20	33.3	33.5	36.6
21–25	24.7	19.3	38.1[a]
26–30	13.3	10.5	38.1[a]
31–40	8.8	9.0	11.7
41–50	8.0	9.5	6.9
51–60	5.1	5.9	2.5
61–70	2.6	1.6	1.7

Note: The data are from the Encuesta Nacional de Empleo (1988) survey, which covers all urban areas and a sample of the rural population and contains a sample of about 46,000 households. The standard definition of unemployment defines individuals as unemployed if they are actively looking for a job. In the expanded definition, the unemployed are defined as those under age 55 who are not working, not studying, and not retired but are able to work (not sick or disabled), regardless of whether they are actively searching for a job. Women who report being at home taking care of the house are not counted as unemployed.

a. Refers to the combined age categories 21–25 and 26–30

Source: Authors' calculations from the Encuesta Nacional de Empleo, 1988.

confirmed by our analysis of the employment data for Mexico (Revenga and Riboud 1993). We find a large fraction of idle men—men who are out of work but are able to work, who are not studying, and who are not taking care of a household. When the definition of unemployment is expanded to include these idle men, the aggregate unemployment rate in 1991 rises from 2.8 to 5.5 percent.[1]

Tables 1 and 2 report the distribution of the unemployed by age and by education, respectively. When the standard definition of unemployment is used, 75.5 percent of total unemployment for men is accounted for by individuals age 30 and below. The comparable figure for women is even higher: 77.2 percent. With regard to education, 53.5 percent of total male unemployment and 63.1 percent of female unemployment are accounted for by those with seven to twelve years of schooling. Individuals with completed secondary education (nine years of schooling) account for 20.4 percent of male unemployment and 18.9 percent of total female unemployment.[2] Those with a higher secondary education (ten to twelve years of schooling) account for an additional 20.2 percent of male unemployment and 35.6 percent of female unemployment.

When the expanded definition of unemployment is used, the overall unemployment rate rises as noted above, and the unemployment distribution of men by age and education changes. The proportion of unemployed men age 25 and

1. This figure is calculated for 1991 because that is the last year for which we have access to the detailed unemployment survey tapes. Note that we do not define a comparable group of idle female workers because family responsibilities tend to make their labor market behavior patterns much more complex, with frequent periods out of the labor force.

2. In Mexico there are six years of secondary education following primary school. The first three years are referred to as secondary education, the second three years as higher secondary education.

Table 2. *Distribution of the Unemployed by Education Level, Mexico, 1988*

	Men		*Women*
Years of school	*Standard definition*	*Expanded definition*	*Standard definition*
0	2.4	4.4	1.6
1–5	9.7	12.5	8.6
6	16.0	20.0	14.6
7–8	12.9	12.8	8.6
9	20.4	18.8	18.9
10–12	20.2	18.1	35.6
13 or more	18.4	13.4	12.1

Note: The data are from the Encuesta Nacional de Empleo (1988) survey, which covers all urban areas and a sample of the rural population and contains a sample of about 46,000 households. The standard definition of unemployment defines individuals as unemployed if they are actively looking for a job. In the expanded definition, the unemployed are defined as those under age 55 who are not working, not studying, and not retired but are able to work (not sick or disabled), regardless of whether they are actively searching for a job. Women who report being at home taking care of the house are not counted as unemployed.

Source: Authors' calculations from the Encuesta Nacional de Empleo, 1988.

below increases slightly, from 62.2 to 63.5 percent. Much more striking is the increase in the proportion of unemployed men with less than nine years of completed schooling: from 41 to 49.7 percent. This more economically meaningful, expanded definition of unemployment will be used throughout the analyses that follow.

Program Features of PROBECAT

PROBECAT is administered through the network of state employment offices. Since 1987 it has trained 251,181 unemployed persons and provided 9,268 courses. During the training period, program participants receive a stipend equal to the minimum wage. Upon completion of the course, the local state employment office helps trainees find a job. (Most trainees surveyed, however, found jobs on their own and not through the state employment office.)

The majority of program participants enroll in classroom training, primarily in short-term vocational courses offered through contracts with local private and public institutions. Courses vary in duration from one to six months, the majority of courses (87 percent) lasting about three months. Training is provided in a variety of occupational areas: carpentry, construction, electricity, food preparation, graphic arts and design, handicrafts, machinery, mechanics, refrigeration, services and administration, shoe repair, textiles and apparel, and welding. In principle, courses are organized to respond to the needs of the local labor market and are designed to redress local shortages of workers with particular skills. These needs are determined through periodic studies of local labor market conditions.

Not everyone is eligible to participate in PROBECAT. The selection procedure gives variable weights to different criteria, including the number of economic dependents, attainment of certain levels of basic education, prior work experi-

ence, and unemployment of less than three months. The weighting scheme is quite complex and nonlinear, and only individuals with a total composite score exceeding a threshold level are eligible to join the program. In addition, participants must (in theory) be between the ages of 20 and 55 and be registered as job seekers at the local state employment office.[3] This nonrandom selection of individuals into PROBECAT poses potentially serious measurement problems for an evaluation of the training program.

Data Sources

A number of surveys have been fielded to help monitor and evaluate PROBECAT. The first set of surveys, comprising follow-ups of trainees at three and six months after program completion, has been used in several reports by the Secretaría del Trabajo y Previsión Social (1988, 1989, and 1990). A second, more complete retrospective survey was administered to the 1990 cohort of trainees in early 1992.[4] It elicited a wealth of information on all jobs held between the completion of training and February 1992, including start and end dates for each job, monthly earnings, work hours per week, occupation, and industry. Our evaluation is based on this second PROBECAT survey.

As a comparison group for the trainees, we used a sample of unemployed individuals drawn from the 1990–91 ENEU. The ENEU, a household-based survey of the sixteen main urban areas in Mexico, elicited detailed information on employment status, jobs, monthly earnings, and work hours per week and was broadly comparable to the PROBECAT survey. The ENEU uses a quarterly rotation system so that each rotation group (of households) remains in the survey for five consecutive quarters and then leaves the sample. We obtained panel data for the rotation group that remained in the survey from the third quarter of 1990 to the third quarter of 1991—the period spanned by the trainee data—and drew our comparison group from this sample. This comparison group included all those who were unemployed in the third quarter of 1990 (whom we then tracked for a year). Note that the comparison group is based on the expanded definition of unemployment that includes all individuals who report being out of work the previous week, are able to work, and are not students or retirees, whether or not they are searching for a job. For certain analyses, we have augmented this comparison group with a second cohort of those who became unemployed in the fourth quarter of 1990 (and were not in the first cohort). For the latter cohort, only nine months of data are available.

3. The original age bracket was amended to allow a small number of participants between the ages of 16 and 20. Follow-up surveys also show the presence of a few participants above age 55.

4. This retrospective survey was based on a sample of 1,995 trainees who were administered a three-month follow-up in 1990. Of this original sample, 273 individuals could not be located for the 1992 retrospective survey. Consistency checks also revealed the presence of four individuals in the 1992 survey who were not part of the original sample.

Table 3 presents summary information on the demographic characteristics of the trainee and comparison group samples. In 1990 the average PROBECAT male trainee was 28 years old; the majority had completed primary schooling and some secondary education, and about 41 percent were married. The average female trainee was 29 years old; female trainees were less likely than men to have a higher education, and about 46 percent were married. Almost half the men (42.8 percent) identified themselves as being household heads. It is evident from table 3 that trainees differed from the general population of the unemployed. Compared with the sample drawn from the ENEU, trainees tended to be slightly older. They were more likely to be married, to be the household head, and to have completed secondary school. They also included a higher proportion of women (women were 49.0 percent of the trainee group but only 33.8 percent of the comparison group).

II. The Evaluation Methodology

We estimated the impact of training on several outcome measures: the time taken to exit from unemployment (that is, time to first job); the probability of employment at three, six, and twelve months after the end of training; post-training monthly earnings; work hours per week; and hourly wages. Analysis of such a wide variety of outcome measures departs from the traditional focus of most training evaluations, which is on the impact of training on earnings, with relatively little attention paid to its impact on subsequent employment. An exception is Card and Sullivan (1988), which looks at the impact of training on post-training employment histories. Most studies focus on earnings outcomes, but typically without trying to disentangle the separate effects of training on employment, earnings, hours of work, and hourly wages.

We believe that our approach provides a more complete characterization of program effects than does the traditional approach. For example, earnings comparisons are contingent on having a job, and one impact of training may be to increase the likelihood of employment. Card and Sullivan (1988) provide evidence that a large part of the measured effect of training on earnings is a result of increases in the post-training employment of trainees. Similarly, monthly earnings are the product of hours of work and hourly wage rates, and training may have very different effects on each of these two outcomes.

The principal methodological issue that arises in evaluating the impact of PROBECAT is that of selectivity bias. As table 3 demonstrates, trainees are a nonrandom sample of the unemployed population. Failure to control for the differences in observed characteristics of trainees and the comparison group can lead to biases in estimated program impacts. These biases are potentially exacerbated by systematic differences across groups in unobserved (by the analyst) characteristics, such as motivation, ability, or tastes.

We addressed the selection bias problem using two approaches. The first approach was used in the analyses of the employment effects of training.

Table 3. *Demographic Characteristics of the Trainee and Comparison Group Samples*

Characteristic	Men		Women	
	Trainees	Comparison group	Trainees	Comparison group
Age (average years)	27.9	24.6	29.0	23.6
Married (percent)	41.2	19.7	45.7	21.2
Unmarried couple (percent)	3.8	2.7	3.3	2.1
Average years of school	9.1	7.8	7.8	9.2
Highest educational level reached (percent)				
No formal education	0.1	4.3	0.4	1.6
Primary incomplete	3.4	17.3	9.1	7.9
Primary complete	13.2	22.6	18.1	22.2
Secondary incomplete[a]	17.5	12.1	24.5	12.2
Secondary complete	30.5	18.9	29.7	15.9
Higher secondary	26.6	14.6	13.8	26.5
University	8.6	10.2	4.3	13.7
Head of household (percent)	42.8	23.7	11.6	6.3
Sample size	881	371	845	189

Note: The comparison group includes all unemployed individuals in the third quarter of the 1990 Encuesta Nacional de Empleo Urbano (ENEU).

a. In Mexico there are six years of secondary education following primary school. The first three years are referred to as secondary education and the second three years as higher secondary education.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

PROBECAT's own selection criteria were used to define a matched group of unemployed individuals with attributes similar to those of the trainees. This involves two steps. The first step is to estimate a probit model on the pooled trainee and unemployed samples relating the likelihood of program participation to the PROBECAT selection criteria for which we have data—marital status, number of children, number of dependents, years of education, and time in unemployment. The second step is to limit the comparison group to unemployed individuals with high predicted probability of program participation. A similar approach is followed in Westat (1981, 1984), Bassi (1983), and Geraci (1984).

The second approach, which was used in the analyses of monthly earnings, hours of work, and hourly wage outcomes, is based on the two-stage selectivity correction procedure developed by Heckman (1979). This involves, as before, estimating a model of selection into PROBECAT, calculating a variable to capture the individual's likelihood of program selection, and including this variable as a regressor in the outcome models to control for sample selectivity.

Our use of two different selectivity correction approaches for discrete and continuous outcomes is justified on econometric grounds. The Heckman approach—which we used for earnings and hours worked—relies critically on the nonlinearity of the first-stage probit for identification of the selection correction term in the second stage. Arguably, the same approach is not appropriate for analyzing employment outcomes because the second-stage outcome equations are themselves nonlinear and the observables in the first-stage participation probit are likely to be correlated with the unobservables in the second stage. Therefore, for this set of discrete outcomes, we adopted the matching procedure.

Neither approach to addressing the problem of selection bias is completely satisfactory. In both strategies, we were forced to address the selection issue through the use of cross-sectional control variables, such as level of education and demographic characteristics. This will yield correct estimates if selection into the program is determined solely by observable characteristics for which we are able to control. However, if selection occurs on the basis of unobservable variables, or if it is influenced by variables for which we cannot control, then our estimates could easily be biased. This no doubt detracts from the overall robustness of our estimates of program impacts.

III. Effects of Training on Employment

We began the PROBECAT evaluation by assessing the impact of program participation on the likelihood of employment, both in the short term and over increasingly longer periods of time. First, we asked if participation in the training program had any effect on the time it takes trainees to move from unemployment into a first job. Next, we asked whether trainees systematically differed from the comparison group in their probability of employment after three, six, and twelve months of unemployment. For trainees, unemployment was mea-

sured after completion of training; for the comparison group, it was measured from the third quarter of 1990. Together, the two sets of analyses can be used to draw inferences about the proportion of time both groups spend in employment during the first twelve months.

Time to First Job

What is the impact of PROBECAT on the time to first job? For trainees, it was straightforward to construct a continuous measure of time to first job (expressed in months) using information on the end dates for training and the start dates for the first job. For trainees who had not found a job within the sample period, the time-to-first-job variable was truncated (censored) at February 1992, and this censoring was taken into account in model estimation. Constructing a measure of the time to first job was more difficult for the comparison group. For this group, we had a continuous measure of time in unemployment up until the third quarter of 1990; subsequently, we observed the group's employment status only at discrete points in time (quarterly) over a one-year interval. The issue is that when an individual's employment status first changes from one quarter to the next, we must infer when, within a three-month period, the individual would find a job.

A number of assumptions may be used to estimate the commencement of employment. First, we can treat the unemployment duration reported by the comparison group in the third quarter of 1990 as being representative of the underlying distribution of incomplete unemployment spells. By appealing to steady-state assumptions, we can estimate the distribution of completed spells of unemployment by doubling the duration of incomplete spells reported (see Salant 1977). This assumption is fairly strong, but not absurd for the Mexican data. Revenga and Riboud (1993) show that, in fact, the distribution of completed unemployment spells in the ENEU is remarkably similar to that inferred from the distribution of incomplete spells.

A second approach is to exploit the panel nature of the ENEU data to identify the first quarter in which an individual's employment status changes (that is, when the individual finds a job) or, if the individual remains unemployed at the end of one year, to code the unemployment spell as censored. To compute the time to first job, we can assume that the job was found at the end, in the middle, or at the beginning of that interval. This corresponds to adding 3, 1.5, or 1 month(s) to incomplete unemployment spells first reported in the third quarter of 1990, plus the number of subsequent full quarters of unemployment.

Both approaches, and all three start-time assumptions, yielded similar results, namely, that the time to first job is always shorter for the trainees than for the comparison group. The assumption that the job is found at the beginning of the interval produces the lowest time to first job for the comparison group, as might be expected. The results reported below are based on the second approach,

which uses the most stringent start-time assumption (job found at the beginning of the interval).[5]

We corrected for selectivity bias by applying to the unemployed sample the same criteria used to select trainees into the program. We first estimated an equation for the probability of selection into PROBECAT, using the pooled trainee and unemployed samples. This probit model relates program participation to the criteria for which we have information: marital status, number of children and economic dependents, education, and time spent in unemployment at the selection point. We then limited the comparison group to "eligible" unemployed individuals with a high predicted probability of program participation. The cutoff point used to select these individuals was a predicted probability value of 0.6. All the employment results presented below are based on comparisons of the trainees with the "matched" (selectivity-corrected) sample of unemployed individuals who were eligible for, but did not participate in, PROBECAT.

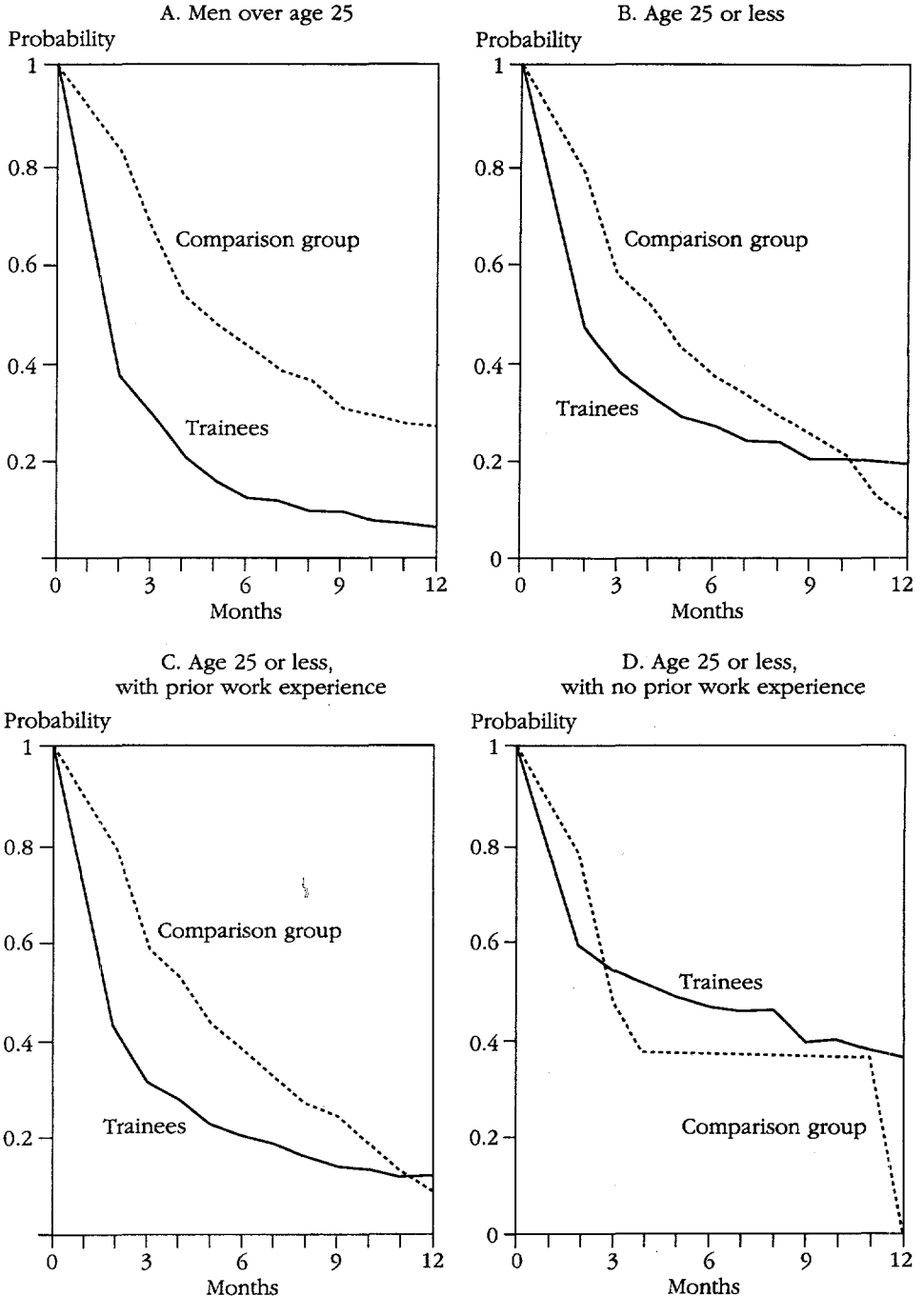
Figure 1 plots survival curves for male trainee and matched comparison groups using the raw duration data on the time to first job. These survival curves, defined as a function of time t (in months), indicate the probability of remaining unemployed t months after entering unemployment. We present separate survival curves for those over age 25 and for those age 25 and under. The survival curves clearly show that trainees exit unemployment more quickly than do individuals from the comparison group: at three months, 62 percent of young trainees have left unemployment compared with just 42 percent of the comparison group. The difference is more marked for the older trainees: 72 percent of them have left unemployment within three months, compared with 33 percent of the comparison group. We estimated that the average duration of unemployment for male trainees under 25 is 1.4 months shorter than that for the comparison group; for trainees over 25, the average duration of unemployment is 3.7 months shorter.

Figure 1 also shows survival curves for young men age 25 and under, both with and without previous work experience. Young trainees with work experience exit unemployment more quickly than comparable individuals in the comparison group. However, for new entrants into the labor force, these patterns are quite different, with some trainees exiting unemployment relatively quickly and others remaining unemployed for a long time. About 39 percent of young trainees without work experience remain unemployed twelve months after training completion. In contrast, all their young counterparts in the comparison group exit unemployment by twelve months. Not surprisingly, for men under age 25, we find that the average duration of unemployment for trainees exceeds that for the comparison group by 1.5 months.

With the exception of age, these graphical comparisons do not control for systematic differences in the demographic characteristics of the trainee and comparison groups. The unadjusted estimates may be misleading if unemployment

5. Results using the first approach and the more lax start-time assumptions are available on request.

Figure 1. *Survival Curves, Men*



Note: The sample sizes are as follows: for panel A, 119 in the comparison group and 437 trainees; for panel B, 252 in the comparison group and 444 trainees; for panel C, 121 in the comparison group and 330 trainees; and for panel D, 131 in the comparison group and 107 trainees.

Source: Authors' calculations.

duration is related to level of education attained or other individual and household characteristics.[6] To address this potential problem, we estimated a Cox proportional hazards model of unemployment duration on the pooled trainee and comparison group samples. This model decomposes the reemployment probabilities (the hazard rate) into a function of time (which is the same for all individuals) as well as other regressors. This regression approach allows us to investigate the impact of training on the time to first job, controlling for both individual and group differences in age, level of education, years of prior work experience, and household attributes.

Table 4 presents the Cox regression results for men. The estimated coefficients on the indicator variables for training are both positive and statistically significant in all cases, confirming the previous finding that trainees exit unemployment more quickly than their counterparts in the comparison group. The size of this estimated coefficient suggests that the average duration of unemployment for the comparison group is 30 percent longer than that for trainees.

Figure 2 plots survival curves for women in the trainee and comparison groups by age group. Like their male counterparts, female trainees appear to exit unemployment more quickly than women who did not undergo training. At three months, 50 percent of female trainees age 25 and under have found employment, compared with 32 percent of the comparison group. For the sample of young women, these differences disappear over the course of the first year; after nine months the survival curves for trainees and the comparison group are virtually identical. For the sample of older women, the difference between trainees and the comparison group increases over time so that 75 percent of trainees have left unemployment after twelve months, compared with just 47 percent of older women in the comparison group.

We also investigated the employment effects for women with different degrees of attachment to the labor force. If training is enhanced by initial skill or education endowments, we might expect training effectiveness to be diminished for women with low attachment to the labor force because of skill obsolescence (Mincer and Ofek 1982). To explore this hypothesis, we distinguished between women who had worked sometime in the six months prior to training and those who had been out of work for a longer period. In the selection process, preference was given to individuals who had been unemployed for less than three months. However, a number of participants surveyed (women in particular) reported being out of work for a longer period. Some women may have been drawn back into the labor force by the training program, and we attempted to flag them under the group that was unemployed for longer than three months. Figure 2 shows the survival curves for these two groups of women. In both cases, trainees fare better than those without training. However, consistent with the hypothesis of skill obsolescence, female trainees who have recently left em-

6. However, a parallel study shows that the only significant determinants of unemployment duration in Mexico are age and having economic dependents (Revenga and Riboud 1993).

Table 4. *Cox Regression Results for Men*

Independent variable	*Regression* 1	2	3	4
Age	−0.009	−0.007	−0.008	−0.007
	(−1.595)	(−1.297)	(−1.551)	(−1.261)
Years of schooling	−0.016		−0.016	
	(−1.370)		(−1.401)	
Number of children	−0.011	−0.008	−0.012	−0.010
	(−0.349)	(−0.269)	(−0.394)	(−0.307)
Dummy variables[a]				
Education				
No formal		0.110		0.106
		(0.284)		(0.272)
Primary incomplete		−0.168		−0.169
		(−0.903)		(−0.908)
Secondary incomplete[b]		−0.015		−0.018
		(−0.116)		(−0.142)
Secondary complete		−0.139		−0.137
		(−1.200)		(−1.184)
Higher secondary		−0.031		−0.037
		(−0.262)		(−0.309)
University		−0.296		−0.299
		(−1.940)		(−1.961)
Household head	0.318	0.311	0.315	0.309
	(3.233)	(3.154)	(3.203)	(3.135)
Prior work experience	0.737	0.742	0.777	0.775
	(5.593)	(5.612)	(5.565)	(5.538)
Training program				
Participant	0.355	0.340		
	(4.101)	(3.840)		
Participant and unemployed six months or less			0.395	0.373
			(4.034)	(3.739)
Participant and unemployed more than six months			0.321	0.312
			(3.380)	(3.215)

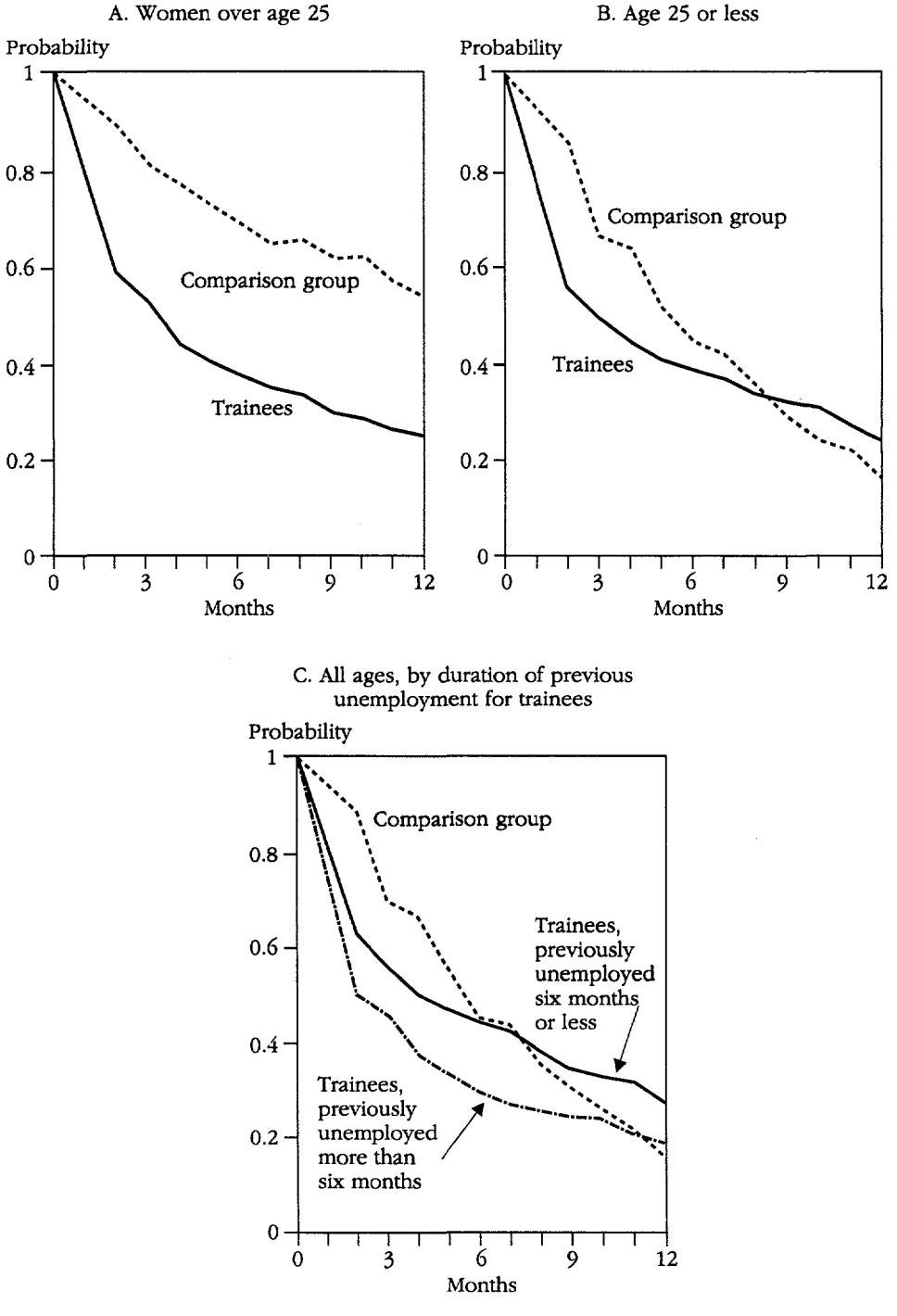
Note: The dependent variable is the log of duration of unemployment, in months. There were 814 observations. *t*-statistics are in parentheses.

a. = 1 if condition holds, = 0 otherwise.

b. In Mexico there are six years of secondary education after primary school. The first three years are referred to as secondary education and the second three years as higher secondary education.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

Figure 2. *Survival Curves, Women*



Note: The sample sizes are as follows: for panel A, 60 in the comparison group and 469 trainees; for panel B, 129 in the comparison group and 376 trainees; and for panel C, 189 in the comparison group, 493 trainees unemployeed six months or less, and 282 trainees unemployeed more than six months.

Source: Authors' calculations.

ployment exit unemployment after training more quickly than do trainees reentering the work force after a long inactive spell.

Table 5 presents the results for women of estimating a Cox proportional hazards model of unemployment duration for the pooled trainee–comparison group samples. The results suggest that differences in exit rates between trainees and the comparison group disappear once account is taken of several individual and household characteristics. The coefficient on the training program participant variable is close to zero. However, this result is due in large part to the differential effects of strong, compared with weak, labor force attachment, shown in figure 2. When an interaction term between training and duration of prior unemployment is included in the Cox model, the results suggest that women who enter training after a relatively short spell of unemployment exit more quickly than those who do not undergo training; those who enter training after a long spell out of the labor force exit more slowly.

Employment Probabilities over Time

We also compared the employment probabilities of trainees and the comparison group over progressively longer intervals of time. The ENEU reports the labor market status of the unemployed sample at three, six, nine, and twelve months after the third quarter of 1990 (when we first observe them). For PROBECAT trainees, we used the start and end dates from their retrospective histories to define variables for labor market status for comparable intervals of time after the completion of training.

In tables 6 and 7 we begin with simple comparisons of the employment status of trainees and the unemployed sample *without* adjusting for program selection effects. These tables show the percentage of each group that reports being employed at three, six, nine, and twelve months, separately by sex and by prior work experience. Table 6 suggests that trainees, on average, are more likely than the comparison group to be employed during the year following training. For men, the difference is about 9 percentage points at three and six months and 5 percentage points at nine and twelve months. For women, the difference between trainees and the comparison group is somewhat smaller, averaging 4 to 5 percentage points over the year. In table 7 we differentiate between new labor force entrants and those with previous work experience. These figures suggest that training is much less effective for new entrants. Although trainees with work experience are usually more likely to be employed than the comparable individuals in the comparison group, trainees without work experience are slightly less likely to be employed at three months and much less likely at twelve months. A similar, but even more pronounced, pattern is found in the samples for women.

This example highlights the importance, in program evaluations, of controlling for group differences in demographic characteristics. As we noted earlier in the methodology section, simple comparisons can be very misleading if trainees differ systematically from the comparison group. In this case, the critical differ-

Table 5. *Cox Regression Results for Women*

Independent variable	*Regression* 1	2	3	4
Age	−0.014	−0.014	−0.011	−0.011
	(−1.866)	(−1.867)	(−1.467)	(−1.481)
Years of schooling	0.005		0.004	
	(0.300)		(0.240)	
Number of children	−0.002	−0.007	0.006	−0.0002
	(−0.056)	(−0.203)	(0.160)	(−0.001)
Dummy variables[a]				
Education				
No formal		0.949		0.876
		(1.305)		(1.208)
Primary incomplete		0.042		0.024
		(0.212)		(0.119)
Secondary incomplete[b]		−0.017		−0.041
		(−0.115)		(−0.276)
Secondary complete		−0.074		−0.109
		(−0.490)		(−0.727)
Higher secondary		0.125		0.123
		(0.787)		(0.769)
University		0.043		−0.0002
		(0.187)		(−0.001)
Household head	0.399	0.390	0.457	0.449
	(2.970)	(2.881)	(3.427)	(3.343)
Prior work experience	0.507	0.506		
	(4.731)	(4.713)		
Training program				
Participant	0.012	0.071		
	(0.098)	(0.543)		
Participant and unemployed six months or less			0.236	0.314
			(1.631)	(2.078)
Participant and unemployed more than six months			−0.153	−0.083
			(−1.175)	(−0.608)

Note: The dependent variable is the log of duration of unemployment, in months. There were 599 observations. *t*-statistics are in parentheses.

a: = 1 if condition holds, = 0 otherwise.

b. In Mexico there are six years of secondary education after primary school. The first three years are referred to as secondary education and the second three years as higher secondary education.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990-91 ENEU.

Table 6. *Employment Outcomes for Trainees and the Unadjusted Comparison Group*
(percentage employed)

Time interval (months)	*Men*			*Women*		
	Trainees	*Comparison group*	*Difference*	*Trainees*	*Comparison group*	*Difference*
3	60	51	9	33	29	4
6	65	56	9	38	32	6
9	66	61	5	38	34	4
12	71	65	6	39	35	4

Note: The table uses the expanded definition of unemployment, in which the unemployed are defined as those under age 55 who are not working, not studying, and not retired but are able to work (not sick or disabled), regardless of whether they are actively searching for a job. Women who report being at home taking care of the house are not counted as unemployed. The time interval is the period from the first observation of the individual. These employment outcomes have not been adjusted for program selection effects. Sample sizes are 1,138 for men and 1,000 for women.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

ence between the two groups appears to be a much greater representation of new labor force entrants in the comparison group. This and other group differences, induced in part by program selection, are explicitly taken into account in the following analyses.

We estimate probit models in which the probability of employment—at three, six, and twelve months—is related to age, education, prior work experience, unemployment duration, a set of seasonal dummy variables, and an indicator variable for whether the individual participated in the PROBECAT program. Two different models are estimated. In one specification, no attempt is made to correct for selectivity bias, and the model is estimated on the pooled trainee and unadjusted comparison group samples. In the second model, the potential selectivity bias issue is addressed (as before) by pooling trainees with a "matched" comparison group—unemployed individuals with high predicted probability of program participation.

The effects of training on subsequent probabilities of employment are summarized in table 8 for men and women.[7] First, consider the results for men. The model without selectivity correction suggests that training produces a weak positive effect on the probability of employment at three months and a zero effect thereafter. Selectivity correction strengthens these results. The corrected estimates show a statistically significant effect of training on the probability of employment at three months, a smaller but still significant effect at six months, but no significant effect thereafter.

For women, the effects of training on employment have a slightly different pattern. When a continuous measure of education is used, the estimates without selectivity correction show that training has no statistically significant impact on the probability of employment. However, in specifications that include dummy

7. The probit regression results on which these estimates are taken are available from the authors.

Table 7. *Employment Outcomes and Work Experience for Trainees and the Unadjusted Comparison Group*
(percentage employed)

Time interval (months)	*Trainees*			*Comparison group*		
	With work experience	*No work experience*	*Difference*	*With work experience*	*No work experience*	*Difference*
			Men			
3	65.0	32.2	5.0	60.0	34.6	−2.4
6	70.6	35.7	0.8	69.8	33.1	2.6
9	71.2	37.4	−2.0	73.2	40.4	−3.0
12	76.4	40.9	1.9	74.5	49.3	−8.4
			Women			
3	43.3	15.1	10.9	32.4	23.8	−8.7
6	50.0	17.4	14.8	35.2	28.6	−11.2
9	50.0	19.0	16.7	33.3	34.5	−15.5
12	50.2	21.6	15.9	34.3	36.9	−15.3

Note: The table uses the expanded definition of unemployment, in which the unemployed are defined as those under age 55 who are not working, not studying, and not retired but are able to work (not sick or disabled), regardless of whether they are actively searching for a job. Women who report being at home taking care of the house are not counted as unemployed. The time interval is the period from the first observation of the individual. These employment outcomes have not been adjusted for program selection effects. Sample sizes are 1,138 for men and 1,000 for women.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

variables for different levels of education, the selectivity-corrected estimates show a positive, statistically significant training effect. Prior experience also appears to be an important determinant of whether training is effective for women. In results not reported here, we find that training has a significantly positive effect on employment at three, six, and twelve months for women with prior work experience but has a negative and statistically significant training effect at three and twelve months for those without work experience.[8]

To summarize, participation in PROBECAT appears to affect subsequent employment probabilities of trainees but does so in quite different ways for men and women. For men, it increases their probability of being employed up to six months after the program but does not have an effect thereafter; this result, taken together with the previous finding that male trainees find jobs more quickly, suggests that they tend to be employed for a greater proportion of the post-training period than the men in the comparison group. For women, training appears to raise employment probabilities only for those with prior work experience, but, unlike with men, this positive training effect persists over the year. In contrast, women without any work experience benefit relatively little, if at all, from training.

8. A substantial proportion of the female trainee sample had no prior work experience. To investigate the potential importance of this variable, we modified the specification of the employment equation to include an interaction term between training and a dummy variable for prior work experience. The results of this model specification are available from the authors.

Table 8. *The Estimated Effects of Training on Employment*
(difference in predicted employment probabilities)

Time interval (months)	Model with education dummy variables		Model with continuous school variable	
	Unadjusted comparison group	Adjusted comparison group	Unadjusted comparison group	Adjusted comparison group
	Men			
3	0.055***	0.084**	0.072**	0.098**
6	0.011	0.055***	0.033	0.077**
12	0.008	0.042	0.015	0.050
Sample size	1,138	943	1,138	943
	Women			
3	0.048	0.089**	0.052	0.054
6	0.069**	0.130**	0.055	0.066***
12	0.061***	0.109**	0.053	0.056
Sample size	1,000	916	1,000	916

** Denotes statistical significance at the 0.05 level.
*** Denotes statistical significance at the 0.10 level.
Note: Values are the estimated differences in predicted employment probabilities due to participation in training. The "unadjusted comparison group" columns are based on a probit model estimated on the pooled trainee and unadjusted comparison groups. The "adjusted comparison group" columns are based on a probit model with selectivity correction in which the matched comparison group is selected from the comparison group sample according to selection criteria used for trainees.
Source: Authors' calculations from the 1992 PROBECAT survey and the 1990-91 ENEU.

IV. Monthly Earnings, Hours of Work, and Hourly Wages

The above analysis suggests that PROBECAT training has a positive but moderate impact on the post-training employment rates of participants. The next step is to investigate whether PROBECAT training also translates into an increase in the post-training earnings of participants.

Data and Summary Statistics

The data set used was constructed from the retrospective PROBECAT survey and a comparison group drawn from two ENEU unemployed cohorts. The first cohort included individuals who were unemployed in the third quarter of 1990 and were tracked for twelve months. The second cohort included individuals who became unemployed in the fourth quarter of 1990 and were not in the first cohort; for this latter cohort, only nine months of information were available. We pooled all observations reporting positive (and usable) earnings at any time during the period of the PROBECAT survey and during the twelve- or nine-month interval in the case of the comparison group.[9] The data set thus contained multiple observations on each individual—observations for every job spell expe-

9. We define usable data as less than 5 million pesos of positive monthly earnings and less than 85 hours of work a week.

Table 9. *Monthly Salary, Hours Worked, and Hourly Wage for Trainees and the Comparison Group*
(average)

	Men		*Women*	
Outcome variable	*Trainees*	*Comparison group*	*Trainees*	*Comparison group*
Monthly earnings (1,000 pesos)	681.59	637.67	531.85	571.52
Work hours per week	45.81	43.59	42.77	39.51
Hourly wage (1,000 pesos)	3.984	4.016	3.476	4.198
Sample size	1,212	1,051	681	300

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

rienced by trainees and for every quarter in which individuals in the comparison group were observed to be employed.

The final data set contained 1,212 trainee observations and 1,051 comparison observations for men, and 681 trainee observations and 300 comparison observations for women. To accommodate the specific structure of this data set, we created (and included) two kinds of variables. The first is a variable for the number of months between the date salaries are reported and time t_0, which is either the completion of training or the initial date of unemployment for the comparison group. The second is a set of quarterly dummy variables to account for inflation in salaries over the base period.

Means of the three outcome variables for men and women are reported in table 9, separately for the trainee and comparison samples. On average, male trainees report monthly earnings of approximately 682,000 pesos, compared with 638,000 pesos for the comparison group. In other words, earnings of trainees are about 7 percent higher than those of the comparison group. However, higher earnings may partly reflect inflation because trainee salaries include those reported in the first quarter of 1992, whereas comparison group salaries end in the third quarter of 1991. Trainees also report slightly higher hours worked—45.8 hours a week compared with 43.6 hours for the comparison group. Finally, the hourly wage of 3,984 pesos for trainees is slightly lower than the 4,016 pesos estimated for the comparison group.

In the women's sample, trainees report monthly earnings that are about 7 percent lower than those of the comparison group: approximately 532,000 pesos versus 572,000 pesos for trainees and the comparison group, respectively. Like their male trainee counterparts, women trainees who worked did so for three hours longer a week than women in the comparison group. However, their hourly wage was about 700 pesos less than the wage received by the women in the comparison group.

Overall Program Effects

We analyzed the separate effects of training on the logarithm of monthly earnings, hours worked per week, and the logarithm of hourly wages. Each of these outcome measures was regressed on a vector of explanatory variables,

including a quadratic measure of potential work experience, level of education, prior work experience, unemployment duration at time 0, quarterly dummy variables, and an indicator variable for whether the individual was a participant in PROBECAT training. We also experimented with interaction terms between training and levels of education to see if training effects would vary across different educational levels (the results are reported below).

In this set of analyses, we follow the statistical adjustment suggested by Heckman (1979) to correct for selectivity bias from nonrandom selection into the training program. As before, we first estimated a probit model that related program participation to the selection criteria for which we had data—marital status, number of children, education, and time unemployed prior to training. We then used the probit estimates to compute an inverse Mills ratio for all individuals—both trainees and the unemployed comparison group—and included this variable as a regressor in the outcome equations to correct for selectivity bias. This adjustment, however, does not address a potentially important second source of bias that arises because earnings outcomes are observed only if the person has a job. We note, but defer to future research, the difficult task of jointly modeling the two sources of selectivity bias.

Table 10 summarizes the overall impacts of program participation for men and women.[10] The first model specification in table 10 is a simple ordinary least squares (OLS) regression. The second is a model that corrects for nonrandom selection into the PROBECAT program. The reported coefficients for monthly salary and hourly wage may be interpreted as the average percentage change in the variables attributable to the individual's participation in PROBECAT. The coefficients for hours of work per week are mean changes attributable to participation in training.

In the raw data, male trainees reported monthly earnings that, on average, were 7 percent higher than those of the comparison group. Results of the simple OLS model specification in table 10 indicate that, without selectivity correction for program participation, the monthly earnings of male trainees are 10.8 percent lower than those of the comparison group. This result suggests that the two groups have very different attributes. In the model that corrects for selectivity bias (and these group differences), this earnings differential is now reversed. The selectivity-corrected estimates show that the monthly earnings of trainees are 17.7 percent higher than the earnings of the comparison group, a difference that is statistically significant.

The results also suggest that training is associated with increased labor supply for the men's sample. In the raw data, trainees reported working about two hours more a week than individuals in the comparison group. The estimated coefficient for hours of work in the regression without selectivity correction (simple OLS) reveals no significant differences between the two groups in the

10. The full set of results is available on request.

Table 10. *Summary of the Effects of Participation in the Training Program*

	Men		*Women*	
Variable	*Simple OLS model*	*OLS model corrected for selectivity bias*	*Simple OLS model*	*OLS model corrected for selectivity bias*
Log of monthly earnings	−0.108	0.177	−0.122	0.033
	(−3.26)	(2.19)	(−2.42)	(0.25)
Work hours per week	0.978	7.796	4.484	6.234
	(1.32)	(4.32)	(4.19)	(2.06)
Log of hourly wage	−0.095	−0.007	−0.261	−0.105
	(−2.61)	−0.07	(−4.48)	(−0.68)

Note: *t*-statistics are in parentheses.
Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

number of hours worked. However, the model corrected for selectivity bias shows that trainees supply, on average, 7.8 more hours per week than the comparison group once a correction is included for selectivity. Similarly, in the hourly wage results, selectivity correction reduces the negative effect of PROBECAT on hourly wage as compared with the simple OLS model. In fact, the final outcome of the selectivity correction is that there is no significant difference in hourly wages between the two groups. Together, these results suggest that training, on average, raises monthly earnings of male trainees through a greater supply of hours worked per week, not through higher hourly wages.

A similar pattern of training effects is found for women. In the aggregate data, women trainees received lower monthly earnings and hourly wages, but worked more hours per week, than the comparison group. In the OLS model, these program effects on earnings, hourly wage, and hours worked are generally statistically significant. In the model that corrects for selectivity bias, however, many of these differences disappear. The only statistically significant effect of PROBECAT is in the results for hours of work, which suggest that women trainees work approximately six hours more a week than women in the comparison group.

Training Effects by Level of Education

Thus far, we have assumed implicitly that program effects are invariant across different groups of trainees. This may not be a good assumption if the effectiveness of training is shaped by the initial skill endowments that trainees bring to the program. If education helps trainees get more out of training, we would expect training effectiveness to increase (at least over some range) with level of education. We addressed this possibility by including interaction terms between training and indicator variables for each level of education. As before, a separate set of dummy variables for each level (except one) was included to control for education effects common to both trainee and comparison groups.

Table 11 presents the results of estimating these expanded model specifications for men. To conserve space, we report results only for the models estimated

Table 11. *Results of Estimating Expanded Model Specifications for Men*

Explanatory variable	*Dependent variable*		
	Log monthly salary	*Work hours per week*	*Log hourly wage*
Constant	5.726*	42.587*	0.574*
General experience	0.023*	0.134	0.019*
Experience-squared	−0.000*	−0.004*	−0.000*
Education			
No formal	−0.203*	−1.024	−0.194
Primary incomplete	−0.005	−0.797	0.003
Secondary incomplete	0.062	0.430	0.026
Secondary complete	0.165*	−1.790	0.186*
Higher secondary	0.279*	−0.704	0.295*
University	0.571*	−0.455	0.555*
Education-training interaction			
No formal	−0.058	14.820	−0.485
Primary incomplete	−0.063	9.101*	−0.270*
Primary complete	0.212*	8.409*	−0.002
Secondary incomplete[a]	0.267*	5.424*	0.161
Secondary complete	0.199*	10.132*	−0.039
Higher secondary	0.171**	7.848*	−0.029
University	0.045	2.769	0.032
Inverse Mills ratio	−0.179*	−4.650*	−0.049
$\bar{R}^2$	0.157	0.054	0.145
Sample size	2,330	2,271	2,271

* Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

Note: These results are for the OLS model estimated with the selectivity correction. The regressions include duration of previous unemployment, self-employment status, and time dummy variables.

a. In Mexico there are six years of secondary education following primary school. The first three years are referred to as secondary education and the second three years as higher secondary education.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

with the selectivity correction. Table 11 suggests that training has positive and statistically significant effects on monthly earnings and hours of work by level of education. In general, these earnings-and-hours effects exhibit an inverted-U pattern, being lowest for the least-educated men, rising with years of education to a peak at the secondary school level (seven to nine years of schooling), and then declining for the most-educated individuals (those with postsecondary education). For women (not reported here), the education-training interaction terms are generally insignificant, suggesting that training effects on these outcomes are broadly similar across educational levels.

The results for men—positive impacts on monthly earnings and hours worked but no systematic effect on hourly wages—raise questions about whether training actually increases productivity, in which case one might expect higher hourly wages, or whether it raises earnings by inducing greater work effort among trainees.[11] We believe the answer lies in the kinds of jobs that trainees find upon completing training. The raw data suggest that, in relation to the comparison

11. These results do not appear to be specific to Mexico. An anonymous referee points out that similar findings have been reported in evaluation studies of U.S. training programs.

group, a higher proportion of trainees eventually find jobs in large enterprises. For the sample as a whole, employment in large firms is associated with longer hours of work per week and higher monthly salaries, which may partially explain the results that we find. To explore this hypothesis more rigorously, we estimated an ordered logit model for the probability of employment in ten (increasingly larger) firm-size categories. As regressors, we included measures of experience, duration of previous unemployment, time dummy variables, and an indicator variable for participation in PROBECAT.

Table 12 reports the results for three different model specifications: training by itself, training interacted with a quadratic measure of years of education, and training interacted with indicator variables for each level of education. All three specifications suggest that trainees are more likely to find jobs in larger firms than are individuals in the comparison group. The fully interacted model specification reveals an inverted-U pattern of effects by level of education, similar to the previous findings for earnings and hours of work. In short, PROBECAT appears to raise trainees' monthly earnings and hours of work by facilitating their entry into larger firms offering higher pay and more stable, full-time employment. PROBECAT may achieve this result either by retraining the unemployed in skills for which there is demand—that is, through a matching effect—or by making them more trainable—that is, by providing them with learning skills. PROBECAT may also indirectly affect future earnings potential by placing trainees in larger firms that tend to provide more on-the-job training.[12] The trainees will have to be followed over a longer time period for us to verify this hypothesis.

To summarize, the results suggest that participation in PROBECAT increases monthly earnings of male trainees and that this occurs primarily because of their increased hours of work. The disaggregated analysis by educational level reveals that this effect varies with the level of education attained. The effects of training on monthly earnings are largest for those with secondary education (seven to nine years of schooling). The effects of hours of work are large and positive for most groups, except possibly for those with the lowest and highest levels of education. For women, there is some evidence that work hours are increased by training, but these do not translate into higher monthly earnings. Unlike their male counterparts, the earnings-and-hours effects of training do not vary by level of education. The results also suggest that, for men, program participation increases the probability of finding employment in a large firm. Because large firms tend to pay higher wages, provide more training opportunities, and thus have steeper earnings profiles, finding a job in a large firm is likely to imply increased earnings opportunities over time for trainees in relation to the comparison group.

12. Estimates based on the 1988 National Employment Survey show that the proportion of workers receiving training in the workplace varies from 5 percent in microenterprises to 23 percent in large firms employing more than 250 workers.

Table 12. *The Probability for Men of Post-Training Employment in Larger Firms*

	Maximum likelihood ordered logit model		
Explanatory variable	*1*	*2*	*3*
Education			
No formal	−0.262	−0.163	−0.229
Primary incomplete	−0.014	0.102	−0.051
Secondary incomplete[a]	0.289*	0.236**	−0.092
Secondary complete	0.202**	0.189	0.095
Higher secondary	0.517*	0.633*	0.541*
University	0.482*	0.986*	0.845*
Trainee			
Dummy (1,0)	0.786*		
Interaction with education		0.246*	
Education-squared		−0.017*	
No formal education			−0.236
Primary incomplete			0.827*
Primary complete			0.707*
Secondary incomplete			1.314*
Secondary complete			0.893*
Higher secondary			0.688*
University			−0.057
Inverse Mills ratio	−0.354*	−0.282*	−0.338*

* Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

Note: The dependent variable is firm-size category. The model estimates the probability of employment in ten (increasingly larger) firm-size categories. The regressions include quadratic specification of general experience, the duration of previous unemployment, and time dummy variables. The sample size is 2,330 observations.

a. In Mexico there are six years of secondary education following primary school. The first three years are referred to as secondary education and the second three years as higher secondary education.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

V. The Cost-Effectiveness of PROBECAT

What do these findings imply about the cost-effectiveness of PROBECAT? To answer this question, we focus on two of the more significant labor market outcomes identified in the previous analyses: first, the impact of program participation on the speed with which trainees find jobs, and, second, the impact of program participation on monthly earnings. These two impacts, and their implications for the benefit streams associated with program participation, are combined with cost estimates to arrive at some back-of-the-envelope calculations on the cost-effectiveness of PROBECAT.

We include the direct training costs as well as the indirect costs associated with participation in the program. Direct costs are costs for instructors, training materials, and program administration. From data provided to us by the Secretaría del Trabajo y Previsión Social, the average operating cost per course completer in 1991 was about 350,400 pesos. Indirect costs are measured in terms of search time forgone by joining the training program. We assume that at time t_0 each unemployed worker faces two possible strategies: immediately initiate a job

search (the strategy for the comparison group), or enter a training course and thus delay a job search by the length of the course (the strategy for the trainees). From our previous analysis, we know that a job search after training is shorter on average (by about 2.5 months) than a job search without training (the case for the comparison group). However, we must also take into account the costs of deferring a search when trainees participate in PROBECAT. Thus, we calculate indirect costs for trainees by adding to search time the time spent in training (an average of 2.9 months). The benefit measures are calculated from the previous estimates of the effects of training on monthly earnings. Monthly earnings are predicted for trainees and the comparison group using sample means of all regressors.

Table 13 summarizes the calculation of these cost and benefit measures. The first and third columns show the mean duration of search for the trainee and comparison groups, respectively. The difference between the two columns measures the decrease in search time (the employment effect) attributable to the program. The second column adds the average duration of training (2.9 months) to the search time for trainees. The fourth column reports the difference in total time out of work for the two groups. For male trainees, participation in PROBECAT increases the total time to first job (search plus training time) by 0.4 months in relation to the comparison group, whereas for female trainees, training increases the total time to first job by about 1 month. Note, however, that the figure for women hides very substantial differences by demographic group. For women with prior work experience, training reduces the time to first job by 1.1 months (even when we include job search delay because of training).

On the benefit side, the fifth column of table 13 reports the estimated wage effect of training. The sixth column reports the corresponding predicted monthly wage evaluated at sample means. The positive wage impact attributable to training is quite large for men, averaging about 152,000 pesos. Although predicted wages for female trainees are slightly higher than for the comparison group, the difference is not statistically significant.

The calculation of the net benefits of the training program is shown in table 14. The first column shows the direct, average cost of providing training—350,400 pesos per trainee. (The training stipend is not taken into account as it is simply an income transfer and not an economic cost.) The second column is the indirect cost of training, which is the monetized value of incremental job search costs (forgone earnings) associated with attending training, valued at the average wage of the comparison group (that is, the wage trainees would have received had they not participated in PROBECAT). On average, these indirect costs are about 196,000 pesos for men and 435,000 pesos for women. The fourth and fifth columns summarize the benefits of training associated with increased wages over three months and twelve months, respectively. The final two columns show the net benefit (benefits minus costs) associated with participation in the training program.

Table 13. *Summary of the Effects of the Training Program*

Trainee type	Average duration of search for employment (months)			Difference in time to first job for trainees and comparison group (months)	Wage effect[b]	Predicted monthly wage[c] (thousands of pesos)	
	Trainees						
	Excluding training period	Including training period[a]	Comparison group			Trainee	Comparison group
Men	4.0	6.9	6.5	0.4	0.27	642	490
Women	5.9	8.8	7.8	1.0	0.02	444	435

Note: The samples included 881 male trainees and 845 female trainees and 371 men and 189 women in the comparison group.

a. The average duration of the training period is 2.9 months.

b. The wage effect, $\ln W_t - \ln W_c$, is the coefficient on the training variable from a regression of log monthly wages on experience, experience squared, education, quarterly dummies, self-employment status, duration of unemployment prior to training or first observation, prior experience, and interactions for training and education status and for training and age.

c. Predicted monthly wages at sample means from the same wage regression as the wage effect.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

Table 14. *Costs and Benefits of the Training Program*
(thousands of pesos per trainee)

	Costs			Benefits (increase in monthly wage compared with that of comparison group)		Net benefits	
Trainee type	*Direct costs*	*Search costs*[a]	*Total costs*	*Over 3 months*	*Over 12 months*	*Over 3 months*	*Over 12 months*
Men	350.4	196.0	546.4	456.0	1,824.0	−90.4	1,277.6
Women	350.4	435.0	785.4	27.0	108.0	−758.4	−677.4

Note: The samples included 881 men and 845 women.

a. The additional time trainees take to find a job because of training times the opportunity cost of that time, which equals the comparison group's wage, that is, the wage trainees would have received without training.

Source: Authors' calculations from the 1992 PROBECAT survey and the 1990–91 ENEU.

These estimates, although very crude, nonetheless suggest the following findings: for men, the benefits of program participation outweigh the costs within a year of finishing training; for women as a whole, the costs exceed the benefits of training. As the previous analyses showed, however, there are substantial differences in outcomes depending upon whether women enter training with or without prior work experience. For women with work experience, benefits from earlier employment clearly offset the costs of participation in the program.

VI. Conclusions

This evaluation of Mexico's PROBECAT sought to measure the impact of training on the employment and earnings of participants. Training outcomes were estimated by comparing PROBECAT trainees with a comparison group of unemployed individuals.

On the whole, the results suggest that PROBECAT was fairly effective in shortening the duration of unemployment for certain target groups, namely the trainees with prior work experience (both men and women). It also appeared to have improved the likelihood of employment for participants over a longer period of time. Compared with those who did not participate in the program, male trainees were more likely to be employed three and six months after training; female trainees with prior work experience also benefited, but unlike the case with male trainees, these positive employment effects appeared to have persisted over a full year. As for earnings, the evaluation suggests that program participation raised the post-training earnings of men but not of women. For male trainees, these earnings effects varied systematically by level of education, being greatest for those with seven to nine years of schooling. Finally, for both men and women, training induced an increase in the number of hours worked per week.

The disparity of training outcomes across different demographic groups indicated that the unemployed constitute a very heterogenous group and, conse-

quently, that eligibility criteria used for program participation can have important implications for the program's cost-effectiveness. In the specific case of Mexico, the analyses suggested that PROBECAT's selection criteria should be modified to target those demographic groups most likely to benefit from the program—the unemployed with prior work experience, slightly older workers (over 25 years old), and those with six to twelve years of schooling. For certain other groups—for example, the young, new entrants into the labor force, and those with low levels of education—it may be more appropriate for the government to provide adult basic education, facilitate return to school for the young, or introduce firm-based apprenticeship programs to give work experience to new entrants in the labor market.

More broadly, our study confirms that program evaluation results can be very sensitive to the way in which training effects are measured. One key source of bias is that arising from nonrandom selection of participants into the training program. In our evaluation of Mexico's PROBECAT program, we sought to correct for this one source of selectivity bias by using a variety of statistical methodologies. Several statistical issues remain, and future evaluations should endeavor to address them both through collection of better comparison group data and through more rigorous econometric modeling. These evaluations should also focus on other dimensions of PROBECAT not investigated here—training duration, type of training, the mix of theory and practice, and the relative effectiveness of different training providers.

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