Do Unions Help or Hinder Women in Training? Apprenticeship Programs in the United States

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Trade unions are frequently criticized for excluding women from skilled crafts by denying them training. This article examines this argument by estimating the retention and attrition probabilities of men and women in the joint union-management and the unilateral employer-sponsored apprenticeship programs. While men, on average, have higher retention and lower attrition rates than women, joint sponsorship raises women's graduation probability above (and lowers their quit probability below) those of men or women apprentices in unilateral programs.

IN THE UNITED STATES, women historically have been excluded from apprenticeship, which is the main formal training method for the skilled trades. While antidiscrimination policies in the late 1970s attempted to expand the occupational choices of women by opening up apprenticeship training programs to them, there has been little change in the gender composition of the crafts labor force in the last two decades. Women apparently do not or cannot take advantage of career opportunities in these occupations characterized by high pay and benefits, relative flexibility, and autonomy. Thus the integration of women into the skilled crafts remains a critical policy issue for those concerned about the ongoing occupational segregation and earnings gap between men and women. Accounts of severe resistance to women's entry and discriminatory practices in training and work abound and point to the training

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process as a source of difficulty in women's integration. Yet there is little systematic evidence on gender differences in apprenticeship training. The objective of this article is to address this gap in the literature by examining the experiences of women and men apprentices and exploring the factors that influence apprenticeship retention and attrition.

The key issue in the literature on apprenticeship training and in our analysis is the role of trade unions. Apprenticeship programs in the United States are sponsored and administered either unilaterally by employers or jointly by unions and employers. The resistance of unions (as well as employers) to attempts to improve women's access to the apprentice and journey-level work force is well documented (e.g., Hartmann, 1979; Schroedel, 1985; Glover, 1989; Riccucci, 1990; Eisenberg, 1998). What remain controversial are the lessons learned from this history and the future role of trade unions in promoting greater integration of women into training. In this respect, two opposing views may be identified. The first position is that union involvement is detrimental to women and minorities because white men control unions and engage in discriminatory practices against interlopers. Consequently, union involvement in training should be either very closely monitored or curtailed, even eliminated, by developing alternative training systems (Riccucci, 1990; Northrup, 1992). The second view recognizes the past and present shortcomings and faults of unions but also acknowledges their unique potential to promote women's apprenticeship training. According to this view, unions can use the institutions of collective bargaining and joint union-management apprenticeship committees to promote equity in training and skill formation (Schroedel, 1985; O'Farrell and Moore, 1993; Petersen et al., 1995; Eisenberg, 1998). Recent research has shown the benefits of unions for women in the U.S. labor force in terms of higher pay, longer job tenure, and smaller gender pay gap (e.g., Freeman and Leonard, 1987; Spalter-Roth et al., 1994). The lesson to be learned from this history is that acceptance of women into trade unions is not a routine process but one that requires vigilance to change the present discriminatory practices and sexist attitudes, and rather than dispensing with trade unions, their resources and mechanisms ought to be strengthened and put into use to promote equity.

The objective of this article is to present an empirical test of these competing hypotheses concerning the role of unions in the provision of apprenticeship training by using the Apprenticeship Information Management System (AIMS) database compiled by the Bureau of Apprenticeship Training (BAT) of the U.S. Department of Labor (DOL). We compare the training outcomes of four groups of apprentices—women and men in joint union-management and unilateral employer programs—in order to

ascertain the relative contribution of unions to the attrition and retention of apprentices, controlling for personal, occupational, and macroeconomic factors.

The article's contributions are twofold. First, we address the gap in the scholarly literature about the ways in which segregated patterns of employment are reproduced in the labor markets for blue-collar workers. In contrast to the significant attention devoted to women's schooling for and entry into white-collar occupations, the literature on women's training for skilled blue-collar occupations is sparse (Harlan and Steinberg, 1989). As a result, myths about women's performance in the skilled trades (such as women not being capable of doing craftwork) have gone unexamined, and the design of more effective policies for the integration of women into the nontraditional blue-collar occupations is hampered (Glover, 1989). Second, our focus on the rates of attrition and retention in training distinguishes this article from much of the empirical research on gender differences in training. This literature addresses short-term training geared toward upgrading skills and examines questions of access to on-the-job training (OJT) and the outcomes of training in terms of pay and promotion (Greenhalgh and Stewart, 1987; Booth, 1991; Green, 1991; Barron et al., 1993; Miller, 1994). The available BAT data preclude the study of these aspects of apprenticeship training but permit the analysis of the success or failure of apprentices in completing the program. In contrast to the short-term training programs, and similar to college education, apprenticeship is preparation for a new career. It is a substantial investment in human capital, requiring up to 5 years of theoretical and practical training in all aspects of a trade. These features make the analysis of the training process and determinants of retention and attrition rates critical.

This article is organized as follows: The second section provides background information on apprenticeship training and women apprentices in the United States. The third section briefly discusses the theoretical backdrop of the empirical model of retention/attrition. The fourth section presents a multinomial logistic analysis estimating women's and men's likelihood of graduating or dropping out of apprenticeship training programs. The final section concludes.

Women and Apprenticeship Training in the United States

In comparison with other industrial countries, apprenticeship is not a widely used training method in the United States. As of the end of 1990, there were 280,000 registered civilian apprentices, who accounted for merely 0.5 percent of the labor force. This number corresponds to

one-twentieth of college enrollment. Most of the craftsworkers do not take the apprenticeship route to training but pursue informal OJT methods. In comparison with other forms of training, apprenticeship is a costlier investment decision requiring commitment from both sponsors and trainees over several years. Registered apprenticeships are structured programs that combine OJT with related theoretical in-class instruction. They have a predetermined set of requirements and periodic examinations. Apprentices are trained in a broad range of skills by pairing up with journey-level craftsworkers and are certified as journey-level workers on graduation. Training is financed both by sponsors, who contribute training funds and resources, and by apprentices, who accept lower wages during training, and the benefits are reaped by the worker, the firm, and the industry in the long run in the forms of higher wages and a readily available skilled labor force.[1]

Women's entry into apprenticeship began in the 1970s with isolated, state-level efforts. At the federal level, the turning point was the amendment of Executive Order 11246 by President Carter requiring written affirmative action programs for women and set goals and timetables for hiring and training of women in federally funded construction projects in 1978. In the same year, the DOL similarly amended the equal employment opportunity in apprenticeship and training regulations (29 CFR Part 30). These amendments, adopted over the objections of construction contractors and unions, were based on the successful experience of opening up skilled trades to men of color in the late 1960s and early 1970s.[2] Just as the policy was beginning to show positive results (doubling women's share of apprenticeship from 3 percent in 1978 to 6 percent by the early 1980s), it came to an abrupt end when the Reagan administration eliminated federal funding for outreach efforts and relaxed the enforcement of affirmative action regulations. Throughout the 1980s and 1990s, women's share in apprenticeship stayed between 6 and 7 percent, and women's share in most

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[1] The Business Roundtable (1997) recognizes apprenticeship as an effective means by which the chronic shortage of skilled labor in the construction industry can be alleviated. Although systematic studies have yet to be undertaken, there is also some evidence indicating that the type of training affects the career prospects of the craftsworkers. Rowings et al. (1996) report that construction workers who have gone through apprenticeship training have higher retention rates and express more job satisfaction. Glover (1989) argues that formal procedures of apprenticeship programs reduce arbitrariness and provide women with better chances to enter nontraditional occupations.

[2] According to Glover (1989), women's absence from the skilled trades did not become a policy issue until the 1970s in part because the women's movement lagged the civil rights movement and the initial focus of the former was on getting women into white-collar occupations. The DOL amended regulation 29 CFR Part 30 to include goals and timetables for women under pressure from the court case *Advocates for Women–San Francisco and Seattle Women in Trades, et al.* v. *U.S. Department of Labor.*

occupations recognized by the BAT as "apprenticeable" remained disappointingly low.[3]

The BAT data permit the analysis of the experience of recent cohorts of apprentices at the individual level. In this study, we concentrate on the apprentices who first enrolled in the years 1989, 1990, and 1991—three classes for which information on attrition and retention is most comprehensive. Occupations selected for this study have the largest number of apprentices from among the more than 800 apprenticeable occupations (DOL, 1991–1992). Table 1 describes the distribution of 100,816 new apprentices enrolled in 24 occupations during this period by program type and gender. Jointly, they account for about 80 percent of all new apprentices.[4]

We grouped these occupations under three industries: construction, manufacturing and services.[5] Table 1 shows that construction occupations dominate apprenticeship training. Almost 80 percent of the apprentices are enrolled in construction occupations.[6] This is not surprising because construction trades are the craft-based occupations for which apprenticeship is the traditional port of entry. The remaining apprentices are approximately evenly divided between manufacturing and services occupations.

Women constitute a small minority (5.3 percent) of all new apprentices, but their share varies by occupation. Women are most highly represented in the service occupations, where their share is 13.5 percent. This share, in turn, is attributable to the high representation of women apprentices in the cook, corrections officer, and police officer occupations. Women constitute around 4 percent of apprentices in manufacturing and construction, although within construction, women's share of the operating engineer trade stands out at 20 percent.

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[3] Research on the subject also flowed and ebbed with these policy shifts. The initial proliferation of conference papers and reports on women and apprenticeship (e.g., Briggs, 1974, 1978; Kane et al., 1977; Briggs and Foltman, 1981; WOW, 1982) subsided in the early 1980s.

[4] The BAT data are estimated to cover 70 percent of all registered apprentices in the United States. Information on some states is not available (CA, DC, DE, HI, NC, OR, WA, and WI) or incomplete (e.g., NY) because they do not report to the BAT.

[5] The data provide information on both the occupation and the industry (as defined by the SIC) of the apprenticeship program. While apprenticeship programs in an occupation may be set up in any industry, generally, a single industry accounted for the majority of apprentices and programs in an occupation. For instance, 90 percent of electrician apprentices are in the construction industry, and 100 percent of police officers are in the services industry.

[6] Bilginsoy (1998) provides a detailed description of apprenticeship in the construction industry.

TABLE 1

NEW APPRENTICES AND WOMEN'S SHARE BY OCCUPATION AND PROGRAM TYPE (1989–1991)[a]

	All Programs		Joint Programs[b]		Non-joint Programs[b]		Women's Share in Occupation
Occupation[c]	Total Apprent.	% Women	Total Apprent.	% Women	Total Apprent.	% Women	(%)
*Construction****	*79,802*	*4.4*	*58,821*	*5.0*	*20,981*	*2.6*	*2.0*
Boilermaker	1,221	5.4	1,200	5.5	21	0.0	0.0
Bricklayer	2,458	2.1	2,157	2.2	301	1.3	0.0
Carpenter**	13,241	5.3	11,498	5.5	1,743	4.3	1.3
Cement mason**	951	9.1	747	10.0	204	5.4	0.0
Electrician***	24,377	4.0	13,807	5.1	10,570	2.4	1.7
Insulation***	1,347	4.3	998	5.2	349	1.7	1.8
Millwright	2,157	3.0	1,966	3.2	191	1.1	3.2
Operating eng.	2,433	20.1	2,183	20.2	250	19.6	3.5
Painter	3,233	8.0	2,859	8.9	374	7.0	3.5
Pipefitter***	6,077	3.4	4,706	3.8	1,371	1.8	0.9
Plumber***	7,615	2.1	4,026	2.8	3,589	1.4	0.9
Roofer	4,397	1.8	3,859	1.8	538	1.1	0.5
Sheet metal	6,384	2.9	4,994	3.1	1,390	2.5	5.7
Ironworker	3,911	2.9	3,821	3.0	90	2.2	0.0
*Manufacturing****	*10,258*	*3.5*	*2,714*	*7.1*	*7,544*	*2.2*	*3.5*
Machinist***	3,360	3.4	618	6.0	2,742	2.8	3.9
Main. electrician***	1,214	7.1	786	9.0	428	3.5	1.7
Main. mechanic	1,734	4.2	784	4.3	950	4.1	12.5
Tool and dye***	3,950	2.2	526	9.9	3,424	1.6	1.3
*Service****	*10,756*	*13.5*	*5,260*	*9.6*	*5,496*	*17.2*	*30.0*
Auto mechanic	556	3.1	178	3.4	378	2.9	0.8
Cook	1,283	22.1	103	28.2	1,180	21.5	46.3
Correct. officer***	4,296	20.5	2,469	16.8	1,827	25.6	17.7
Firefighter*	1,654	3.3	1,391	3.6	263	1.5	1.0
Line maintainer	1,298	0.6	1,110	0.6	188	0.5	1.7
Police officer	1,669	12.5	9	0.0	1,660	12.5	12.2
*All occupations****	*100,816*	*5.3*	*66,795*	*5.5*	*34,021*	*4.9*	*12.7*

SOURCES: Data on the number of apprentices come from the BAT/AIMS data set. The data for the last column are unpublished 1990 averages from the Current Population Survey.

[a]Military and prison apprenticeship programs are excluded.

[b] "Joint programs" are jointly sponsored by employers and unions, and "non-joint programs" are sponsored solely by employers.

[c]Asterisks indicate that the difference between women's shares in the joint and nonjoint programs is statistically significant at the 1 and 5 percent levels (two-tailed tests).

Most apprentices (66 percent) are in programs sponsored jointly by employers and unions, which we refer to as *joint* programs for short,[7] but there are significant variations across industries. While apprentices in construction are predominantly in joint programs (75 percent), in manufacturing and services the jointly sponsored apprentice shares drop to 25 and 43 percent, respectively. Overall, women are slightly better represented in joint programs with a 5.5 percent share as opposed to 4.9 percent in nonjoint programs. Women's shares in joint construction and manufacturing programs are two and three times higher than the nonjoint shares, respectively, whereas in services women's share in nonjoint programs is twice as high as that in joint programs. These differences are statistically highly significant ($p < 0.01$).

As a reference point, we report women's share in employment across occupations in the last column of Table 1. These figures should be interpreted with caution because they come from the Current Population Survey (CPS) of 1990, where occupational demarcations are not as detailed as in the BAT classification[8] and individuals self-report their occupation. Still, certain patterns emerge from these numbers. With the exception of cooks, all occupations are heavily male-dominated. In construction and manufacturing, women's share in the labor force is negligible, reaching peaks of only 5.7 and 12.5 percent among sheetmetal workers and maintenance mechanics, respectively. In the public service occupations, women seem to have made some headway in the corrections and police officer trades, but not among firefighters, where their share is a mere 1.5 percent. Comparison of women's shares in apprenticeship training and the occupation suggests that women are "overrepresented" as trainees in most of the occupations, especially operating engineers, cement masons, boilermakers, and maintenance electricians, relative to the initial (1990) occupational structure. Still, given the current low levels of women's training, it seems unlikely that substantial integration of women into these trades can be achieved within any reasonable time horizon. In addition, "overrepresentation" of women as apprentices may not even imply a positive trend toward integration of the labor force unless it is accompanied by high retention rates in apprenticeship.

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[7] The term *nonjoint* indicates that the apprenticeship program is not established or funded under a collective-bargaining agreement. It is possible for a union to represent the workers but not be involved in the apprenticeship program. Such nonjoint programs are more commonly observed in the manufacturing industry.

[8] The BAT classification distinguishes, for instance, between nine different types of electrician trades (in addition to the maintenance electrician), whereas the CPS does not even distinguish between electrician, maintenance electrician, and line maintainer.

Training, Women, and Unions

Neoclassical economic theory would explain decisions to enter apprenticeship, to continue with the program, or to drop out during the course of the program in terms of the expected benefits and costs of investment in human capital and attribute gender differences in training outcomes to differences in the preferences and endowments of men and women. Once in training, apprentices who started with more human capital endowment, who can put up more ably with the arduous physical work, who have less domestic responsibilities, and/or who have fewer alternative career opportunities are less likely to quit the training program. The first three of these conditions generally describe men better than women and therefore suggest that male apprentices are more likely to complete training and women are more likely to drop out. Men are more likely to have taken shop classes and technical subjects in high school or helped father fixing things around the house, providing them with basic familiarity with tools and technical skills; they are likely to be physically better conditioned; and they bear a smaller fraction of domestic responsibilities. On the other hand, men are likely to have wider occupational opportunities, as well as alternative training routes, which increase their propensity to quit relative to women.

Tinto's (1993) longitudinal model of departure complements the human capital analysis by highlighting the ways in which the institutional setting of training affects the costs and expected returns and thereby training outcomes. While Tinto's model was developed to explain attrition in higher education, it is adaptable to the analysis of apprenticeship training. Tinto emphasizes the *process* of decision making during training and argues that the trainee's experiences during training, specifically his or her degree of integration into academic and social life, would lead him or her to continually reassess the initial decision and either to continue or to drop out. The apprentice's degree of integration would depend on both the "formal" aspects of training and the "nonjob" activities within the social system of training. Thus the level and quality of interaction of the apprentice with fellow journeyworkers, supervisors, foremen, apprenticeship coordinator, and the employer during job search and OJT and the nature of peer group interaction on and off the job are all relevant to the determination of the retention rate.[9]

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[9] Another component of the institutional environment of apprenticeship training is the policy/political milieu. The degree of enforcement of federal affirmative action guidelines and the existence of complementary institutions that create equal training opportunity for women (such as outreach efforts, preapprenticeship programs, training of supervisory staff to address coworker harassment problems) would affect the retention/ attrition of traditionally excluded groups (Kane and Miller, 1981). During the 1989–1991 period examined in this study, there have not been any policy shifts.

In the case of apprenticeship, the institutional setting of training is likely to tip the scales further against women. For example, the prevalent father-to-son tradition in crafts and the existence of informal networks among (white) men provide informational advantages to men and reduce their training costs while making it more difficult for women to gain a footing in the trade. If male apprentices have an easier time finding jobs, receive more mentoring, and are generally favored by journeyworkers and supervisors, then the training period for them would be relatively shorter and less costly. They also may receive better-quality training, which would enhance their expected future earnings in comparison with women's prospects. The exclusionary male culture, which may lead to outright discrimination or harassment, also makes women's entry and persistence in the skilled trades costlier and more difficult. Hostility of the journeyman or simply his inability to establish a working relationship with a woman apprentice would affect the quality and/or length of her training. The apprenticeship program coordinator may fail to rotate her among different jobs and journeyworkers so as to ensure the acquisition of skills in all aspects of the trade. Such exclusionary practices would lead women to revise their objectives and commitment, and make them more likely to drop out of training.[10]

Trade unions are often a critical component of the institutional environment of training and have a significant and controversial impact on how training is done. In the union-management–sponsored programs, the joint apprenticeship committee (composed of representatives of the union and the employer in equal numbers) and the apprenticeship coordinator, who is a union member, carry out the daily administration and management of the program, including admission of new apprentices, and determination of curriculum, requirements, overall quality of training, and job allocation. Various studies suggest that, besides the union officials on the joint apprenticeship committee, the foremen and supervisors, who are union members, also have a great degree of influence on the behavior and attitude of the rank and file (Schroedel, 1985; O'Farrell and Moore, 1993; Eisenberg, 1998).

Becker (1971) identifies trade unions as a chief agent of discrimination in his classic work on the subject. Unions reflect the preferences of their membership. If unionized male (white) workers discriminate against women (nonwhite) coworkers, then the union would exclude the latter group, and segregation or market discrimination ensues even if the two

[10] The evidence on how men's behavior affects women's decision to enter and persist in a male occupation is mixed. See, for instance, Padavic and Reskin (1990).

groups of workers are perfect substitutes. Becker (1971:73) argues that these practices are more common in craft unions than in industrial unions and that they increase with the strength of the union. Employers may find it less costly to accommodate the discriminating workers rather than risk workplace discord by hiring nontraditional workers, even when the latter are cheaper. Opponents of trade union involvement in training follow this line of reasoning to argue that unions engage in discriminatory practices against women and minorities in order to pursue the self-interest of their own membership, thereby preventing the underrepresented demographic groups from joining the crafts labor force. The standard solution, accordingly, is to remove unions from training and to allow all workers to compete freely in the training market, given their choices and endowments.

Proponents of unions, on the other hand, argue that discriminatory practices are not the sole preserve of unions and that these may persist with or without unions. The solution, then, is active intervention into the labor market in the forms of outreach and affirmative action programs. Unions can be turned into a powerful and necessary instrument in the struggle against discrimination by putting collective bargaining, grievance procedures, and other mechanisms at the service of women who enter training. They can work to raise awareness among the foremen and stewards about potential harassment problems and be a disciplining force on the individual members who object to working with and teaching women. They also can countervail any resistance from the employer to training women. They can provide an "academically" and socially supportive environment to women during skill acquisition, which, in turn, improves women's retention.

Reports on the role of unions indicate that unions have a mixed record on their treatment of women workers. Hartmann (1979) and Reich (1981) provide historical evidence on how crafts unions excluded women and minorities, whereas Milkman (1987) reports on unions' struggle against gender inequality. Cobble (1991) gives an account of how the waitress' unions, organized along crafts lines, had been helpful to women workers. For the recent period, Schroedel (1985), O'Farrell and Moore (1993), HASWIC (1996), and Eisenberg (1998) report varieties of women's experiences, many of them negative. Their stories also reveal, however, that the behavior of union management varies widely across unions and evolves over time.[11]

[11] According to Milkman (1990), organizational features of unions and historical circumstances under which they were formed explain the variations in the relationship between unions and women. She argues that in the case of crafts, where apprenticeship training is most pertinent, skill is the essence of the organizational

The following section tests these competing hypotheses by estimating the impact of joint and nonjoint programs on the retention and attrition probabilities of men and women apprentices. Comparison of these predicted probabilities would indicate whether program sponsorship matters in allocation of training to men and women and, if so, which type of program provides more training more equitably.

Attrition and Retention of Apprentices

The data classify the status of each apprentice as of November 30, 1995, the last day of data collection, as "completion," "active," and "cancellation." Completion indicates that the apprentice has graduated from the program, henceforth referred to as "graduation." Active apprentices are those still in training on the terminal date. Cancellation refers to apprentices who have not completed training but are no longer registered as apprentices. The theoretical framework of the article is suitable for explaining voluntary quits, although not all reported cancellations in the data may be interpreted as such. The data set provides some remarks on the reasons for cancellation, although these are unsystematic and incomplete. These remarks, as well as the anecdotal information received from apprenticeship program coordinators, suggest that continuation of training is largely at the discretion of the apprentice. The most commonly given reasons for cancellation are "failed to pay union dues," "did not show up for work," or "did not attend classes." There are some dismissals from the program in instances of violation of certain basic rules, such as failing drug tests or picking fights on the job site, but these are very rare. In addition, there are obvious cases of involuntary quits due, for instance, to death or, more commonly, closing down of the apprenticeship program. We excluded from the analysis these latter observations, which obviously were not the outcome of the apprentice's decision, and treated the rest of the cancellations as voluntary quits.

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logic, and crafts unions historically excluded women (and ethnic/racial minorities) not because of who they were but because they were unskilled. Industrial unions of the 1930s were more inclusive, reflecting the higher share of women in the industrial labor force, although women were viewed paternalistically and excluded from the leadership. Today, women are more heavily represented both in the membership and leadership of the service- and public-sector unions because these occupations were already more feminized and unions were organized during a period of feminist resurgence. These factors may explain, in part, a finding we report in the next section: Women's performance in completing the apprenticeship programs is so much better in the service occupations than those in construction (and, to a lesser degree, better than in manufacturing). As Milkman (1990:97) suggests, however, the answer to the critical question of the conditions under which unions promote equity (e.g., how to explain the high enrollment and retention rates of women operating engineer apprentices in the last decade?) requires detailed comparative case studies of individual unions within and across industries.

This section first presents descriptive statistics on gender differences in training outcomes (graduation, quit, and still active) for apprentices who started training between 1989 and 1991 (inclusive) and then examines the sources of these differences by multinomial logistic analysis.

Attrition and retention rates. Of all the women apprentices in joint programs, 41 percent graduated and 39 percent quit. For joint program male apprentices, these figures were 47 and 33 percent, respectively. In nonjoint programs, graduation rates were lower and quit rates were higher: 38 and 45 percent, respectively, for both women and men. Comparisons of performance within or across program types on the basis of these simple average graduation and quit rates, however, may be misleading. For instance, since women were concentrated in occupations with higher graduation rates, the simple average graduation rates would overstate women's graduation rate relative to men. In Tables 2 and 3, such biases are removed by calculating the appropriately weighted averages.

We first compare the performance of women and men apprentices within each type of program. The upper half of Table 2 reports the weighted average graduation and quit rates for men and women enrolled in joint programs, where weights are based on the total joint program apprentices in each occupation. According to this table, 37 percent of all the women enrolled in joint programs graduated, whereas 47 percent of the men did. This differential stems from the construction and manufacturing occupations: The hypothesis that women's graduation rate is equal

TABLE 2

COMPARISON OF TRAINING OUTCOMES WITHIN PROGRAMS TYPE

	Percentage of Apprentices			
	Graduated		Quit	
	Women	Men	Women	Men
Joint programs				
All industries	37.3***	47.4	42.1***	33.0
Construction	32.2***	43.1	46.0***	35.8
Manufacturing	59.1***	72.1	23.5***	15.7
Service	81.8	82.6	8.2**	11.1
Nonjoint programs				
All industries	28.1***	37.8	51.3***	44.6
Construction	16.8***	26.9	60.7***	53.3
Manufacturing	44.7**	54.4	36.2*	30.0
Service	51.5**	59.1	34.1***	29.4

SOURCE: BAT/AIMS.

NOTES: These tables report graduation and quit rates (as of November 30, 1995) for apprentices who started training in the 1989–1991 period. The percentages of apprentices who are "still active" are not reported in the tables but can be calculated as the residuals. In Table 2 the null hypothesis that *within* each type of program graduation (quit) rates of women and men are equal is tested. In Table 3, the null hypothesis that graduation (quit) rates of either gender are equal *across* joint and nonjoint programs is tested. ***, **, and * indicate that the hypothesis is rejected at the 1, 5, and 10 percent levels (two-tailed tests).

TABLE 3
COMPARISON OF TRAINING OUTCOMES ACROSS PROGRAM TYPES

	Percentage of Apprentices			
	Graduated		Quit	
	Women	Men	Women	Men
Joint programs				
All industries	43.0***	49.4***	36.7***	33.5***
Construction	31.9***	43.6***	45.0***	33.6***
Manufacturing	57.7	68.4***	24.9	18.1***
Service	74.3***	77.9***	13.8***	14.0***
Nonjoint programs				
All industries	27.4	33.5	56.8	48.9
Construction	14.8	27.3	67.9	54.2
Manufacturing	50.3	55.3	32.7	28.9
Service	55.9	62.6	32.7	25.7

SOURCE: BAT/AIMS.

NOTES: These tables report graduation and quit rates (as of November 30, 1995) for apprentices who started training in the 1989–1991 period. The percentages of apprentices who are "still active" are not reported in the tables but can be calculated as the residuals. In Table 2 the null hypothesis that *within* each type of program graduation (quit) rates of women and men are equal is tested. In Table 3, the null hypothesis that graduation (quit) rates of either gender are equal *across* joint and nonjoint programs is tested. ***, **, and * indicate that the hypothesis is rejected at the 1, 5, and 10 percent levels (two-tailed tests).

to men's is rejected for construction, manufacturing, and all industries ($p < 0.01$). In the service industry, women's and men's graduation rates were not statistically different. The lower portion of Table 2 reports the corresponding rates for the nonjoint programs. In this case, men had higher rates of graduation, by approximately 10 percentage points, across all industries ($p < 0.05$). Thus, in general, a smaller fraction of women apprentices graduated in comparison with men, regardless of the type of program they were enrolled in. Quit-rate comparisons yield a similar result: Women had higher quit rates than men, with the exception of service-sector joint programs.

Table 3 compares the average graduation rates of women (and men) across the joint and nonjoint programs. The figures in each column are averages weighted by the sum of the joint and nonjoint apprentices of the respective sex in each occupation. Comparison of the upper and lower blocks of Table 3 indicates that, with the exception of women in the manufacturing sector, apprentices in joint programs had higher graduation rates in comparison with their peers in nonjoint programs ($p < 0.01$). These graduation-rate differentials for both men and women apprentices were very close, approximately 16 percentage points. Symmetrically, nonjoint quit rates were higher than the joint program rates in all industries.

One final comparison concerns the performance of joint program women apprentices and nonjoint program men apprentices (which cannot

be read directly from Tables 2 and 3 because it requires different weights based on the total number of apprentices in these two groups across occupations). After the appropriate calculation, we found that joint program women's overall average graduation rate was higher than the nonjoint program men's rate by 5 percentage points (and quit rate was lower by 11 percentage points; $p < 0.01$).[12] Joint program women's graduation rates also were statistically significantly higher than nonjoint program men's graduation rates in the construction and service industries (and their quit rates were lower in both industries), whereas no difference is observed in the case of manufacturing.

Thus three main conclusions emerge from the data. First, on average, a smaller fraction of women graduated (and a larger fraction quit) in comparison with men, independent of the type of program they were enrolled in. Second, on average, regardless of gender, a larger fraction of apprentices enrolled in joint programs graduate and a smaller fraction quit. Third, women in joint programs had, on average, a higher rate of graduation and a lower quit rate than men apprentices in nonjoint programs.

Determinants of attrition and retention. In examining the effects of union involvement on gender differences in training outcomes, we use multinomial logistic analysis for women and men apprentices separately.[13] The dependent variable is apprenticeship status as of November 1995. We use a set of training program, occupational, individual, and macroeconomic variables to capture the factors that influence the relative costs and benefits of training for men and women and determine their likelihood of graduation or quitting.

The primary explanatory variable of interest here is the program sponsor type, because it is the critical variable in determining the quality of training supplied. Joint efforts of union and management can provide an institutional framework that distributes costs, risks, and benefits of training among the stakeholders (firms, unions, and apprentices) and avoids "poaching" externalities, whereas unilateral employer programs may find it more difficult to circumvent market failure in training.[14] However, higher efficiency of joint programs does not necessarily imply that women

[12] Complete results are available from the authors on request.

[13] The women and men samples are separated on the presumption that (1) factors that affect graduation from, quit from, or continuation in training differ by gender, (2) gender is an exogenous variable, and (3) the samples of women and men are independent.

[14] For discussions of market failure in training, see Booth and Snower (1996). Soskice (1994) discusses how unions, employer associations, and the government cooperate in the German apprenticeship system to avoid market failure. Bilginsoy (1999) shows that joint programs in the construction trades in the United States are more efficient in graduating apprentices relative to the unilateral employer programs with single or multiple sponsors.

and men apprentices would benefit equally from this effect. We will estimate the impact of joint sponsorship on women's and men's performance by the joint/nonjoint program intercept dummy variable. Sponsor-industry interaction dummies, in turn, capture variations in the impact of joint programs across industries.[15]

Occupational variables include the share of women in the occupation, earnings, state licensing requirements, and term length of the apprenticeship program. A higher female share means a larger pool of journey-level women to train with and hence an environment more conducive to graduation for women. Earnings measure the median weekly earnings in the occupation. We expect the likelihood of graduation to rise with the level of skilled craftsworker earnings in each occupation (which indicates both higher apprentice pay and higher expected earnings on graduation).[16] If the state requires the craftsworker to be licensed in order to practice the trade, there may be an additional incentive to make use of apprenticeship training to master the skills. Apprenticeship term length is expected to have an inverse relationship with the probability of graduation because costs of investment vary directly with the length of training. Apprenticeship in an occupation with a shorter term length is a less costly commitment and therefore associated with higher likelihood of graduation. This effect may be stronger for women, who are likely to have greater family responsibilities and therefore face greater obstacles to completing longer programs.

Personal characteristics are age, gender, ethnicity/race, and OJT credit hours awarded at the beginning of apprenticeship for prior work in the craft. If age is a proxy for maturity, general experience, and commitment to training, then it is expected to raise the graduation probability. Given the possibility of a nonlinear relationship, we also include its squared

[15] Table 1 showed significant variations in the prevalence of joint programs across industries. The nature of union involvement also differs by sector, to some extent being related to the nature of work. In construction, unions are referral agents, and apprentices are often hired from the union hall. Apprentices constantly change jobs, employers, and crews as old projects are completed and new ones start. In services and manufacturing there is a closer bond between the apprentice, the employer, and coworkers by virtue of the continuity of the work. In addition, apprenticeship in manufacturing is allocated by seniority in the internal market to incumbents on the job, whereas in construction it is more likely to be the training route for newcomers.

[16] Some words of caution concerning the quality of data on female share and earnings are necessary. These data come from the CPS, where many occupations are combined (e.g., plumbers with pipefitters, electricians with maintenance electricians) and therefore not defined as precisely as in the BAT data. Second, the measured female shares and median earnings are the U.S. averages. Although state averages would have been more desirable to use, we were not able to obtain these data for all occupations for this study. Finally, the data do not allow us to control for earnings differences by either gender or union/ nonunion workers. In light of these shortcomings, findings on these variables should be considered provisional.

value as an explanatory variable. Race/ethnicity is a dichotomous variable taking the value of 0 for whites and 1 for people of color.[17] The OJT credit hours awarded to the apprentice by the program coordinator at the beginning of training is used as a measure of previous experience. Apprentices with more credit hours are more likely to graduate and less likely to quit because they face lower opportunity costs of apprenticeship and their greater familiarity with tasks also may facilitate graduation. Due to lack of data, other potentially relevant variables, such as education, father's occupation, marital status, and number of children, are not included in the empirical analysis.[18]

As a factor influencing alternative opportunities and the costs of apprenticeship, we also include the state unemployment rate among the regressors. This variable is measured for each state as the average of annual unemployment rates for the term length of the program following the start of apprenticeship. Its impact is theoretically indeterminate. The higher the rate of unemployment, the more likely it is for a worker to invest in apprenticeship and not drop out because the opportunity costs of staying are lower. On the other hand, periods of stagnation also mean less work for apprentices and therefore an inability to complete the required OJT. This may lead the apprentice to prolong the training period or quit the program.

Region (East, North, South, West) dummies, following the Census Region Classification, are included in order to control for geographic variations. Finally, in the regression analysis we pooled the apprentices who started training in 1989, 1990, and 1991. Since the last date at which the apprenticeship status is determined in the data is the same for all classes of apprentices, the graduation and quit probabilities of apprentices are expected to decline with the year of initial enrollment. In order to control for this cohort effect, we included dummy variables for years among the explanatory variables.[19]

Descriptive statistics on explanatory variables and the data sources are presented in Table 4. We tested the hypothesis of equality for each pair of means (or proportions) reported for women and men apprentices in Table 4 and rejected the hypotheses in every case decisively ($p < 0.01$) except for

[17] People of color include African, Hispanic, Asian, and Native Americans. While this variable does not take into account the diverse circumstances faced by different groups of people of color, we will pursue a more disaggregated analysis in a separate article focusing on the experience of minority apprentices.

[18] Variation in education level is expected to be relatively small. All apprenticeship programs require high school graduation or GED. Apprentices with college education are few, although rising in numbers.

[19] Marginal effects of these year dummies were in accordance with our expectations and are not reported in the article.

TABLE 4
DESCRIPTIVE STATISTICS[a]

	All Apprentices	Women Apprentices	Men Apprentices
Continuous variables[b]			
Age (years)	26.97	30.04	26.80
	(6.83)	(6.90)	(6.78)
OJT credit[c] (%)	7.17	4.31	7.33
	(16.58)	(14.22)	(16.69)
Unemployment rate (%)	6.51	6.46	6.51
	(1.03)	(1.07)	(1.03)
Median weekly earnings ($)	486.36	466.57	487.42
	(67.10)	(79.80)	(66.18)
Female share in occupation (%)	3.29	7.20	3.08
	(6.16)	(11.08)	(5.70)
Program length (years)	3.64	3.23	3.67
	(0.71)	(1.05)	(0.68)
Dichotomous variables[d]			
Joint sponsorship	66.96	72.31	66.67
Minority	16.63	27.61	16.04
Construction	79.81	69.08	80.39
Manufacturing	10.19	6.94	10.36
Service	10.00	23.98	9.25
Licensed occupation	13.87	9.61	14.10
Eastern states	17.77	15.30	17.91
Northern states	40.61	42.14	40.53
Southern states	32.10	28.94	32.27
Western states	9.52	13.62	9.30
Class of 1989	32.90	30.89	33.01
Class of 1990	36.55	36.75	36.54
Class of 1991	30.55	32.36	30.45
No. of observations	96,957	4,941	92,016

SOURCES: Unemployment rate: *Statistical Abstract of the United States* (various years); female share in occupation: unpublished 1990 CPS data; median earnings: 1990 CPS data as reported in GAO (1992); licensed occupation: Bianco (1993); other variables: BAT/AIMS.

[a]The hypothesis that the reported mean values (or proportions) are equal for women and men is rejected for all variables ($p < 0.01$), except for the "Class of 1990."

[b]The first and second lines show the means and standard errors.

[c]Measured as the percentage of total required OJT hours.

[d]Figures show the proportion of apprentices.

the "class of 1990." Thus there are significant differences between men and women apprentices. Women, on average, were older and received less OJT credit. The average woman apprentice was trained in an occupation that requires a shorter period of training, was lower paying, and had a greater concentration of women. Proportions of women apprentices who were in joint programs and who were of color also were higher than those of men.

Empirical results. We estimated the following multinomial logistic model separately for men and women:

$$\text{Prob}\,(Status{=}j) = \frac{\exp(\beta_j X_i)}{\sum_{k=1}^{3}\exp(\beta_k X_i)} \qquad (1)$$

where *Status* indicates whether the apprentice has quit, is active, or has graduated (coded as j = 1, 2, 3, respectively), β_j is the row vector of regression coefficients, and $\mathbf{X}_i$ is the matrix of explanatory variables. The estimated equations provide predicted probabilities of the three possible outcomes for the apprentice with characteristics $\mathbf{X}_i$.

Estimation results are summarized in Table 5. Likelihood ratio (LR) test values are comfortably higher than the critical value of $\chi^2(19)$ = 30.14, indicating that explanatory variables are significant for both women and men. The top row of Table 5 reports the baseline probabilities of graduation and quitting for the "average" woman and man apprentices. The average apprentices are defined by the mean values of regressors for each gender. The partial impact of each explanatory variable on these probabilities and its standard error are reported in the remainder of Table 5. For the continuous variables, the reported marginal effects are the derivatives of the conditional mean function. For the dichotomous variables, the marginal effect is the change in the value of the function (1) with the relevant variable changed from 0 to 1, while other variables are kept constant at their mean values. Probabilities pertaining to the "active" status are not reported for the sake of brevity.[20]

Baseline probabilities suggest that the average woman apprentice's probability of graduating is 41.1 percent, 3 percentage points lower than the average man apprentice. Women are also more likely to drop out by 5 percentage points. These probabilities, however, are altered considerably with variations in the explanatory variables.

Program sponsorship has a significant impact on the performance of both women and men apprentices. Women in joint programs are more likely to graduate and less likely to drop out relative to their peers in nonjoint programs by 21 and 22 percentage points, respectively. Joint sponsorship raises men's likelihood of graduating by 20 percentage points and lowers the likelihood of quitting by 22 percentage points in comparison with men apprentices in nonjoint programs. These joint/nonjoint program differences are statistically highly significant ($p << 0.01$), underscoring that

[20] These results are available from the authors on request.

TABLE 5

GRADUATION AND QUIT PROBABILITIES OF APPRENTICES (CLASSES OF 1989, 1990, 1991)[a]

	Women Apprentices		Men Apprentices	
	Graduation	Quit	Graduation	Quit
Base probability	41.38	43.73	44.56	38.22
Partial effects				
Program type				
Joint sponsor	20.50	–22.05	20.01	–22.02
	(3.42)***	(2.89)***	(0.54)***	(0.49)***
Industry				
Manufacturing	28.05	–20.52	18.87	–12.39
	(5.37)***	(5.02)***	(0.81)***	(0.76)***
Service	59.17	–46.32	25.20	–21.94
	(6.86)***	(6.77)***	(1.42)***	(1.45)***
Sponsor-industry interaction				
Joint* manufacturing	42.64	–37.91	39.43	–34.98
	(4.50)***	(4.79)***	(1.29)***	(1.44)***
Joint* service	72.53	–62.79	42.20	–40.17
	(6.26)***	(7.66)***	(1.19)***	(1.39)***
Macroeconomic				
Unemployment rate	1.53	–5.56	–0.36	–2.09
	(0.89)*	(0.92)***	(0.20)*	(0.19)***
Occupation				
Female share	–0.59	–0.01	0.71	–0.78
	(0.18)***	(0.18)	(0.05)***	(0.05)***
Median earnings	0.09	–0.11	0.15	–0.17
	(0.02)***	(0.02)***	(0.00)***	(0.00)***
Licensed	–0.18	–4.45	–2.31	0.53
	(2.99)	(2.89)	(0.56)***	(0.53)
Term length	–5.55	–3.25	–4.85	–5.15
	(1.48)***	(1.47)**	(0.38)***	(0.37)***
Personal				
Age	2.26	–2.33	1.51	–1.45
	(0.88)***	(0.83)***	(0.18)***	(0.17)***
Minority	–5.74	5.61	–11.47	11.23
	(1.95)***	(1.85)***	(0.54)***	(0.48)***
OJT credit	0.29	–0.13	0.48	–0.23
	(0.06)***	(0.06)**	(0.00)***	(0.01)***
Geographic				
East	18.26	–6.27	22.05	–13.38
	(3.06)***	(2.95)**	(0.59)***	(0.56)***
North	15.86	–5.24	17.03	–7.59
	(2.21)***	(1.98)***	(0.48)***	(0.44)***
West	–2.87	16.19	2.04	10.14
	(3.11)	(2.88)***	(0.75)***	(0.67)***
Class dummies	Included		Included	
Log-likelihood	–4,301.46		–83,739.09	
Restricted log likelihood	–5,162.70		–96,220.30	
–2LR	1,722.48		24.962.42	
No. of observations	4,941		92,016	
Hit ratio[b]	0.65	0.67	0.73	0.55

SOURCE: BAT/AIMS.

NOTE: ***, ** and * indicate that the partial effect is statistically significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed tests).

[a]Calculated at the mean values of regressors.

[b]Percentage of outcomes that are correctly predicted by the estimated regression equation.

the program sponsor type is critical in determining the attrition and retention rates of both men and women. It is also notable that the partial effect of joint sponsorship is almost identical for men and women.

The marginal effects of manufacturing and service industries show that, in comparison with construction, both women and men apprentices are more likely to graduate and less likely to quit in these industries ($p << 0.01$). This effect is particularly strong for women apprentices. Relative to construction, women in manufacturing and services are more likely to graduate by 28 and 59 percentage points, respectively. The corresponding figures for men are 19 and 25 percentage points. Thus there are significant differences in the performance of apprentices by industry. Apprentices of either sex have the highest probability of graduating in the service industry and the lowest probability of graduating in construction. Cross-industry variation in the likelihood of quitting is the mirror image of the observations on graduation.

These interindustry comparisons are made for the average apprentice, without identifying the type of apprenticeship program. Similarly, marginal effects of industry were ignored in calculating the joint sponsorship impact. We now control for the industry and the program type simultaneously by introducing joint-industry interaction dummies. The baseline apprentice for each gender is now the nonjoint apprentice in construction, who is otherwise defined by the mean values of the variables. In comparison with the baseline apprentice, a joint program woman apprentice in manufacturing is more likely to graduate by 43 percentage points and less likely to quit by 38 percentage points. For services, the differences are more dramatic, at 73 and 63 percentage points, respectively. For men apprentices, the same pattern holds, although the partial effects of joint program and industry are of smaller magnitudes than those observed in the case of women.

The rate of unemployment has opposite effects on women's and men's graduation probabilities. While the likelihood of women's graduation rises, men's graduation probability declines. The magnitudes of these effects are quite small, especially for men, and they are only marginally statistically significant ($p < 0.10$). The quit probabilities are more sensitive to variations in the unemployment rate. A percentage point increase in the unemployment rate lowers women's and men's likelihood of quitting by 5.6 and 2.1 percentage points, respectively, and both estimates are statistically highly significant ($p << 0.01$). Jointly, these imply that changes in the unemployment rate have a significant positive marginal effect on the likelihood of being still active for both men and women, but the effect is greater in the case of women. The marginal effects of unemployment on

the probability that women and men are still active are 4.0 and 2.4 percentage points, respectively ($p << 0.01$). Thus, while the primary effect of a higher unemployment rate and fewer job opportunities is a higher propensity for both women and men apprentices to stick with training and not to quit, this effect is stronger for women apprentices.

If male apprentices are given preferential treatment in job allocation during a period of job shortage, then unemployment is expected to *widen* the gender differentials in graduation and quit probabilities. Such discriminatory behavior would make it more difficult for women to complete training and might induce them to quit. We find, however, that gender differentials in both the graduation and quitting probabilities narrow. In the case of graduation, the differential declines from its baseline value of 3.2 to 1.3 percentage points when the unemployment rate increases by 1 percentage point. But both the magnitude and the statistical significance of the change are small. In the case of quits, women's probability of quitting declines more than that for men, bringing the gender differential from –5.5 to –2.0 percentage points. Thus these results do not provide support for the hypothesis that male apprentices are favored relative to women during recessions.[21]

Among the occupation variables, median level of earnings has a significant effect on training outcomes. As expected, the likelihood of graduation rises and the likelihood of quitting declines with earnings. However, the magnitude of the marginal impact of earnings on women's graduation and quitting probabilities is smaller than men's. The lower sensitivity may be the outcome of relatively fewer job alternatives available to women apprentices. Female share and state licensing requirements yield unanticipated results. Female share has a significant negative impact on women's likelihood to graduate, whereas it raises men's graduation probability and lowers their quitting probability. Licensing requirement turns out to be statistically insignificant in affecting women's training outcomes but reduces men's likelihood to graduate. There are no plausible explanations for these surprising results. Further research into the characteristics of occupations is required to assess whether these variables reflect the

[21] The duration of training until graduation and quitting indicates no significant gender differences either—at least at the aggregate level for all occupations. Among those who quit, the median male quits on completion of 43 percent of the term length of the program. For women, this figure is 41 percent. Similarly, among graduates, women complete the program only slightly more slowly than men do. By the time the median male graduate completes the program, 101 percent of the term length has expired; in the case of the median woman graduate, 104 percent of the term has elapsed. Based on the CPS data, Petersen et al. (1995) also found that the average annual hours of work for men and women apprentices are essentially the same (1519 and 1534 hours, respectively).

impact of occupation-specific factors that are currently unobservable. An increase in term length lowers both men's and women's likelihood of quitting while raising the probability of being still active. This outcome simply may reflect the fact that a significant number of apprentices have not yet reached the point during their training when they decide to quit or complete the required OJT hours to graduate. The negative effect also may suggest that the longer term length is associated with higher skill and therefore greater motivation not to quit, although the negative impact of term length on the graduation probabilities does not fit this explanation. More definitive answers to these questions require an analysis of the duration of apprenticeship.

Personal characteristics turn out to be significant factors in explaining graduation and quitting probabilities. Among personal characteristics, race/ethnicity seems to be the most important factor that influences apprentice performance. Both men and women of color are less likely to complete training and more likely to quit relative to whites, but this effect is stronger for men. Age is positively related to the probability of graduation and negatively related to the probability of quitting. Apprentices who receive higher OJT credit are more likely to graduate, and the marginal effects are of the same sign for both sexes, although somewhat stronger for men.

Conclusion

Providing equal access to apprenticeship training and helping women complete their training successfully are important means for accomplishing the gender integration of nontraditional craft occupations. This article compared the attrition and retention rates of women and men apprentices in joint union-management and unilateral employer programs in order to identify the type of program that provides more equitable outcomes in apprenticeship training.

The BAT data on the 1989–1991 classes of apprentices show first that the share of women in apprenticeship training is very low, especially in construction and manufacturing occupations. If this pattern persists, it is unlikely that women's integration into the crafts labor force will be achieved. Second, joint apprenticeship programs take the credit for training the bulk of new craftswomen. In construction and manufacturing sectors, which train 90 percent of apprentices, shares of women's enrollment in joint programs are twice as high as their shares in nonjoint programs. Joint programs also graduate a higher proportion of the women apprentices in comparison with the nonjoint programs. As a result, the overwhelming

majority of women reaching the journey level are trained in joint programs. Third, controlling for other factors, union involvement raises the graduation probabilities of both men and women, indicating their greater effectiveness in turning out journeyworkers than the unilateral employer programs. In fact, a woman trainee in a joint apprenticeship program has a higher probability of graduation and a lower probability of dropping out in comparison with an apprentice in a nonjoint program, regardless of gender.

Union-management–sponsored programs leave much to be desired as models of equal access to training and successful integration, especially in construction occupations, where the overwhelming majority of apprentices are men. In all industries, women's share in apprenticeship is abysmally low. As O'Farrell and Moore (1993:84) argue, however, "in an imperfect world . . . unions are still the best vehicles for bringing equality to the workplace." The evidence presented in this article suggests that union involvement in training offers better prospects for integrating women in the skilled trades than leaving training exclusively to employers. This union difference may be due to the changing attitudes and commitment of unions to open up to the traditionally underrepresented groups of workers brought on by either lost legal battles against integration or a realization that there can be no future for unions without a demographically diverse membership. This conclusion strengthens the case for the role of unions in either creating or promoting gender equity in labor markets and weakens the argument for eliminating unions' control over the training of skilled craftworkers. It also underscores the urgency of building political support for unions at a time when union membership is continuing its trend decline. While strengthening the commitment to and the practice of equity in the unions and union-management training programs is important, by itself it will not be sufficient to ensure gender integration of the skilled trades. It is also necessary to renew the commitment to affirmative action in hiring and to develop and bolster outreach programs in order to increase the numbers of women who are interested in pursuing careers in the skilled trades (Kane and Miller, 1980).

This analysis raises two questions for future research. The first is to focus on the union locals that have been successful in integration and to identify the ways in which joint programs are more successful than nonjoint programs in recruiting and training women. Such case studies also need to examine the consequences of integration in training and union membership for the earnings and job prospects of union members. Second, it is also important to examine a further consequence of apprenticeship training: the employment prospects and earnings of journey-level women relative to men. Clearly, women's successful graduation from

training is necessary but not sufficient to ensure the rise in women's representation in the skilled trades.

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