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Registered Apprentices and Apprenticeship Programs in the U.S. Construction Industry between 1989 and 2003: An Examination of the AIMS, RAIS, and California Apprenticeship Agency Databases

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Abstract

This study is a descriptive statistical examination of apprenticeship training in the construction industry, based on the U.S. Department of Labor and California Apprenticeship Agency databases. It specifically addresses the following questions: What were the patterns of enrollment across states and occupations, and over time? How diverse were the registrations in terms of gender and ethnic/racial composition of apprentices? What were the completion and cancellation rates, and how do these vary by gender and ethnic racial groups? What were the differences between union-management joint and unilateral employer programs in terms of enrollments, occupational distribution, gender and ethnic/racial composition, completion and cancellation rates, and program size?

Keywords: Apprenticeship training, construction.
JEL Classification: J24, L74

In the late 1980s, the Bureau of Apprenticeship and Training (BAT) of the U.S. Department of Labor (USDOL) started compiling apprenticeship data from programs registered either with the BAT or federally approved state apprenticeship councils/agencies (SACs). This database is known as Apprenticeship Information Management Systems (AIMS). In 2002, the AIMS database was revised, improved, and renamed Registered Apprenticeship Information System (RAIS) by the Office of Apprenticeship Training, Employer and Labor Services (OATELS) which includes the BAT.

The objective of this study is to examine these micro level datasets to provide basic information about the apprentices and apprenticeship programs in the U.S. construction industry (SIC Codes 1500-1799), which accounts for the majority of indentures. This examination will be purely descriptive, limiting itself to the reporting of the essential statistics and binary relationships with minimal interpretation. In view of the concerns over the future of the skilled workforce voiced repeatedly by the construction industry insiders and the controversy over the comparative performance of apprenticeship programs in the organized and open-shop sectors of the industry, this information expected to serve as a background to the discussion among the practitioners and the policy-makers. It may also be of some use to the academics interested in the area of training.

The study addresses specifically the following questions: What were the patterns of enrollment across states and occupations, and over time? How diverse were the registrations in terms of gender and ethnic/racial composition of apprentices? What were the completion and cancellation rates, and how do these vary by gender and ethnic racial groups? What were the differences between union-management joint and unilateral employer programs in terms of enrollments, occupational distribution, gender and ethnic/racial composition, completion and cancellation rates, and program size?

The study has both geographic temporal limitations. The major shortcoming of the AIMS and the RAIS databases is that they are not nationwide. Some states do not report to the USDOL at all, or do so only partially. Two of largest states, California and New York, are among the latter. In this study, I included only the 30 states which a report written for the OATELS has listed as full participants to the USDOL information systems. [1] In addition, post-1995 data from the California Apprenticeship Agency database (henceforth CAA) were obtained separately and included in this study, bringing the number of states to 31.

Secondly, the AIMS database covers the indentures that took place until November 1995. Observations on apprentices indentured in years prior to 1989 are, however, appear to be seriously incomplete. Thus, I ignored all observations from years preceding 1989. The RAIS database, on the other hand, recorded apprentices that entered training until March 2004. Comparing the number of observations from the RAIS for years prior to 1995 with those from the AIMS dataset, however, indicate that the former are also incomplete while the numbers for year of 1995 are compatible. Thus, in this study I will use the AIMS to study the 1989-1994 period, and the RAIS to cover the 1995-2003 period. Finally, California apprenticeship data

[1] Frank J. Bennici, *The Status of Registered Apprenticeship: An Analysis Using Data from the Registered Apprenticeship Information System.* Report prepared for OATELS by Westat. Rockville, MD: April 2004.

seem to be more complete in the post-1995 period (although there may be some missing observations in total number of registrations in 1995 to 1997). Data fields reported by the RAIS and the CAA overlap substantially and codes are largely compatible. I appended these two datasets for the examination of the post-1995 period and will call this database RAIS+CAA.

All three datasets have the same structure that records the flow of apprentices into and out of the programs. They are compilations of entries made for each new registration, recording characteristics of the apprentice and apprenticeship program (including birth date, sex, race/ethnicity, veteran status, education level, state, date of entry into the apprenticeship training, credit of prior experience, trade, program, industry, and sponsor type). The status of the apprentice is also recorded as of the last day of data collection, as completion, cancellation or still in training. If the apprentice has exited either through completion or cancellation, the date of exit is also recorded. On the basis of this information, it is possible to report the total number of new apprentices who entered a program during a particular period but it is not possible to know, without a base stock number, the total number of apprentices in the training system at a particular point in time.

In principle, it should be possible to append the AIMS and RAIS databases vertically to obtain an uninterrupted time series from 1989 to 2003 on the inflow of new apprentices, and merge them horizontally by individual apprentice identifiers to obtain information on the type and timing of exit from training. I did not do attempt to create such a unified database. Instead, information from the AIMS and RAIS+CAA datasets will be reported separately. The primary reason for not appending the datasets is that there appear to be differences in the compilation methodologies of the BAT and the OATELS. For example, the education variable in the AIMS has many missing observations. In the RAIS, however, there are relatively few missing observation in this field (even for the overlapping year of 1995). Another example is the status of apprentices. The AIMS reported a relatively high percentage of apprentices (15 percent) who entered training in 1989 and 1990 as “still active” as of November 1995, i.e. they had not exited the programs via completion and cancellation. In the RAIS database, however, such observations from 1995-1997 cohorts were much lower (3 percent), and this difference is not explainable by the longer follow-up time. The most likely reason is that many of these apprentices were effectively drop-outs and were categorized as cancellations in the RAIS. At this point in time there is no sufficient information on the methodologies used in gathering data for AIMS and RAIS, and for this reason I decided against stacking these datasets temporally.

Both the AIMS and the RAIS datasets report the entry dates as well as the status of apprentices at the terminal points. Merging datasets at the registration level should allow the tracing of consecutive cohorts of apprentices for at least a decade starting in 1989. This is not feasible because there are no unique individual observation identifiers common to both datasets that would permit a follow-up of an AIMS apprentice who might have graduated or dropped out after 1995.

In addition to the geographic and temporal limitations, the study is confined to civilian apprentices only. Military and prison apprenticeships are excluded.

1. New Registrations by State:

Table I reports the new registrations in apprenticeship programs by state. The greater number of registrations in the RAIS database was due to the longer time period, inclusion of California apprentices, and the overall increase in annual registrations. There was a strong positive relationship between the state construction labor force and the number of new registrations. The correlation coefficient between the new registrations in RAIS and the construction workforce in December 2000 by state, for instance, is 0.88.

Apprenticeship programs are sponsored either jointly by unions and contractor(s) signatory to a collective bargaining agreement in the organized sector, or unilaterally by contractor(s) in the open-shop sector. Following the USDOL terminology, I will refer to these as joint and non-joint programs, respectively. Table 1 also provides information on the distribution of registrations between joint and non-joint programs.[2] Joint program registrations account for about 70 percent of the total. The higher average share of the joint programs in the RAIS+CAA was due, however, to the inclusion of California in the dataset. Without this state, the share of joint programs in the RAIS dropped to 68.4 percent. Nevertheless, apprenticeship training was carried out disproportionately by the organized sector since three-quarters of the construction workforce, circa 1990, was employed in the open-shop sector.

The shares of non-joint programs were highest in several Southern (AR, FL, MS, SC) and Western (ID, MT) states, as well as in SD. It is also noticeable that the shares of non-joint programs were higher in many Southern and Western states, in some cases by as much as five percentage points, in the RAIS database, which may indicate that relative regional expansion of non-joint programs.

[2] Several other studies listed in the Appendix referred to these as union and non-union programs.

Table 1: New Registrations and the Joint Program Shares by State

	AIMS: 1989-1994		RAIS+CAA: 1995-2003	
	Registrations	% in Joint Programs	Registrations	% in Joint Programs
AK	1,294	78.6	3,464	70.7
AL	3,546	67.5	8,604	76.3
AR	2,901	21.2	10,726	14.6
AZ*	3,544	85.1	9,256	75.6
CA*	Not available	--	121,558	87.9
CO	4,721	67.4	12,468	48.3
FL*	13,714	41.0	36,760	31.2
GA	4,540	74.9	9,116	71.1
IA	3,739	73.6	9,201	71.2
ID	1,950	33.1	2,245	43.6
IL	15,735	97.6	46,392	81.2
IN	9,464	75.4	25,292	76.3
MI	8,311	71.0	19,941	75.2
MO	7,931	92.1	34,048	90.1
MS	1,267	47.0	3,391	56.7
MT*	923	40.2	2,623	39.8
ND	381	88.2	1,234	75.5
NE	1,070	76.1	3,002	78.3
NJ	6,205	69.6	15,439	75.8
NM*	3,454	64.5	7,287	54.4
NV*	3,977	93.1	14,165	89.3
OH*	12,448	73.0	32,117	74.3
OK	2,080	60.7	3,474	73.1
PA*	10,424	71.9	27,829	83.1
SC	1,162	45.5	1,225	29.1
SD	599	12.2	1,431	9.8
TN	4,592	75.5	9,789	68.5
TX	11,330	65.3	33,184	58.3
UT	2,821	54.4	7,082	63.5
WV	1,571	88.6	3,243	88.2
WY	256	79.3	1,044	53.6
Total	145,950	70.7	516,630	73.0

*States with State Apprenticeship Council/Agency.

2. Annual Registrations

Table 2 presents total number and joint program share of annual new registrations. Between 1989 and 1994, annual new registrations fluctuated between 20,000 and 30,000. By comparison, annual registrations between 1995 and 2003 were much higher. The relatively larger numbers in the post-1995 period was due, in large part but not exclusively, to the inclusion of California apprentices. California registrations accounted for as little as 20 percent (in 1995) and as much as 40 percent (in 2003) of new registrations, and their share had increased steadily over the period. The changing share of California apprentices may, in part be, due to missing observations in the California data prior to 1998. With or without the California apprentices, the number of new registrations increased until 2001 and then dropped. Looking over the whole period, declines in registration figures coincided roughly with recessions, which may be due to the fact that apprenticeship is also employment and training jobs shrink during economic downturns.

The distribution of new registrations between the joint and non-joint programs was relatively stable over the years with the joint program share fluctuating around the 70 percent mark. The share of joint program registrations declined from 73 percent to 68 percent between 1989 and 1992, and then recovered somewhat by 1994. In the post-1995 period, the joint program share had a mild inverted U-shape, rising until 2001 and then declining. Again, the inclusion of California apprentices had a substantial effect on the joint program share. Excluding the California apprentices, the joint program share turned out to be lower every year by four to seven percentage points, although the observed trend remained unchanged.

Table 2: New Registrations and the Share of Joint Program Apprentices by Year

	New Registrations	% Joint Program Registrations
AIMS		
1989	23,139	73.1
1990	25,975	71.6
1991	21,242	69.5
1992	20,864	68.3
1993	24,459	70.8
1994	30,271	70.4
RAIS+CAA		
1995	33,245	71.8
1996	43,900	71.9
1997	50,038	72.5
1998	57,299	73.3
1999	65,538	73.4
2000	69,834	74.7
2001	70,528	74.1
2002	64,844	73.5
2003	61,404	72.9

3. Single- and Multiple-Employer Programs

Joint and non-joint programs may involve either a single or multiple employers. In the case of multiple-employer programs, several employers participate in sponsorship. Multiple-employer non-joint programs are typically organized under the leadership of an employer association.

Table 3 distinguishes between the single and multiple employer programs in order to investigate trends in annual registrations within the joint and non-joint programs. Multiple-employer joint programs accounted for the largest number of registrations, while the share of single employer joint programs was negligible. Multiple employer non-joint programs had the second largest number of registrations, although their share was less than a third of the joint multiple employer program share.

Joint-program shares after 1995 parallel those observed in Table 2, although the levels were lower in the absence of California registrations. It is also observed that there was a more pronounced change in program shares at the end of the period, in comparison with the share figure reported in Table 2. Joint multiple-employer share dropped by four percentage points between 2001 and 2003, while the non-joint single employer program share rose by almost the same amount. It is not possible to judge without further information whether this change is a temporary phenomenon or it heralds a structural change.

Table 3: Shares of Program Types in Annual New Registrations*

	Joint Programs		Non-joint Programs	
	Single Employer	Multiple Employer	Single Employer	Multiple Employer
AIMS				
1989	0.7	72.4	8.2	18.7
1990	1.0	70.7	9.3	19.0
1991	0.8	68.6	10.2	20.3
1992	1.0	67.3	10.6	21.1
1993	0.9	69.9	10.0	19.2
1994	0.5	70.0	9.6	20.0
RAIS				
1995	1.7	66.6	10.7	21.0
1996	1.7	66.0	10.7	21.6
1997	1.7	66.5	10.2	21.6
1998	1.6	67.5	10.4	20.5
1999	1.7	68.3	10.5	19.5
2000	2.0	68.5	11.0	18.6
2001	1.7	67.8	10.4	20.1
2002	2.7	65.5	12.5	19.3
2003	2.0	63.9	13.8	20.3

*CA registrations are not included because information is not available.

4. Occupational Distribution

According to the USDOL databases, apprenticeship programs are organized in more than 500 occupations in the construction industry. However, a handful of trades accounted for most of the registrations. Ten largest occupations listed in Table 4 made up almost 90 percent of all registrations in the 1989-1994 and 75 percent in the 1995-2003 periods.

Electrical and carpentry trades were by far the largest trades, jointly accounting for 40 percent of all registrations. Registrations were relatively more uniformly distributed among the remaining eight large trades. It is also notable that the total share of the ten largest trades was substantially lower in the 1995-2003 period, which may indicate the ascendance of new occupations.

There were significant differences between the joint and non-joint programs in terms of the occupations in which they provide training. In comparison with the joint programs, non-joint programs were concentrated in a few trades, namely electrical and plumbing. As the distribution of registrations by program type within each trade reported in columns 3 and 4 indicate, about half of electrician and plumbing registrations were in non-joint programs. In other trades, however, non-joint program share was hardly ever higher than 25 percent. Structural steel work and operating engineer registrations were almost exclusively in joint programs.

Another way to observe this pattern is in terms of the occupational distribution of registrations within each program type. Occupational distribution was relatively more even within the joint programs. Electrical and carpentry trades were the largest occupations accounting jointly for 35 to 40 percent of all registrations, while other apprentices were more or less uniformly distributed across other trades. Registrations in non-joint programs, on the other hand, were overwhelmingly in the electrical (45-48 percent) followed by the plumbing (14-15 percent) trades, with much fewer registrations in other trades. Thus, activities of non-joint programs were concentrated in a few trades whereas joint programs operate in a much wider range of occupations.

Table 4: Occupational Distribution of New Registrations and Joint Program Share

	AIMS: 1989-1994		RAIS+CAA: 1995-2003	
	New Registrations	% in Joint Program	New Registrations	% in Joint Program
Bricklayer	4,251	88.0	14,246	80.2
Carpenter	25,380	87.5	87,823	85.0
Electrician	41,303	51.2	118,722	46.4
Operating engineer	4,301	90.2	13,968	92.1
Painter	5,334	92.2	17,210	87.0
Pipefitter	8,861	76.8	21,922	77.4
Plumber	13,069	47.7	39,597	52.1
Roofer	8,585	83.8	29,123	86.9
Sheet metal worker	9,815	74.2	24,232	78.1
Structural steel worker	7,058	97.6	27,244	98.4
Other occupations	17,796	71.5	122,543	82.2
All occupations	145,753	70.7	516,630	73.3

5. "Active" Programs and Program Size

The AIMS, RAIS, and CAA databases report the flow of registrations and therefore do not provide information on the size of the program measured as the stock of apprentices in a program at any point in time. Assuming that the size of the program and the inflow of new apprentices are positively correlated, I measure the program size by the total numbers of registrations over the 1989-1994 and 1995-2003 periods. For each period, I define "active" apprenticeship program as one in which there was at least one new registration.

The first column of Table 5 reports the number of active programs. The upper panel shows that there were 5,443 active programs in the AIMS and 8,214 programs in the RAIS+CAA databases. In both databases the number of non-joint programs was far greater than that of the joint programs, by factor of two to three, but they were much smaller in size. The average size of joint programs was larger by factors of six to eight. Standard deviations indicate that there was a lot of variability in program size. Size distributions of programs were heavily skewed to the right. Hence, the median values reported in the last column of Table 5 permit a better comparison than the means. These figures indicate that the joint programs were larger by even higher orders of magnitude.

The lower panel of Table 5 disaggregates joint and non-joint programs into single- and multiple-employer programs. These figures exclude the California registrations because CAA did not provide information on this aspect of sponsorship. On the joint program side, this disaggregation does not yield interesting result given the small numbers of these programs and apprentices indentured to them. It indicates, however, that there was an enormous disparity between the single- and multiple-employer non-joint programs in terms of size. An overwhelming number of these programs (almost 90 percent) were single-employer programs and these were likely to be small programs mean and median values of 8 and 2 new registrations. Non-joint multiple-employer programs, by contrast were substantially larger in size, coming close to, but not matching, the size joint multiple-employer programs.

Table 5: Distribution and Size of Programs*

	Number of Programs	Mean size (s.d.)	Median size
AIMS: 1989-1994			
Joint programs	1,653	62 (132)	26
Non-joint programs	3,790	11 (42)	2
All programs	5,443	27 (84)	3
RAIS+CAA: 1995-2003			
Joint programs	2,136	177 (450)	58
Non-joint programs	6,078	23 (134)	2
All programs	8,214	63 (266)	4
AIMS: 1989-1994			
Joint single-employer programs	116	10 (20)	3
Joint multiple-employer programs	1,537	66 (136)	29
Non-joint single-employer programs	3,306	4 (12)	2
Non-joint multiple-employer programs	484	59 (102)	24
RAIS: 1995-2003			
Joint single-employer programs	264	28 (77)	4
Joint multiple-employer programs	1,596	165 (365)	69
Non-joint single-employer programs	5,414	8 (41)	2
Non-joint multiple-employer programs	628	126 (356)	33

*Excludes programs for which sponsor type is not known

6. Black and Hispanic Apprentices

The discussion of ethnic/racial minorities in apprenticeship in this study is limited to blacks and Hispanics, the two largest ethnic/racial minority groups. Other non-white racial/ethnic groups constituted about 3 percent of registrations. Integration of blacks into the craft workforce has been topical since the Civil Rights movement of the 1960s. More recently, Hispanics became a part of this discussion as well with their rising share in the labor force. The importance of apprenticeship in this debate derives from the fact that exclusion from the delivery of skills could translate to the exclusion from the craft. The critical issues here are both the share of ethnic/racial minorities in crafts, and the role of unions in the integration process. Previous research has shown that the experiences of blacks and Hispanics in apprenticeship were diverse and therefore it is not appropriate to pool them as minorities.

Table 6A shows the annual shares of blacks and Hispanics.[3] The share of blacks remained stable across the period at around 9 percent, although there was some decline during the last two years. Also, while the joint–non-joint differential of the black share was as high as three percentage points in the early 1990s, by the end of these shares were virtually identical.

The most remarkable pattern concerns Hispanics. The Hispanic share doubled from 1995 to 2003. Hispanics had a higher representation in joint programs after 1995 (except in 1999) and the differential widened after 2000. This phenomenon, however, was driven primarily by California registrations, especially in the joint programs. Once California apprentices are excluded the Hispanic share in joint programs rose from 7.4 to 11.4 percent between 1995 and 2003, whereas the corresponding figures were 9.8 and 16.3 percent in the non-joint programs.

Table 6B summarizes the occupational distribution of blacks and Hispanics. Both black and Hispanic shares were relatively lower in the electrical and mechanical (plumbing, pipe fitting and sheet metal) trades. Blacks were most heavily represented in roofing and operating engineer occupations while the Hispanic shares were highest in roofing and painting. Overall, blacks were more uniformly distributed across the occupations relative to the Hispanics.

Another result that follows from Table 6B is that the occupational distribution of Hispanics over the 1995-2003 period exhibited much greater variation in comparison with that of the Hispanics in the earlier period or blacks overall. Thus, the explosion in the number of Hispanic registrations after 1995 was accompanied with rising occupational segregation. This was true for both the joint and the non-joint programs.

[3] Distinguishing blacks, Hispanics and whites is problematic. Te AIMS and CAA have only one race/ethnicity field which does not distinguish between black and white Hispanics. Codes include black, white (Caucasian) and Hispanic (in addition to several smaller groups such as Asians). The RAIS has two fields, one for race and one for ethnicity. Thus, it is possible to distinguish between black and white Hispanics, although the former were few in numbers. In this section, I included black Hispanics under blacks. Thus Hispanic refers only to white Hispanics.

Table 6A: Annual Black and Hispanic Shares of New Registration by Program Type

	Blacks			Hispanics		
	All Programs	Joint Programs	Non-joint Programs	All Programs	Joint Programs	Non-joint Programs
AIMS						
1989	8.4%	9.3%	5.8%	6.1%	6.1%	6.3%
1990	8.7	9.7	6.4	6.1	6.3	5.8
1991	8.7	9.7	6.3	7.4	7.9	6.3
1992	9.1	10.0	7.1	8.3	8.3	8.4
1993	10.2	10.3	9.8	8.2	8.2	8.1
1994	9.1	9.7	7.8	8.5	8.0	10.0
RAIS+CAA						
1995	8.8	9.0	8.4	12.7	13.1	12.0
1996	9.2	9.7	7.9	14.5	14.9	13.7
1997	10.1	10.2	9.7	15.5	16.4	13.5
1998	9.4	9.5	9.1	16.9	17.6	15.3
1999	9.3	9.4	9.0	18.1	18.4	17.2
2000	9.3	9.4	8.9	20.9	22.0	17.7
2001	9.8	9.9	9.3	21.4	22.4	18.5
2002	8.8	8.8	8.7	22.2	23.4	18.9
2003	8.8	8.8	8.7	24.5	26.2	19.8

Table 6B: Occupational Shares of Black and Hispanic Registrations

	Blacks			Hispanics		
	All Programs	Joint Programs	Non-joint Programs	All Programs	Joint Programs	Non-joint Programs
AIMS						
Bricklayer	11.1%	11.3%	9.6%	7.1%	7.4%	5.3%
Carpenter	10.0	9.7	12.3	8.7	8.7	8.1
Electrician	7.8	8.2	7.4	6.5	6.5	6.6
Operating engineer	12.9	14.0	3.1	5.1	4.5	11.2
Painter	11.5	11.6	9.6	8.2	7.8	13.0
Pipefitter	7.5	8.1	5.8	6.9	5.9	10.3
Plumber	7.0	8.3	5.7	4.8	6.8	3.1
Roofer	15.2	16.4	8.8	15.1	11.5	11.5
Sheet metal worker	7.9	8.7	5.8	6.6	6.2	8.1
Structural steel worker	9.9	9.8	14.1	8.0	8.0	7.7
Other occupations	8.1	8.8	6.4	7.3	6.9	8.5
All occupations	9.0	9.8	7.3	7.5	7.4	7.6
RAIS+CAA						
Bricklayer	12.5	10.0	22.6	17.0	14.2	28.3
Carpenter	10.4	10.1	11.5	19.8	20.0	18.9
Electrician	8.5	8.3	8.7	12.4	11.1	13.6
Operating engineer	12.1	12.7	5.0	11.4	11.0	16.9
Painter	10.8	11.5	6.5	28.4	27.9	32.3
Pipefitter	7.5	7.6	7.3	10.1	8.9	14.0
Plumber	7.8	8.2	7.2	10.5	11.8	9.4
Roofer	11.8	12.8	5.0	44.2	41.3	63.7
Sheet metal worker	8.0	7.9	8.6	12.7	11.6	16.3
Structural steel worker	9.4	9.5	8.2	17.4	17.4	17.4
Other occupations	8.7	8.7	9.0	25.2	26.3	20.2
All occupations	9.3	9.4	8.9	19.2	20.1	16.7

7. Women Apprentices:

Both the organized and the open-shop sectors frequently mention women as the untapped source of labor that could alleviate the skilled labor shortage in construction. In view of these declarations, it is interesting that the share of women was not only low but also declining. Table 7A shows that women constituted less than five percent of all new registrations, and their share was declining since early 1990s.

Their relative representation was higher in the joint programs throughout the periods under study, but the downward trend was shared by both the joint and non-joint programs.

Table 7B shows the occupational distribution of women apprentices. Across the databases and program types, women's share was consistently higher in operating engineer and painting occupations. Large representation of women in operating engineer occupation was a prominent outlier.

Table 7A: Women's Share in New Registrations

	All Programs	Joint Programs	Non-joint Programs
AIMS			
1989	4.1%	4.7%	2.3%
1990	4.3	4.9	2.7
1991	4.8	5.7	2.8
1992	4.9	6.0	2.7
1993	4.9	5.5	3.6
1994	4.4	5.2	2.6
RAIS+CAA			
1995	4.4	4.9	3.1
1996	4.5	5.1	3.0
1997	4.1	4.5	3.0
1998	3.8	4.3	2.5
1999	3.7	4.1	2.6
2000	3.2	3.5	2.6
2001	3.9	4.5	2.2
2002	2.8	3.1	2.2
2003	2.6	2.9	1.7

Table 7B: Occupational Shares of Women

	All Programs	Joint Programs	Non-joint Programs
AIMS			
Bricklayer	2.4%	2.4%	1.8%
Carpenter	5.3	5.4	5.0
Electrician	4.0	5.2	2.7
Operating engineer	21.4	21.1	24.3
Painter	8.2	8.5	5.5
Pipefitter	3.8	4.4	1.6
Plumber	2.2	3.0	1.4
Roofer	2.1	2.3	0.9
Sheet metal worker	2.4	2.7	1.7
Structural steel worker	3.9	3.9	2.9
Other occupations	4.8	5.4	3.3
All occupations	4.5	5.3	2.8
RAIS+CAA			
Bricklayer	1.6	1.7	1.2
Carpenter	4.9	5.0	3.8
Electrician	3.3	4.5	2.4
Operating engineer	14.4	13.8	21.3
Painter	6.7	7.0	4.9
Pipefitter	2.8	3.0	1.4
Plumber	2.0	2.3	1.5
Roofer	1.6	1.7	1.0
Sheet metal worker	2.2	2.4	1.8
Structural steel worker	2.5	2.5	3.1
Other occupations	3.2	3.3	2.5
All occupations	3.6	4.0	2.5

8. Completion and Cancellation Rates

Examination of the completion and the cancellation rates are based on the new registration cohorts of 1989-1990 and 1995-1997 in order to allow sufficient time to complete requirements. The AIMS dataset reports the status of the apprentice as of end of November 1995, and the RAIS+CAA reports the status as of the end of December 2003. I further selected apprentices in programs with 8,000 and 6,000 hours of OJT requirement in order to standardize the completion requirements. Most of the apprentices were registered in programs with 8,000 hours of OJT, and 6,000-hour programs were the second most populous.

Overall, less than half of the apprentices completed the program. The overall completion rates were 45 percent and 39 percent in the 8,000 hour programs. Secondly, completion rates were lower and attrition rates higher in the non-joint programs. The completion rate in joint programs was at least 15 percentage points higher in the joint programs. In the 1995-1997 cohorts, joint programs accounted for two-thirds of all graduates from 8,000-hour and 88 percent of all graduates from 6,000-hour programs.

It is also notable that there were a substantially larger number of apprentices listed as still active in the 1989-1990 cohorts. This is in part due to the fact that 1995-1997 cohorts were followed up for a longer duration. More importantly, however, the difference is due to the data collection. It appears that in the RAIS and the California datasets "missing" apprentices, i.e. those who did not report to work for extended periods of time were recorded as cancellations, whereas many such apprentices were reported as "still active" in the AIMS dataset.

While these figures are indicative of the general patterns of completion and cancellations, it is necessary to bear in mind that there are confounding factors. These include occupational factors, OJT and RTI credit awarded to qualified entrants, race/ethnicity and gender. Table 8C controls for the last two of these factors for registration in the 8,000-hour programs. The Table is not reproduced for the 6,000-hour programs due to the smaller number of registrations.

According to Table 8C, both women and minorities lagged behind white males in terms of performance. White males had the lowest rate of attrition and the highest rate of completion by wide margins vis-à-vis each of these groups. Hispanic males, however, performed substantially better than blacks. Regardless of gender and race/ethnicity, apprentices in joint programs had higher rates of graduation relative to their counterparts in non-joint programs. In fact, the percentages of black and Hispanic males and women in joint programs who graduated often matched and sometimes exceeded the percentage white male graduates in non-joint programs.

Table 8A: Completion and Cancellation rates: 8,000-hour Programs

	N	% Completed	% Cancelled	% Active
1989-1990 Cohorts				
All apprentices	34,524	45.0	39.2	15.8
Joint program apprentices	23,091	53.6	32.3	14.1
Non-joint program apprentices	11,366	27.2	53.4	19.4
1995-1997 Cohorts				
All apprentices	64,483	39.3	57.3	3.4
Joint program apprentices	36,317	45.4	64.6	3.1
Non-joint program apprentices	27,586	31.5	64.6	3.0

Table 8B: Completion and Cancellation rates: 6,000-hour Programs

	N	% Completed	% Cancelled	% Active
1989-1990 Cohorts				
All apprentices	11,972	38.4	49.6	12.0
Joint program apprentices	10,160	41.4	48.8	9.8
Non-joint program apprentices	1,812	21.4	54.6	24.1
1995-1997 Cohorts				
All apprentices	23,127	39.9	57.3	2.7
Joint program apprentices	19,162	42.4	54.8	2.8
Non-joint program apprentices	3,895	27.4	70.2	2.4

Table 8C: Completion and Cancellation Rates by Ethnicity/Race and Gender: 8,000-hour Programs

	N	% Completed	% Cancelled	% Active
White Males				
1989-1990 Cohorts				
All apprentices	29,325	47.4	37.3	15.4
Joint program apprentices	19,434	56.8	29.7	13.5
Non-joint program apprentices	9,831	28.7	52.3	19.1
1995-1997 Cohorts				
All apprentices	47,473	42.5	46.8	3.3
Joint program apprentices	25,985	50.5	62.9	1.7
Non-joint program apprentices	21,020	33.1	76.1	4.0
Black Males				
1989-1990 Cohorts				
All apprentices	2,602	30.0	50.6	19.4
Joint program apprentices	1,918	35.0	47.2	17.8
Non-joint program apprentices	683	16.0	60.0	24.0
1995-1997 Cohorts				
All apprentices	5,460	26.0	70.1	3.8
Joint program apprentices	3,219	29.1	67.3	3.6
Non-joint program apprentices	2,207	21.8	73.9	4.3
Hispanics				
1989-1990 Cohorts				
All apprentices	1,923	34.5	48.1	17.4
Joint program apprentices	1,291	41.8	42.2	16.0
Non-joint program apprentices	628	19.1	60.5	20.4
1995-1997 Cohorts				
All apprentices	7,140	34.0	62.6	3.4
Joint program apprentices	4,213	35.5	60.4	4.1
Non-joint program apprentices	2,889	31.8	65.7	2.4
Women				
1989-1990 Cohorts				
All apprentices	1,268	37.2	45.1	17.7
Joint program apprentices	1,017	42.7	40.4	16.9
Non-joint program apprentices	251	15.4	64.1	23.2
1995-1997 Cohorts				
All apprentices	2,620	27.5	67.6	4.9
Joint program apprentices	1,857	30.4	65.1	4.5
Non-joint program apprentices	750	20.8	73.5	5.7

9. Miscellaneous Demographic Information

The average and median age of apprentices at the start of training are reported in Table 9. In comparison with other industrialized countries, where the starting age is below 20, U.S. apprentices started training late.

Almost 90 percent of all new apprentices in the RAIS+CAA dataset had completed high school or had GED.

About one in ten new apprentices registered during the 1995-2003 period was veteran. The share of veteran was slightly higher in the non-joint programs.

Table 9: Age, Veteran Status and Education Level of New Registrations.

	AIMS*			RAIS+CAA		
	All	Joint	Non-joint	All	Joint	Non-joint
Age (in years)						
Mean	26.4	26.2	26.9	27.5	27.5	27.7
Standard deviation	6.2	6.0	6.7	7.4	7.3	7.7
Median	25	25	25	26	26	26
Education						
<12th grade (%)				11.7	11.0	13.8
>=12th grade (%)				86.9	87.5	85.0
Veteran (%)				8.6	8.2	9.7

*Education level is missing for almost half of the registrations recorded in the AIMS. Veteran information is also not available for apprentices covered by the AIMS.

10. Conclusion

The examination of the AIMS, RAIS, and CAA databases reveal the following patterns in apprenticeship in the U.S.

- There were a substantially higher number of recorded registrations since 1995.
- Joint program registrations accounted for more than two-thirds of all registrations, although there has been a slight decline in their share after 2000.
- Non-joint programs were concentrated in a few occupations whereas joint programs were active in a greater variety of occupations.
- The average size of single employer non-joint programs is very small. Multiple employer non-joint programs were larger, although, on average, they did not match the size of the multi-employer joint programs.
- The most significant demographic change in the last decade has been the increase in the number of Hispanic apprentices.
- The representation of women in apprenticeship is very small and declining.
- Apprentices in joint programs were more likely to complete the program and less likely to drop out. Women and blacks also experienced higher attrition rates. The performance of Hispanics was markedly better than that of the blacks.
- The union participation improved the graduation rates sufficiently to offset the "disadvantages" of being black or women.

APPENDIX

The following is a non-exhaustive list of studies which provide statistical information on the U.S. apprenticeship:

Nationwide Studies:

- Bennici Frank J. *The Status of Registered Apprenticeship: An Analysis Using Data from the Registered Apprenticeship Information System.* Report prepared for OATELS by Westat. Rockville, MD: April 2004.
- *A Final Report on Associated Builders and Contractors Apprenticeship Training: Flawed and Failing Programs*. A Study by the Building and Construction Trades Department, AFL-CIO, April 2005.
- *Apprenticeship Training: Administration, Use, and Equal Opportunity*. Government Accounting Office, GAO/HRD-92-43, Washington D.C., April 1992.

State-Level Studies:

Florida

- *Apprenticeship Program is Beneficial, But Its Ability to Meet State Demands is Limited*. Office of Program Policy Analysis and Government Accountability (Oppaga) Program Review, Report No.02-36, June 2002.

Indiana

- Vincent, Jeff. *Analysis of Construction Industry Apprenticeship Programs in Indiana*. Indiana University, Institute for the Study of Labor in Society, April 2004.

Kentucky

- Londrigan, William J. and Joseph B. Wise. *Apprenticeship Training in Kentucky: A Comparison of Union and Non-union Programs in the Building Trades*. Study prepared for Building Trades Apprenticeship Coordinators/Directors Association of Kentucky, Inc. and Greater Louisville Building and Construction Trades Council. March 1997.

Maryland

- Johansson Erin and Fred Feinstein "Apprenticeship Training Programs in Maryland: A Case Study of the Construction Industry, 1990-2003," March 2005.

Pennsylvania

- Bradley David H. and Stephen A Herzenberg. Construction Apprenticeship and Training in Pennsylvania. Study prepared for the Capital Area Labor-Management Council, Inc. Construction Partnership Coordination Project, 2002

Washington

- *Preliminary Review of Seattle-King Country's Apprenticeship and Pre-Apprenticeship System*. Report prepared by the Office of PortJOBS, Worker Center-King County Labor Council, AFL-CIO, and Northwest Policy Center at the University of Washington, March 1998.
- Loomans, Randy and Mitch Seaman. *Apprenticeship Utilization in Washington State Programs in the Building and Construction Trades*. Washington State Building and Construction Trades Council, AFL-CIO (no date).

West Virginia

- Etherton, Sarah S., Stephen L. Cook and Rovert V. Massey, Jr. Building Trades Apprentice Training in West Virginia: A Comparison of Union and Non-union Building

Trades Programs in the 1990s. West Virginia University Extension Service, Institute of Labor Studies and Research, May 2002.