

# Skill Overshooting in Job Training with the Trade Adjustment Assistance Program

## Appendix

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## Abstract

We investigate the training choices made by workers entering the Trade Adjustment Assistance (TAA) program and their post-exit outcomes. This is important as more workers enter these types of programs due to technological change and globalization. We show that workers that choose a training occupation beyond their skill level (skill overshooting) achieve higher earnings (\$615 annually) and wage replacement rates (2.0 percentage points) at the cost of lower reemployment rates (-1.9 percentage points) immediately following program exit. An investigation of subsamples shows that skill overshooting is especially beneficial to females and those living in rural areas with earnings gains of \$1,443 and \$1,080, respectively, without hurting their chances of reemployment.

**Keywords:** TAA, job training, wage replacement, ALMP

**JEL:** J08, J68, F16

**Complete Paper:**

<http://www.personal.kent.edu/~jbarne25/Barnette-Park-Overshooting.pdf>

## **Appendix**

### **A1. Preparing earnings record for estimation**

TAPR reports participants earnings prior to participation and post program exit. Pre-participation earnings are recorded for three quarters prior to participation. These three quarters are calendar quarters prior to participation rather than prior to separation. This makes some of the earnings records invalid, especially in terms of constructing the wage replacement rate.

We use \$2,000 for the lower bound and \$50,000 for the upper bound for earnings record validity. The lower bound is chosen to mimic the minimum earnings requirement for Unemployment Compensation eligibility. The minimum requirement values differ across states and change over time, but the figure is comparable to the weekly earning of a minimum wage worker working for 30 hours. All our earnings records are converted to 2000 USD value using the national consumer price index. In 2000, the federal minimum wage was \$5.15. 30 hours per week for 13 weeks at that rate makes the quarterly earnings \$2,008.5. We choose \$2,000 for the lower-bound. The upper bound of \$50,000 is chosen somewhat artificially based on the data. As one can expect, TAA participants – mostly comprised of manufacturing workers – do not often fall into the high-income category. A large number of participants have reported quarterly earnings of \$25,000 or below. \$50,000 is chosen to limit the influence of outliers without affecting the distribution of earnings too much.

Table A1 shows the statistics regarding the reported values of quarterly earnings before and after participation. It shows that a non-negligible fraction of participants reported quarterly earnings below \$2,000 for all six quarters used for earnings reporting, but the upper bound of \$50,000 does not account for a meaningful share of our sample. Comparing panels, A and B of Table A1, shows that the standard deviation of quarterly earnings declined drastically after

imposing the upper and lower bounds. This is probably largely from dropping reported values beyond the upper bound rather than the lower bound.

**[ Table A1 about here ]**

Then we construct the pre-participation earning by taking the maximum value among the valid earnings record out of three quarterly earnings. Lastly, we check when participants were separated from the qualifying position. We drop the earnings record if the qualifying separation occurred 5 quarters or more before participation. Three quarterly earnings following the program exit are treated in the same manner with lower bound of \$2,000 and upper bound of \$50,000.

## **A2. Occupation Codes Reporting Quality**

Occupation codes in TAPR are reported using the 8-digit Standard Occupational Classification (SOC) system. The SOC system is structured with the first two digits representing occupation families. The following four digits describe specific occupations and the last two digits describe subcategories of an occupation.<sup>36</sup> We use the 6-digit SOC as our occupation classification but these codes are not always provided. Among 320,603 participants observed in our sample, 209,762 received occupational training (classroom, customized, or on-the-job training) and of those 173,012 have a training occupation reported with 118,925 having a valid<sup>37</sup> 6-digit code. Reemployment occupation reporting is reported less. 247,511 participants are indicated as employed at least for one quarter during the three-quarter observation period following the exit of the TAA program. 87,410 reported an occupation of which 66,113 have a

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<sup>36</sup> Many 8-digit SOC codes end with 00.

<sup>37</sup> By valid codes we mean that the reported occupation code has at least 6 digits and the first two digits are odd numbers between 11 and 55.

valid 6-digit SOC. Overall, 56.70 % of participants who received occupational training have a valid occupation code. This share is 26.71 % for reemployment occupations.

The reporting quality does not seem to be participant specific as some participants have one reported and valid and the other missing. A total of 168,793 participants received job training and found a job after exiting the program. Only 43,064 (25.51%) have valid occupation codes for both training and reemployment occupations. 53,507 have only the training occupation, 9,874 have only the occupation of reemployment, and 62,348 have neither.

### **A3. IPUMS CPS Education Variable Construction**

In the construction of skill overshooting and skill upgrading variables, we use the average education attainment for each occupation from IPUMS CPS to be compared to the participant's own level of education. We construct the occupation-level average education by taking the average years of schooling for job holders of each occupation in using IPUMS CPS from 1998 to 2008. Skill overshooting uses the occupation-level education for the year of participation and skill upgrading uses that for the year of program exit. IPUMS CPS reports the occupation of each observation using Census Occupation Codes (COCs). We first crosswalk COCs to SOC codes using 2000 crosswalk file published by BLS then merge the occupation level education variable to TAPR using SOC codes.

Table A2 presents the most frequently observed occupations for training and reemployment and Table A3 shows statistics for schooling for relevant individuals from both TAPR and CPS for five selected occupations that are most frequently observed in TAPR. This shows how CPS individuals compare to TAA participants. For all five occupations, individuals with various educational background are working for the same occupation. For instance, workers

with 7 years of education to those with and advanced degree are holding a job as a truck driver. The mean values of schooling also do not differ too much across the TAPR samples (those who choose the occupation for training and those who find a job in that occupation) and the CPS sample. The CPS sample shows a slightly higher average years of schooling for some occupations (e.g. general office clerks and medical assistants).

**[ Table A2 about here ]**

**[ Table A3 about here ]**

In the analysis, education values from TAPR are used individually. This preserves variations from 7 to 17 years in educational attainment for the same occupation. The value from CPS used in the analysis is only the mean value for each occupation which varies from 10.5 to 17.0.

#### **A4. Identification of the Urban-Rural Nature of Commuting Zones**

For the analysis on the geographic subsample analyses, we divide our sample to trainees living in urban areas and rural areas with the unit of local area being commuting zones (CZs). We identified urban/rural nature of each CZ based on urban-rural continuum code (2003 version) published by U.S. Department of Agriculture. This is reported at the county-level and we aggregate these county-level codes to the CZ-level.

The continuum code places each county on a 9-point urban-rural spectrum with 1 as the most urban and 9 the most rural based on three factors: first, whether a county is a metro area; second, population of the county; third, whether a non-metro county is adjacent to a metro county. A metro county is divided into three codes based on the population (code 1 = 1 million population or more, code 2 = 250,000 to 1 million population, code 3 = 250,000 or fewer than

250,000). Non-metro counties are divided by urban population thresholds of 20,000 and 2,500. Then each population category is divided into two based on the adjacency to a metro area. A county with the continuum code 9 is described as either completely rural or less than 2,500 urban population and not adjacent to a metro area.

A CZ is classified as urban if all counties in the CZ are either a metro area or adjacent to a metro area. Out of 708 CZs in the U.S., 298 are classified as urban based on this criteria. The average population of urban CZs is 783,362 based on 2000 Census. Among 320,603 participants in our TAPR dataset, 191,081 are identified to reside in an urban CZ. Defining an urban commuting zone as a commuting zone with all counties in the metro area or non-metro counties that are adjacent to a metro area means that no county in the CZ is too isolated and all counties are within a reasonable distance from a metro area. The urban-ness of a commuting zone is broadly defined and an urban CZ should not be interpreted as a densely populated metro area.

A CZ is classified as rural if no county in the CZ is identified as a metro area. 397 out of 708 CZs are classified as rural. The average population of these CZs in 2000 Census is 63,659 which is less than 10% of the size of an average urban CZ. 49,486 observations in our TAPR sample are identified to reside in a rural CZ compared to 191,081 TAPR observations in urban area. i.e. The vast majority of TAA participants reside in an urban area.

## **A5. Balancing Test**

Table A4 demonstrates the bias before and after the first stage of matching. The t-tests indicate that all but one variable was statistically different before matching but matching reduces this bias to statistically insignificant differences. Before matching, the comparison group had it strongest bias in gender. Initially, the data on those that do not overshoot was made up of

55.28% male trainees, compared to the treated group or the overshooters who were 38.51% male.

After matching and the enforcement of the common support as discussed above, the treated group is only slightly adjusted but the comparison group is now 38.66% male. Given the large differences in gender that we discussed in the main body of the paper, this 99.2% reduction is crucial. Notice similar reductions throughout the rest of the variables as indicated in the table.

**[ Table A4 about here ]**

Table A1. Cleaning of Reported Quarterly Earnings

|                                    | Obs     | Mean     | Std. Dev. | Min   | Max       | # below<br>\$2,000 | # above<br>\$50,000 |
|------------------------------------|---------|----------|-----------|-------|-----------|--------------------|---------------------|
| <b>A. RAW DATA</b>                 |         |          |           |       |           |                    |                     |
| <b>Pre-participation</b>           |         |          |           |       |           |                    |                     |
| Three quarters prior               | 281,962 | 10,067.8 | 47,902.0  | 0.01  | 1,000,000 | 12,823             | 1,146               |
| Two quarters prior                 | 279,274 | 10,210.2 | 49,629.8  | 0.80  | 1,000,000 | 16,365             | 1,345               |
| One quarter prior                  | 121,448 | 15,552.5 | 81,682.4  | 0.06  | 1,000,000 | 14,863             | 1,631               |
| <b>Post-exit</b>                   |         |          |           |       |           |                    |                     |
| First quarter post                 | 216,694 | 5,072.9  | 3,895.0   | 0.1   | 119,663   | 39,096             | 63                  |
| Second quarter                     | 222,167 | 5,375.5  | 4,333.2   | 0.0   | 805,744   | 32,347             | 69                  |
| Third quarter                      | 222,312 | 5,565.5  | 3,980.1   | 0.0   | 231,713   | 29,560             | 58                  |
| <b>B. CLEANED DATA</b>             |         |          |           |       |           |                    |                     |
| <b>Pre-participation</b>           |         |          |           |       |           |                    |                     |
| Three quarters prior               | 267,993 | 7,675    | 4,372     | 2,000 | 49,965    |                    |                     |
| Two quarters prior                 | 261,564 | 7,691    | 4,612     | 2,000 | 49,983    |                    |                     |
| One quarter prior                  | 104,954 | 8,559    | 6,006     | 2,001 | 49,987    |                    |                     |
| <i>Pre-participation earnings</i>  | 284,368 | 8,739    | 5,599     | 2,000 | 49,987    |                    |                     |
| <b>Post-exit</b>                   |         |          |           |       |           |                    |                     |
| First quarter post                 | 177,535 | 5,950    | 3,568     | 2,000 | 49,919    |                    |                     |
| Second quarter                     | 189,751 | 6,092    | 3,539     | 2,000 | 49,471    |                    |                     |
| Third quarter                      | 192,694 | 6,245    | 3,626     | 2,000 | 49,902    |                    |                     |
| <i>Post-participation earnings</i> | 220,141 | 6,700    | 4,060     | 2,000 | 49,919    |                    |                     |



Table A2. Most popular occupations of training and reemployment

| <b>I. TRAINING</b>      |                                                                       |
|-------------------------|-----------------------------------------------------------------------|
| <b>SOC</b>              | <b>SOC title</b>                                                      |
| 533032                  | Truck Drivers, Heavy and Tractor-Trailer                              |
| 319092                  | Medical Assistants                                                    |
| 311012                  | Nursing Aides, Orderlies, and Attendants                              |
| 439061                  | Office Clerks, General                                                |
| 499021                  | Heating, Air Conditioning, and Refrigeration Mechanics and Installers |
| 439011                  | Computer Operators                                                    |
| 292061                  | Licensed Practical and Licensed Vocational Nurses                     |
| 151041                  | Computer Support Specialists                                          |
| 436013                  | Medical Secretaries                                                   |
| 292071                  | Medical Records and Health Information Technicians                    |
| <b>II. REEMPLOYMENT</b> |                                                                       |
| <b>SOC</b>              | <b>SOC title</b>                                                      |
| 533032                  | Truck Drivers, Heavy and Tractor-Trailer                              |
| 311012                  | Nursing Aides, Orderlies, and Attendants                              |
| 519199                  | Production Workers, All Other                                         |
| 519198                  | Helpers--Production Workers                                           |
| 319092                  | Medical Assistants                                                    |
| 499021                  | Heating, Air Conditioning, and Refrigeration Mechanics and Installers |
| 439061                  | Office Clerks, General                                                |
| 519061                  | Inspectors, Testers, Sorters, Samplers, and Weighers                  |
| 516031                  | Sewing Machine Operators                                              |
| 537062                  | Laborers and Freight, Stock, and Material Movers, Hand                |

\*\* Minimum and Maximum education for these occupations are mostly 7 years and 17 years with two occupations with minimum education of 8 years and two occupations with maximum education of 16 years.

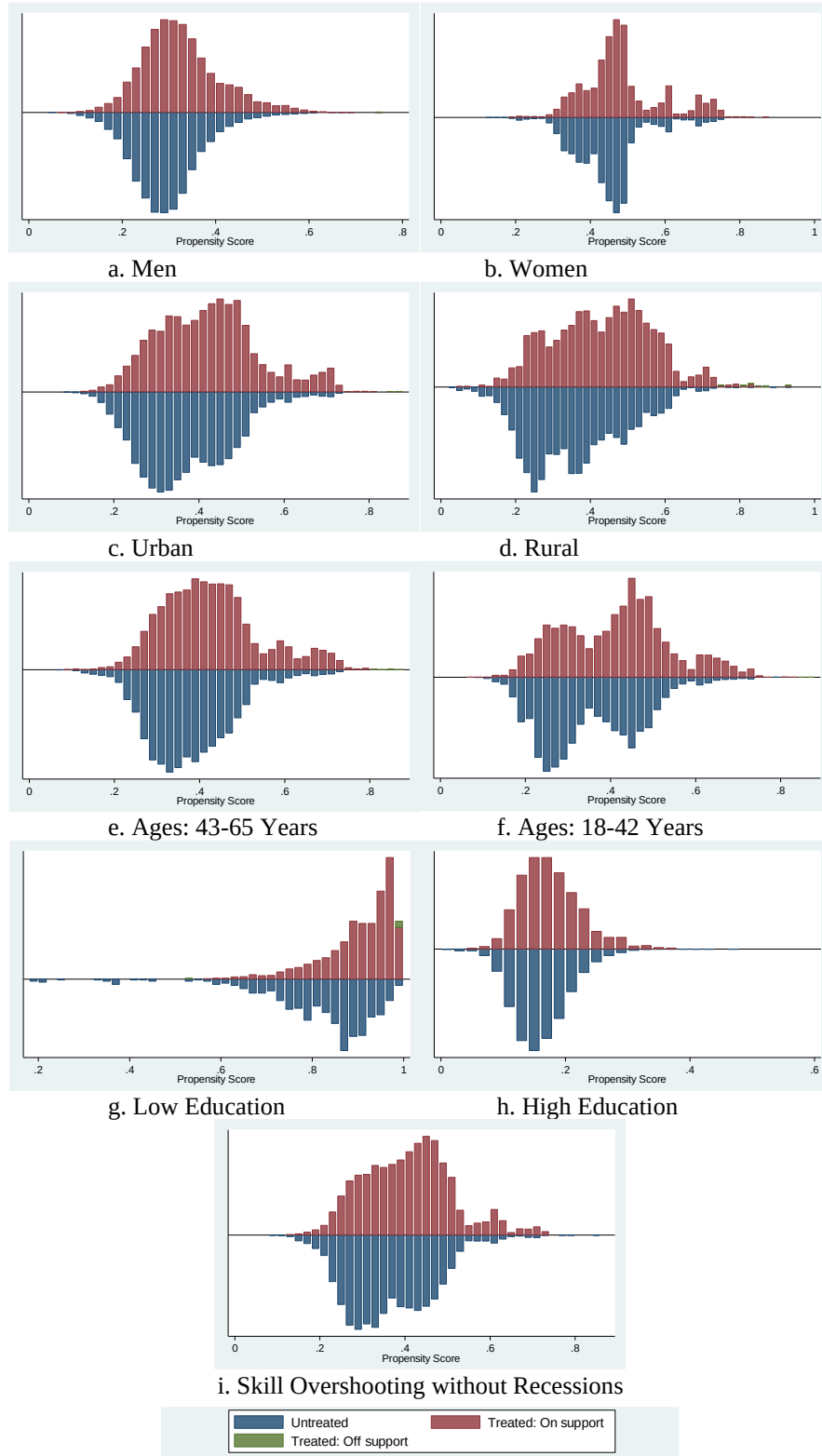
Table A3. Average educational attainment of popular occupations

| SOC    | Occ title                                                             | Training Occ (OSTC) |                 |             | Reemployment Occ (OCE) |                 |             | CPS        |                 |             |
|--------|-----------------------------------------------------------------------|---------------------|-----------------|-------------|------------------------|-----------------|-------------|------------|-----------------|-------------|
|        |                                                                       | Obs.                | mean            | min/<br>max | Obs.                   | mean            | min/<br>max | Obs        | Mean            | min/<br>max |
| 533032 | Truck Drivers, Heavy and Tractor-Trailer                              | 6,963<br>6.79%      | 12.00<br>(1.33) | 7/17        | 2,646<br>4.41%         | 12.06<br>(1.37) | 7/17        | 259,633    | 12.17<br>(1.47) | 7/17        |
| 311012 | Nursing Aides, Orderlies, & Attendants                                | 4,164<br>4.06%      | 11.61<br>(1.43) | 7/17        | 2,074<br>3.46%         | 11.84<br>(1.27) | 7/16        | 162,342    | 12.50<br>(1.53) | 7/17        |
| 319092 | Medical Assistants                                                    | 4,711<br>4.60%      | 12.19<br>(1.19) | 7/17        | 2,469<br>2.45%         | 12.42<br>(1.15) | 8/17        | 51,039     | 13.03<br>(1.44) | 7/17        |
| 439061 | Office Clerks, General                                                | 4,070<br>3.97%      | 11.66<br>(1.65) | 7/17        | 1,081<br>1.80%         | 12.51<br>(1.24) | 8/17        | 102,721    | 13.13<br>(1.57) | 7/17        |
| 499021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 3,930<br>3.83%      | 12.37<br>(1.26) | 7/17        | 1,126<br>1.88%         | 12.51<br>(1.18) | 7/17        | 26,519     | 12.50<br>(1.35) | 7/17        |
| All    |                                                                       | 123,852             | 12.40<br>(1.51) | 7/17        | 72,269                 | 12.49<br>(1.56) | 7/17        | 13,339,017 | 13.45<br>(2.10) | 7/17        |

Table A4. Treated vs. Comparison Group Matching Quality Statistics

| Variable                       | Matched | Mean    |            | % Bias | Reduction<br>in Bias (%) | t-test |       |
|--------------------------------|---------|---------|------------|--------|--------------------------|--------|-------|
|                                |         | Treated | Comparison |        |                          | t      | p> t  |
| Gender: Male                   | Before  | .38507  | .55275     | -34.1  |                          | -38.21 | 0.000 |
|                                | After   | .3853   | .38666     | -0.3   | 99.2                     | -0.28  | 0.777 |
| Pre-Part Earnings              | Before  | 31642   | 36077      | -21.4  |                          | -23.70 | 0.000 |
|                                | After   | 31648   | 31750      | -0.5   | 97.7                     | -0.54  | 0.587 |
| Limited English<br>Proficiency | Before  | .06294  | .03599     | 12.5   |                          | 14.42  | 0.000 |
|                                | After   | .06254  | .06626     | -1.7   | 86.2                     | -1.54  | 0.124 |
| Tenure                         | Before  | 9.8573  | 10.349     | -5.6   |                          | -6.22  | 0.000 |
|                                | After   | 9.8586  | 9.8469     | 0.1    | 97.6                     | 0.14   | 0.891 |
| Age at<br>Participation        | Before  | 42.639  | 43.274     | -6.4   |                          | -7.16  | 0.000 |
|                                | After   | 42.643  | 42.625     | 0.2    | 97.1                     | 0.19   | 0.852 |
| Eth: Black                     | Before  | .15143  | .16824     | -4.6   |                          | -5.13  | 0.000 |
|                                | After   | .15151  | .15159     | -0.0   | 99.6                     | -0.02  | 0.984 |
| Eth: Hispanic                  | Before  | .15215  | .09164     | 18.6   |                          | 21.41  | 0.000 |
|                                | After   | .15166  | .15304     | -0.4   | 97.7                     | -0.39  | 0.696 |
| Eth: Asian                     | Before  | .02399  | .03257     | -5.2   |                          | -5.72  | 0.000 |
|                                | After   | .02401  | .02595     | -1.2   | 77.3                     | -1.26  | 0.206 |
| Eth: Other                     | Before  | .01166  | .01191     | -0.2   |                          | -0.26  | 0.795 |
|                                | After   | .01166  | .0112      | 0.4    | -84.4                    | 0.44   | 0.660 |

Figure A1. Predicted Probabilities of Skill Overshooting for Subsamples



Note: These come from the first part of matching in the estimation for the subsamples of Section V(c). *Treated: On support* provides our sample of those that overshoot which are matched from two of the comparison group labeled *Untreated*. The label, *Treated: Off support*, are those that overshoot but have no match. The subsamples in figures a and b are split by gender. The subsamples in figures c and d are split by geographic location using the Urban-Rural Continuum Code discussed in section III(d). The subsample in g has less than 12 years of education and the subsample in h has more than 12 years of education. The subsample in figure i are for those that exited training in 2003-2007.