Does Trade Adjustment Assistance Make a Difference?

by

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Abstract

The U.S. Trade Adjustment Assistance (TAA) program provides workers who have lost their jobs due to increased trade with income support and training, job search, and relocation benefits. This paper uses the most recent data collected by the Department of Labor on TAA beneficiaries to provide one of the first evaluations of the effectiveness of the Trade Adjustment Assistance program. Using propensity score matching techniques, we find that the TAA program is of dubious value in terms of helping displaced workers find new, well-paying employment opportunities.

Key words: Trade Adjustment Assistance, displaced workers

JEL classification: J08, J65, F16

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1   Introduction

For over 30 years, the U.S. Trade Adjustment Assistance (TAA) program has provided

workers who can show that they have lost their jobs due to increased trade with income support

and training, job search, and relocation benefits. Congress has approved additional funding for

the TAA program with virtually every new free trade agreement that has been implemented since

the program's inception. Thus, the program has served two purposes. First, it has provided

support to workers who have been displaced by increased trade flows, theoretically smoothing

the shift of these workers to new, internationally competitive industries as predicted by the

Heckscher-Ohlin theory of trade. Second, the program has served to decrease political resistance

to new trade liberalization efforts.

While the program has generally enjoyed support among Congressional representatives,

the future of the program is uncertain. The Department of Labor has funding to continue the

program only through the end of October 2008 due to the fact that authorization for the program

expired on December 31, 2007. The Office of Management and Budget (OMB) rated the

program "ineffective" in 2007, putting future funding in jeopardy.

Nevertheless, legislation passed by the House on October 31, 2007 and currently pending

in the Senate would both reauthorize the program through 2012 and expand the program in

several important ways.[1] Recently, a policy paper commissioned by the Financial Services

Forum, a group of the chief executives of some of the largest financial services firms in the

United States, recommended expanding the program by over $20 billion. Specifically, the paper

recommends expanding training and benefits for all workers who qualify for unemployment

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[1] The Trade and Globalization Assistance Act of 2007 (H.R. 3920) would, among other things, extend TAA
eligibility to service and public sector workers and allow for automatic approval of firms within certain industries.

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insurance as a way to mitigate protectionist sentiment in the United States.[2] Prior to any

expansion of the program, however, it is important to find out if the TAA program actually

works.

In fiscal year 2007, the United States spent $855.1 million to assist approximately

150,000 workers under the TAA program. However, there is little evidence regarding to what

degree this money was well spent, or to what degree workers have actually been helped by the

TAA program. The Department of Labor bases its evaluation of the program's effectiveness on

simple statistics that measure, for example, the percentage of beneficiaries who are able to find

employment following their participation in the TAA program. Statistics such as these fail to

take into account the fact that these participants may have found the same employment absent

participation in the TAA program. As discussed Heckman, LaLonde, and Smith (1999), the

more appropriate measure of a program's effectiveness is to what extent the program *changed*

the employment outcome of TAA participants.

This paper uses recent data collected by the Department of Labor in their Trade Act

Participant Report database to provide one of the first in depth evaluations of the effectiveness of

the Trade Adjustment Assistance program. Using propensity score matching techniques, we find

strong evidence that the TAA program helps displaced workers find new employment,

particularly when they take advantage of the program-funded training opportunities. However,

this new employment is at much lower wage rates. Estimates suggest that participating in the

TAA program causes a wage loss approximately 10 percentage points greater than if the

displaced worker had chosen not to participate in the program. Although the TAA program

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[2] Deborah Solomon, "Displaced Worker Aid is Proposed," *Wall Street Journal*, July 30, 2008, page A12. The paper recommends creating a new program to make up for lost wages in workers 45 and older and fund the continuation of health benefits for displaced workers. The authors propose funding the program with a new unemployment insurance tax system.

certainly provides an income safety net for displaced workers, and may mitigate protectionist sentiment in the United States, there is little evidence that it helps displaced workers find new, *well-paying* employment opportunities. The results suggest that policy makers should be wary of expanding the current TAA program.

2   The Trade Adjustment Assistance Program

The U.S. Trade Adjustment Assistance program was first developed in 1962 to compensate workers harmed by the increased import competition that typically accompanies trade liberalization. Although the program has been amended repeatedly in the 45 years since its inception, the goals of the program have not changed significantly during this time.[3] Today, the goals of the program are three-fold: encourage the rapid reemployment of participants; provide training and income support, when necessary, to allow participants to achieve reemployment; and assist participants obtain reemployment in fields where they are "likely to remain employed and earn wages comparable to their prior jobs."[4]

In order to be eligible for the TAA program, a group of three of more workers, union representative, or company official from the affected firm must file a petition with the Department of Labor within one year of worker displacement.[5] The petition must allege that workers in the firm have lost their jobs or suffered a reduction in hours and/or wages as a result of increased imports or shifts in production outside of the United States.[6] The Department of

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[3] For an excellent history of the TAA program, see Baicker and Rehavi (2004).
[4] "Overview of the Trade Adjustment Assistance (TAA) program," Department of Labor.
[5] Representatives from state labor agencies may also file a petition on behalf of the workers. The program rules described in this section are those that were approved by Congress as part of the Trade Act of 2002 and became effective November 4, 2002.
[6] Currently service workers are ineligible for the TAA program. In order to be certified for the TAA program, the firm's shift in production must either be (1) to a country that is party to a free trade agreement with the United States or is a beneficiary of a U.S. preferential trade program such as the Andean Trade Preference Act or (2) likely to result in an increase in imports.

Labor has 40 days to conduct an investigation into the claim and decide whether or not to certify workers from the firm as eligible for the program.

Once a firm is certified, any worker from the firm laid off up to one year before the petition was filed and up to two years after the certification is eligible for TAA benefits. Since 2002, workers employed by firms that are suppliers to firms that are TAA-certified are also eligible for TAA benefits. TAA benefits fall into five primary categories which are discussed in more detail below: training, income support, relocation allowances, job search allowances, and a health coverage tax credit.[7]

The TAA program will pay for up to 104 weeks of any basic training program approved by the Department of Labor.[8] Any training program, including occupational or classroom training, on the job training or remedial education, could be approved as long as the worker can show that there is not suitable employment currently available to the worker, the worker will benefit from the training, and there is a reasonable expectation of employment following completion. The worker must also show that they are qualified to undertake and complete the training, and that the training is available at a reasonable cost.

TAA participants are eligible for an additional 26 weeks of unemployment insurance, known as the basic Trade Readjustment Allowance (TRA), after their traditional unemployment insurance benefits have been exhausted. Workers must be enrolled in or have completed training to receive TRA benefits, although some workers may be eligible for a waiver of the training

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[7] The Trade Act of 2002 created an additional TAA program which will not be analyzed in this paper: the Alternative TAA (ATAA) program. Workers over 50 years old are eligible for the ATAA program, in which they can collect up to 50 percent of the difference between their reemployment wages and the wages earned at the time of their displacement for up to two years and/or $10,000.

[8] TAA will fund up to 130 weeks of training if the worker is in need of remedial education.

requirement.[9] Workers that are participating in a training program may receive an additional 52 weeks of "additional" TRA, and those workers enrolled in remedial education may be eligible for additional remedial TRA payments.

Other benefits include a job search allowance of up to $1,250 for job search expenses outside of the worker's commuting area, and a relocation allowance for relocation to jobs outside of the worker's commuting area of 90 percent of moving costs and the equivalent of three weeks of wages, up to $1,250. Finally TAA-eligible workers qualify for the Health Coverage Tax Credit, which pays 65 percent of the premium for qualified health insurance plans.

In fiscal year 2007, the federal government appropriated $855.1 million to TAA programs. Of this funding, TRA benefits accounted for 66.9 percent while funding for training programs accounted for an additional 25.7 percent of the total TAA appropriations. The Department of Labor certified 146,592 workers in 1,427 firms as eligible for TAA in 2007. Nearly 40 percent of the certified firms were located in five states: Nebraska, Michigan, Pennsylvania, Ohio, and North Dakota.

Since 2001, the Department of Labor has set national performance goals for the TAA program in three areas: (1) the percentage of participants who find jobs after exiting the program (reemployment rate); (2) the percentage of participants who are employed after exiting the program and are still employed nine months later (retention rate); and (3) a wage goal.[10] Prior to fiscal year 2007, the Department of Labor's wage goal was for participants to earn on average not less than 80 percent of their pre-displacement earnings (earnings replacement rate). In fiscal

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[9] Workers who show that they are subject to recall, in poor health, near retirement, or already possess marketable skills can obtain a waiver of the training requirement. Waivers are also available to workers who can prove that training is either unavailable or they are unable to enroll in training.

[10] The Department of Labor implemented these same performance goals, or "common measures," to evaluate the effectiveness of many of its workforce programs following the President's 2001 Management Agenda to improve the management and performance of the federal government.

year 2007, the wage goal was redefined as the average earnings in the second and third quarters after exit from the program.

As indicated in Table 1, the Department of Labor has met or exceeded many of their performance goals over the past three fiscal years. In fact, the Office of Management and Budget (OMB) noted in their fiscal year 2007 evaluation of the TAA program that the program has to a "large extent" made adequate progress in achieving its long-term performance goals, and that the program's performance had trended upwards over the past several years. Despite this progress, the OMB rated the TAA program as "ineffective" using its Program Assessment Rating Tool (PART). The OMB found that the TAA program fails to use tax dollars effectively because, among other reasons, the program has failed to demonstrate the cost effectiveness of achieving its goals.

3   Literature Review

In part because of a lack of data, there have been few empirical evaluations of the TAA program. Evaluations of the program from the 1970s, including Corson and Nicholson (1981) and the U.S. General Accounting Office (GAO) (1980) found that 70 percent of TAA support went to workers who eventually returned to work with their previous employers.

More recently, Decker and Corson (1995) used a survey of TAA participants between 1988 and 1989 to evaluate the impact of the 1988 amendments to the program that mandated participation in a training program. Using descriptive statistics, the authors compared TAA beneficiaries to Unemployment Insurance exhaustees, and found that the TAA program serves workers who have a greater difficulty in becoming reemployed when compared to other workers. The authors also find that the 1988 changes in the TAA program increased participation in training programs, reduced the amount of TRA benefits collected by beneficiaries, and led to a

decline in the duration of unemployment and an increase in earnings. Using a simple regression in which the explanatory variable of interest was a dummy variable that equaled one if the TAA beneficiary participated in training, the authors conclude that training does not have a substantial positive effect on the earnings of TAA participants.

Marcal (2001) uses the same data as Decker and Corson (1995) to study whether the TAA program increases the earnings of beneficiaries over comparable unemployment insurance exhaustees.[11] Using a regression with dummy variables for displaced workers that participated in the TAA program, Marcal (2001) finds that there is little evidence that the TAA program improves the earnings of import-displaced workers, although TAA beneficiaries that participate in training programs were employed more on average than both UI exhaustees and TAA beneficiaries who did not participate in a training program.

The only recent evaluations of the TAA program have been conducted by federal agencies such as the Office of Inspector General and GAO. For example, in 2006 the GAO released a series of studies on the TAA program in preparation for Congressional consideration of the program's reauthorization in 2007. In the study most relevant to this paper, GAO (2006b) conducted a survey of workers from five trade-related plant closures. They found that at three sites over 60 percent of workers were reemployed, while at another site 40 percent were reemployed and a third retired. At the final site, one-third of workers were reemployed, and many were participating in TAA-funded training programs. The GAO (2006b) study further found that the majority of reemployed workers were earning less than they had previously.

This paper improves upon previous evaluations of the TAA program in a number of ways. Perhaps most importantly, rather than relying on summary statistics of the employment

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[11] Marcal (2001) improves upon the Decker and Corson (1995) analysis by controlling for conditions in the pre-layoff industries and the occupations of the workers, using a selection correction technique, and adjusting reemployment probabilities for any time spent in training over a 36 month period.

outcomes of TAA beneficiaries, we use propensity score matching econometric techniques to estimate the actual *impact* of the TAA program on the participants. The results should shed light on whether the TAA program actually assists those workers displaced due to increased trade flows.

4   Empirical Methodology and Data

As described in Heckman, Lalonde and Smith (1999), there is an extremely large literature devoted to the evaluation of various labor market programs. To accurately evaluate the impact of a program such as TAA on workers, the researcher ideally compares the outcome of interest for program participants with the outcome for a "comparable" group of non-participants.

For example, define Y_{i1} as the outcome of interest (i.e. length of unemployment spell, change in earnings) for displaced worker i when he participates in the TAA program, and Y_{io} as the outcome for this same worker when he does not participate in the TAA program. The impact of the program, T, could be estimated as

$$T\mid_{TAA=1} = E(Y_{i1}\mid TAA=1) - E(Y_{io}\mid TAA=1). \qquad (1)$$

The problem with research of this nature, of course, is that the researcher never observes how the displaced worker would have faired if they chose not to participate in the program *(Y_{io})*.

Alternatively, one could compare the outcome of displaced workers who enrolled in the TAA program with the outcome of those who were ineligible or chose not to enroll in the TAA program:

$$T = E(Y_{i1}\mid TAA=1) - E(Y_{io}\mid TAA=0). \qquad (2)$$

Unfortunately, estimators such as these suffer from selection bias if those who are eligible and choose to participate in the TAA program are systematically different from those who are ineligible or chose not to participate.

Heckman, Ichimura, and Todd (1997, 1998) proposed a solution to this problem in which each participant in the labor program is matched with a "control" observation from an alternative dataset using a propensity score; the outcome variable of the participant is then matched with the outcome of the control variable. Specifically, propensity score matching techniques use the estimates from a logistic or probit regression analysis to generate the predicted probability of program participation for each observation based on observed characteristics such as age, gender, and education level. The impact of the program is then measured as the average difference between the program participants and one or more of the control observations that they are matched to based on the similarity of this predicted probability, or the propensity score. In the notation used above, the impact of the program is estimated as:

$$T = E(E(Y_1 \mid TAA = 1, P(X)) - E(Y_o \mid TAA = 0, P(X))) \qquad (3)$$

where *P(X)* is the estimated probability of participating in the TAA program conditional on a set of covariates *X*. This matching technique controls for the selection bias described above.

The propensity score matching estimator relies on two identifying assumptions. First, conditional on the propensity score, P(X), the potential employment outcomes must be independent of whether or not the displaced worker participates in the TAA program, otherwise known as the conditional independence assumption. Second, individuals with the same covariates must have a positive probability of being both TAA-participants and non-participants, otherwise known as the common support assumption. In other words, one shouldn't be able to perfectly predict whether or not an observation is a TAA-participant. The plausibility of these assumptions is discussed in the next section.

To conduct this evaluation of the TAA program, we utilize data from the Department of Labor's Trade Act Participant Reports (TAPR). The Department of Labor began to require the

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collection of TAPR reports in 1999 to track program performance and participant outcomes in the TAA program. Under this reporting requirement, each state must submit TAPR reports to the Department of Labor each quarter with data on individuals who exited the TAA program. TAPR reports include data on each TAA participant's characteristics, including their gender and education level, and the services they received under the TAA program. Outcome variables in the TAPR reports include whether the participant was employed in the first and the third quarter after exit, and the worker's earnings in these quarters.[12]

Unfortunately, the TAPR data has a number of weaknesses. In one of a series of reports on the TAA program completed in 2006, the General Accounting Office (2006a) noted that only half of the states reported that the data they submit in the TAPR include all TAA participants who exit the program. For example, some states admitted to the GAO that they are more likely to submit information on TAA participants who received TAA-funded training when compared to those that received waivers from the training requirement. Other states may be inaccurately recording some workers as unemployed that actually have jobs due to limited information technology systems or exclusion of valuable data sources. Nevertheless, the TAPR database is the best data available regarding participants in the TAA program.

Our original TAPR dataset included data on 286,840 individuals who exited the TAA program between the final quarter of 2000 and the first quarter of 2008. In order to observe the four-digit Standardized Industrial Classification (SIC) industry from which the worker was displaced from, we limit the dataset to those observations which reported a valid Trade Adjustment Assistance Petition Number. We also limit the dataset to those workers who were

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[12] State labor officials are directed to obtain this information from state Unemployment Insurance wage records, if possible.

displaced between 2003 and 2005 and who exited the TAA program after September 30, 2005.[13] The number of TAA participants in the final dataset is 72,859.

Table 2 summarizes the characteristics of the TAA beneficiaries in our sample, and lists the specific TAA program provisions that these individuals profited from. We observe an overwhelming majority (80.6 percent) of workers enrolled in a TAA-funded training program. Of these, approximately 17 percent of workers reported enrolling in remedial education. Surprisingly, only 67 percent of beneficiaries in the sample received Trade Readjustment Allowance (TRA) payments. Recall that TRA monetary benefits are provided only if traditional unemployment insurance has run out and the displaced worker is actively enrolled in a training program or obtains a training waiver. Less than two percent of program beneficiaries collected job search or relocation benefits.

In order to conduct an evaluation of the TAA program, we need to compare the employment outcomes of the TAA participants included in the TAPR dataset to the employment outcomes of a group of control observations. The best control group would be workers who were eligible for the TAA program but chose not to participate. Since data on this group of workers is not available, we instead use workers from the January 2006 Displaced Worker, Employee Tenure, and Occupational Mobility Supplement File of the U.S. Census Bureau's Current Population Survey (CPS). The Displaced Worker Survey includes data on 5,611 workers who reported that they were displaced from their job between 2003 and 2005.[14] We

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[13] We limit the sample in this way in order to better match the period during which we observe the control observations in the CPS dataset. We also limit the sample in two other ways. We exclude from the analysis 1,159 participants who reported that they were choosing to participate in the Alternative Trade Adjustment Assistance Program, as these participants are less likely to be concerned about find new, well-paying employment. We also exclude from the analysis 6,283 individuals for which we had no employment outcome data.
[14] We exclude from the analysis those workers who reported they were displaced due to the completion of a seasonal job or the failure of a self-operated business.

exclude from the sample observations in which we had no post displacement employment data, resulting in a final CPS sample of 3,509 individuals.

Not surprisingly, Table 2 reveals that the biggest difference between the two groups is their industry of employment. Provisions of the TAA program ensure that the overwhelming majority of beneficiaries (97.8 percent) are displaced from the manufacturing industry. As revealed in Figure 1, approximately 35 percent of our sample of TAA workers was displaced from the electronic, motor vehicle, machinery, textile, and furniture manufacturing industries. In contrast, only 21.2 percent of workers in the CPS sample were displaced from manufacturing industries. Figure 2 reveals that the largest percentage of CPS workers was displaced from the construction industry. The differences in their industry of employment are also reflected in the average import penetration ratio of the industry from which the workers were displaced; while the average import penetration ratio in industries displacing TAA workers was 31.8 percent, the comparable figure in the CPS sample was 6.2 percent.

Table 2 also reveals several distinctions between the two groups in terms of their age, the length of their tenure (in years) with their employer prior to displacement, and their level of education. TAA participants are slightly older, with an average age of 46.3 compared to an average age of 41.6 in the CPS sample. TAA participants were employed nearly twice as long in the job from which they were displaced when compared to those workers from the CPS sample. As suggested in the results of Wolf et. al. (1995), TAA workers may find the adjustment to new employment far more challenging than displaced workers from the CPS sample because they are further along in their careers.

Workers from the CPS sample are also, on average, more educated than TAA beneficiaries. For example, 84.2 percent of the TAA beneficiaries in our sample have a high

school diploma compared to 90 percent of those sampled from the CPS.[15] College attendance is also markedly dissimilar, with 23 percent of TAA participants reporting at least some college compared to *56 percent* of the sampled displaced workers from the CPS. This lack of education may negatively impact TAA participants' opportunities for reemployment.

Finally, the most dramatic differences between the two samples may be the post-displacement outcomes. The level of reemployment is relatively similar between the two groups: 77.2 percent of TAA participants and 75.3 percent of displaced workers from the CPS sample were employed at the time of survey. However, TAA workers earned on average 30 percent less than they made at their previous job. Displaced workers from the CPS data also suffered from reduced wages, but they earned only 9.4 percent less in their new place of employment. Obviously, these summary statistics do not indicate that the TAA program itself caused the wage loss; differences in the two samples may be driving the results. The propensity score matching technique allows us to compare the outcomes of more similar samples on which to base our findings.

5   Propensity Score Matching

As discussed above, the propensity score matching technique is only valid if one believes that both the conditional independence and common support assumptions hold. Therefore, prior to discussing the estimates of the average treatment effects, we present a detailed discussion of the estimation of propensity score and the matching technique used in this study.

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[15] The average education level of TAA beneficiaries more closely reflects national averages. According to the 2007 Digest of Education Statistics, 85.7 percent for adults over the age of 25 hold a high school diploma in the United States.

Propensity Score Estimation

We estimate the propensity score using a probit binary choice model in which the independent variable equals one for TAA participants.[16] In order for the conditional independence assumption to hold, the researcher must condition on all variables that jointly influence the decision to participate in the TAA program and the employment outcome variables. Although there are no clear econometric guidelines as to how to choose which variables should be included in the propensity score estimation, Caliendo and Kopeinig (2008) suggest using a selection method that maximizes the within-sample prediction rate, otherwise known as the "hit or miss" method. Table 3 includes the within-sample prediction rates, or hit rates, and Pseudo-R^2s for various specifications of the propensity score.[17] The variables included in each specification are discussed more thoroughly below.

Obviously one of the best predictors of whether a worker is a TAA participant is whether their company was certified for the TAA program by the Department of Labor. Unfortunately, we observe only the industry, and not the firm, from which workers in the CPS were displaced. However, this information is enough to control for a number of important TAA-program eligibility predictors. First, the TAA program is currently structured to primarily serve those in the manufacturing sector; as discussed above, 97 percent of the TAPR sample used in this estimation was employed in the manufacturing sector. Therefore, we control for the displaced worker's industry using three dummy variables: one for the manufacturing, agriculture, and mining sectors.

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[16] Any binary choice model can be used to estimate the propensity score. The results from estimation using a logit model were not qualitatively different from those presented here, and are available from the authors upon request.
[17] Hit rates were calculated by predicting that the observation was a TAA participant if their propensity score was greater than the sample proportion of observations participating in the TAA program.

Next, the more import sensitive the worker's industry the more likely it is that their displacement is due to a surge in imports and, thus, the more likely that the worker is eligible for the TAA program. Using trade data from the U.S. International Trade Commission and production data from the Bureau of Economic Analysis, we construct the industry's import penetration ratio *(Import Sensitivity)* by dividing industry imports by domestic consumption, or the value of the industry's production less net exports.[18,19] We also construct a measure of the industry's intra-industry trade by dividing the minimum of the industry's imports or exports over one half of the sum of imports and exports in the industry. The propensity score estimation includes squares of both terms and an interaction between the import sensitivity and intra-industry trade variable in order to account for potential non-linearities in these measures.

As can be seen from Table 3, inclusion of these industry-level variables alone does an excellent job of predicting participation in the TAA program; the pseudo R^2 of the probit regression with these variables alone is 0.540, while the hit rate is 96.75 percent. However, it is important to control for individual level characteristics to capture other determinants of the decision to participate in the TAA program and, perhaps more importantly, the employment outcome. The TAPR and CPS datasets include a number of variables that have traditionally been used to explain employment outcomes, including the age of the individual, gender, and the level of education. We also include the length of time the worker had been employed with the firm from which he or she was displaced *(Tenure)* and the square of the tenure variable. Finally, we include a dummy variable for those workers who were displaced from their jobs in the first year

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[18] We use 2003 import and production data. A BEA concordance was used to match the industry-level BEA production data to the six-digit North American Industry Classification (NAICS) import and export data. Similarly, the Current Population Survey concordance was used to match the NAICS-level import and production data to the Census Industry Classification Codes.

[19] Other studies of trade and job displacement, such as Kletzer (1998), measure trade sensitivity using import growth rates. The results from specifications that measure import sensitivity using the growth in the industry's imports are not qualitatively different from those presented here and are available from the authors upon request.

of the sample, 2003. Recall that only workers who have exited from the TAA program are included in the TAPR data set; we are more likely to observe TAA participants the further in the past their displacement was.

As Table 3 illustrates, inclusion of the socio-demographic and employment characteristics described above increases the Pseudo-R^2 of the probit regression, but results in a decrease of the within sample prediction rate. Nevertheless, we choose to include these variables in the final specification. The primary purpose of the propensity score estimation is not to predict participation in the TAA program, but rather to make the characteristics of the two samples as similar as possible, or to balance the covariates in the samples. As discussed below, the specification with the industry, socio-demographic, tenure, and year dummies improves the balance of the covariates.

We choose to exclude other variables from the final specification of the propensity score, including regional dummies and race variables, because inclusion of these variables results in a decrease of the within sample prediction rate of the model and fails to improve the balance of the covariates. In addition, we would have to significantly reduce the number of observations in the estimation if we included race variables due to the large number of missing race variables in the TAPR dataset.

The parameter estimates from the final specification of the propensity score are included in Table 4. Columns 2 and 3 of the table present the results from the full-sample, while columns 4 and 5 present the results when we restrict the sample to just those observations in which we observe pre- and post-displacement wage information. Almost all of the parameters are significant and of the expected sign. For example, displaced workers are more likely to participate in the TAA program if they were employed in manufacturing industries with high

import penetration levels and intra-industry trade ratios. Males and younger, more educated workers are less likely to be TAA beneficiaries than other displaced workers.

Matching

We match each TAA participant in the sample with two CPS counterparts using the nearest neighbor matching method. In this method, each TAA participant is matched with two displaced workers from the CPS sample based on those observations with the closest propensity scores. Because the number of TAA participants far exceeds the number of control observations, we use nearest neighbor matching with replacement of the control observations; in other words the same CPS observations can serve as the match to more than one TAA participant.[20] We match each TAA participant with more than one CPS neighbor, using more information to construct the counterfactual for each participant, in order to reduce the variance of the estimator. Although this over-sampling can increase the bias of the estimator by reducing the quality of the match, the mean difference between propensity scores of the matched pairs in this sample is just 0.00004, with a maximum difference of 0.0097.

As discussed above, the propensity score matching technique is only valid if the common support assumption holds. We ensure that this assumption holds by imposing a common support on the final sample. To do this, we delete all TAA participants whose propensity scores are higher than the highest propensity score observed in the CPS comparison group from the analysis. This results in a loss of 58 TAA participants from the sample. Imposition of a common support typically requires the researcher to also delete those observations from the comparison group that have a propensity score lower than the lowest TAA participant; this

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[20] Although matching with replacement improves the quality of matching, thus decreasing the bias of the estimator, it increases the variance of the estimator because it uses fewer observations.

results in no loss of observations in our sample. Figure 3 illustrates the distribution of propensity scores of TAA participants and the CPS comparison group.

Finally, prior to estimating the impact of the TAA program we assess how well the matching procedure has been able to balance the distribution of covariates in the TAA treatment group and CPS control group. As suggested by Rosenbaum and Rubin (1985), we assess the matching quality using the standardized bias of the covariates. The standardized bias for each covariate is the difference between the sample means in the TAA treatment group and the *matched* comparison CPS control group as a percentage of the square root of the average of the sample variances in both groups. In other words, the standardized bias for each covariate is defined as:

$$St.Bias = 100 * \frac{\overline{X}_{TAA} - \overline{X}_{CPS}}{\sqrt{0.5*(Var_{TAA}(X) - Var_{CPS}(X))}} . \tag{4}$$

The median and mean standardized bias across the covariates, both before matching and after matching, is included in Table 5. Matching reduces the median standardized bias in the full sample from 53.3 percent to just 1.8 percent, suggesting that the matching procedure dramatically increases the similarity of the treatment and control group.

Another method of assessing the matching quality is the joint significant and Pseudo R^2 of the propensity score estimation after matching. The Pseudo R^2 measures how well the covariates explain participation in the TAA program. Ideally, the Pseudo R^2 should be high prior to matching, but after matching there should be no systematic difference in the covariates in the TAA and CPS samples. As a result, covariates should have little explanatory power after matching. As Table 5 shows, the Pseudo R^2 is just 0.008 after matching. Increasing the degree of over sampling, or increasing the number of CPS control observations matched to each TAA participants, fails to improve the matching quality.

6   Impact of the TAA Program

Using the matching specification discussed in Section 5, we estimate the average treatment effect of the TAA program on two post-displacement job outcomes: (1) ability to find re-employment and (2) the ability to replace lost wages. Detailed analyses of these treatment effects are provided below.

Reemployment

State officials are asked to submit information on the employment outcomes of participants who exit the TAA program in the TAPR report. Specifically, each TAPR report includes data as to whether the participant was employed in the first, second and third quarter following exit from the TAA program. We use this data to create an indicator variable *(Work)* that measures whether the TAA participant was employed in any of the three quarters following their exit from the program.

Approximately 22 percent of the sample failed to find employment during the three quarters following their exit, while 61 percent were employed in each of the three quarters. Approximately 7 percent of the sample were employed in either the first or second quarter following exit from the TAA program, but were apparently not employed in the third quarter following their exit. The remaining 10 percent could not initially find employment, but were employed by the third quarter following exit.

The displaced worker survey from the CPS includes slightly different post-displacement employment information. All observations in the CPS dataset were interviewed in January 2006. At that time, workers were asked whether or not they had worked for pay since they were displaced, as well as how long they were unemployed after displacement and how many jobs they had held between displacement and the time of the interview. We define the indicator

variable *(Work)* to equal one if the CPS worker indicated that they had worked since

displacement in any of these questions.

A naïve comparison of the probability of reemployment would suggest that workers who

participated in the TAA program were 2.3 percentage points more likely to obtain re-

employment, as reported in the third column of Table 6. Controlling for the covariates in the

matched sample, the average treatment effect is slightly larger. Specifically, the estimates

suggest that participating in the TAA program increased displaced workers average likelihood of

employment by 5.0 percentage points.

Differences in the period of observation in the CPS and TAPR dataset could significantly

bias these results. Recall that we include only those TAA participants who exited the program

after September 30, 2005 in order to better match the fact that we observe CPS workers in

January 2006. However, some of the TAA participants in the dataset exited the program

significantly after January 2006 (as late as the first quarter of 2008), giving them much more

time to find new employment when compared to the CPS workers.[21] To correct for this bias, we

recalculate the average treatment effect using only those workers who exited the program in the

final quarter of 2005.[22] As can be seen from Table 6, the propensity score matching estimate of

the average treatment effect in this sub-sample indicates that there is a slightly larger increase in

the likelihood that a displaced worker will find reemployment following participation in the

TAA program of 5.9 percent.

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[21] Another potential source of bias is the fact that TAA participants may be less likely to search for employment because they are receiving extended unemployment compensation benefits. This would be of great concern if one was comparing the length of the unemployment spell of the TAA participants to non-participants. It is less of a concern in this research as all observations have exited the TAA program, thus are no longer receiving the extended unemployment compensation.

[22] Results from the covariate balancing tests are similar to those from the full sample, and are available from the authors upon request.

A natural hypothesis is that TAA participants are more likely to find reemployment if they take advantage of program-funded training opportunities. In fact, estimates of the average treatment effect when the sample of TAA participants is limited to those who participated in various training programs indicate that TAA participants are on average 10.0 percent more likely to find new employment when compared to non-participants.

When all of these results are taken into consideration, it seems clear that participation in the TAA program significantly increases the likelihood that participants will find new employment, particularly if they choose to take advantage of TAA-funded training opportunities. These results suggest that training programs have an even stronger positive effect on the likelihood of reemployment than earlier studies of the TAA program have found. Marcal (2001), for example, finds that between 1988 and 1989 participants in TAA-funded training programs were four percent more likely to find reemployment when compared to unemployment insurance (UI) exhaustees.

Wage Replacement

The TAPR dataset includes the quarterly earnings of participants in each of the three quarters prior to their displacement and the three quarters following their exit from the TAA program. We calculate the wage change of each worker as the percentage change in their calculated weekly wage from the third quarter prior to displacement to the third quarter following exit from the TAA program. On average, TAPR workers in this sample experienced a nearly 30 percent decrease in their weekly wages following displacement.

The CPS displaced worker survey includes information on weekly wages prior to displacement, and current weekly wages in January 2006. Like the TAPR workers, we calculate the wage change of each CPS worker using the percentage change in the two values. On

average, the comparison group experienced a 9.5 percent decrease in their weekly wages following displacement.

Estimates of the average treatment effect on the change in weekly earnings are provided in Table 7. Note that there are far fewer observations when compared to the employment analysis because we observe weekly earnings in only a subset of observations. The results should be interpreted with this sample selection in mind. In other words, the estimated average treatment effects are the change in weekly earnings due to the TAA program, but only for those workers who were reemployed.

As illustrated in the third column of the table, the naïve estimate of the impact of the TAA program would suggest that those who participate in the TAA program experience an extremely large loss of weekly earnings; the wage loss of TAA participants is 20 percentage points greater than that of non-participants. This large discrepancy may be due to the fact that many of the displaced workers in the unmatched CPS sample are moving between low-paying service industry jobs, while TAA participants are overwhelmingly being laid off from manufacturing jobs, which tend to have higher wage levels. The matching technique controls for this difference in the two samples.

After controlling for covariates using propensity score matching techniques, the results are much less shocking but still of concern. Estimates of the average treatment effect suggest that participating in the TAA program causes a wage loss nearly 10 percentage points greater than if the displaced workers had not participated. This is obviously not the result one would expect from a program designed to help displaced workers.

As discussed above, in order to control for differences in the period of observations we re-estimate the average treatment effect for the sub-sample of TAPR workers who exited the

TAA program between September 30, 2005 and December 31, 2005. We also investigate whether TAA participants who choose to take advantage of funding for additional training fair better in the job market than other participants. The results, which are included in Table 7, are virtually identical to the full-sample results that participating in the TAA program causes a wage loss approximately 10 percentage points greater than if the displaced worker had chosen not to participate.

The strong, negative treatment effect found in this study suggests that participation in the TAA program results in a significant loss in earnings. This loss in earnings may be due to the fact that participants in the TAA program tend to experience a longer period of joblessness, which may be viewed unfavorably by new employers. The average displaced worker from the (unmatched) CPS sample was unemployed for 14 weeks, compared to 49 weeks in the TAA sample. TAA participants may also feel pressured by program administrators to accept new job offers, regardless of whether the new wage is significantly less than previous earnings. Recall that one of the goals of the TAA program is to encourage the *rapid* reemployment of individuals. This possibility would explain both the higher likelihood of employment as well as the greater loss in weekly earnings associated with the program.

There is also a possibility that TAA beneficiaries view the loss of earnings in a positive light. Although it is impossible to tell from the TAPR database, participants in TAA-funded training opportunities may find that they now have the skills to find employment in new industries and/or occupations. Although workers often have to accept a temporary loss in earnings to gain entry-level employment in new industries or occupations, the new jobs may offer a higher life long earning potential.

It should be noted, however, that our results indicate that participation in the TAA program results in a much greater loss of earnings than earlier econometric evaluations of the TAA program have suggested.[23] Although we would argue that this difference is due to the fact that we use more appropriate econometric techniques, the difference may also be due to the fact that the our results continue to suffer from biases associated with residual unobserved differences that cannot be controlled for. For example, the labor literature typically finds that household characteristics such marital status and number of children may impact labor market outcomes. Variables such as these cannot be controlled for as they are not included in the TAPR survey. The difference may also be driven by differences in the data collection methods. While weekly wage data in the CPS sample is self-reported, the TAA data is collected by state program administrators. As noted above, GAO (2006a) warns that the TAPR database is plagued by a number of reporting problems, and self-reported wage data tends to be overestimated.

7   Conclusion

This paper uses data collected by the Department of Labor in their Trade Act Participant Report database to provide one of the first in depth evaluations of the effectiveness of the Trade Adjustment Assistance program. Using propensity score matching techniques to compare the employment outcomes of TAA participants with similar displaced workers from the Current Population Survey, we find that the TAA program is of dubious value to displaced workers.

There is strong evidence to suggest that the TAA program helps displaced workers find new employment, particularly when they take advantage of the program-funded training opportunities. However, this new employment is apparently at much lower wage rates. Estimates suggest that participating in the TAA program causes a wage loss approximately 10

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[23] After controlling for selection bias using a standard Heckman correction technique, Marcal (2001), for example, concludes that TAA participants earn three percent *more* than otherwise identical unemployment insurance exhaustees, although this result is statistically insignificant.

percentage points greater than if the displaced worker had chosen not to participate in the program.

Policy-makers should take these results into consideration when deciding whether or not to expand the TAA program. Although the TAA program certainly provides an income safety net for displaced workers, and may mitigate protectionist sentiment in the United States, there is little evidence that it helps displaced workers find new, *well-paying* employment opportunities.

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Table 1
TAA Performance Goals and Outcomes, Fiscal Years 2005-2007

	Fiscal Year 2005		Fiscal Year 2006		Fiscal Year 2007	
	Goal	Outcome	Goal	Outcome	Goal	Outcome
Average Earnings					$12,000	$13,915
Wage replacement	80.0%	76.0	80.0%	89.0%		
Reemployment rate	70.0	70.0	70.0	72.0	70.0%	70.0%
Retention rate	89.0	91.0	85.0	90.0	80.0	88.0

Source: Department of Labor

Table 2
Summary Statistics

	Trade Act Participant		CPS Displaced Worker	
	Mean	Std. Dev.	Mean	Std. Dev.
Male (% sampled)	0.522	0.499	0.552	0.497
Age	46.397	10.908	41.673	12.747
Tenure (in years)	10.462	10.260	5.236	7.010
Education (highest level)				
Years of Education	12.038	2.256	13.634	2.535
High-School Graduate	0.612	0.487	0.340	0.474
Some College	0.161	0.367	0.319	0.466
BA+	0.069	0.253	0.241	0.428
Import Sensitivity	0.318	0.176	0.062	0.145
Intra-Industry Trade	0.637	0.284	0.148	0.299
Manufacturing	0.978	0.146	0.212	0.409
Agriculture	0.001	0.032	0.005	0.071
Mining	0.002	0.045	0.006	0.080
TAA Benefits				
Training	0.806	0.394		
Job Search	0.013	0.116		
Relocation	0.014	0.117		
TRA	0.667	0.471		
Post Displacement				
Employed (% sampled)	0.772	0.418	0.753	0.431
Change in Wages	-0.301	0.848	-0.094	0.641
Number of Observations	72,859		3,509	

Table 3
Hit-Rates and Pseudo R^2 for Propensity Score Specifications

Industry[a]	Socio-Demographic[b]	Tenure	Year Dumour	Region Dummies	Race	Hit Rate	Pseudo R^2
x						96.75	0.5402
x	x					95.50	0.5783
x	x	x				95.20	0.5846
x	x	x	x			95.22	0.5847
x	x	x	x	x		94.58	0.5948
x	x	x	x	x	x	92.09	0.6059

[a] Industry variables include manufacturing, agriculture and mining dummy variables and import sensitivity and intra-industry trade measures.

[b] Socio-demographic characteristics include age, gender, and education variables.

Table 4
Estimates from Probit Estimation of Propensity Score[a]

	Obtain Employment		Replace Wages	
	Coefficient	Std. Error	Coefficient	Std. Error
Male	-0.084*	(0.026)	-0.124*	(0.035)
Age	4.321*	(0.528)	4.846*	(0.799)
Age^2	-4.189*	(0.559)	-5.032*	(0.882)
Education				
Years of Education	-0.153*	(0.014)	-0.215*	(0.021)
High-School	0.488*	(0.053)	0.599*	(0.074)
Some College	0.353*	(0.076)	0.572*	(0.109)
BA+	0.525*	(0.108)	0.805*	(0.158)
Tenure	0.034*	(0.003)	0.038*	(0.005)
$Tenure^2$	-0.000*	(0.000)	-0.001*	(0.000)
Trade				
Import Sensitivity	6.296*	(0.478)	6.704*	(0.647)
Import Sensitivity^2	-5.251*	(0.462)	-5.681*	(0.633)
Intra-Industry Trade	1.697*	(0.276)	2.063*	(0.360)
Intra-Industry Trade^2	-0.480**	(0.207)	-0.825*	(0.272)
Sensitivity*Intra-Industry	-3.532*	(0.389)	-3.852*	(0.520)
Industry Dummies				
Agriculture	-0.155	(0.199)	-0.329	(0.261)
Manufacturing	1.253*	(0.111)	1.239*	(0.145)
Mining	0.402	(0.167)	0.462*	(0.224)
Year 1993	0.044	(0.027)	-0.081*	(0.035)
Constant	-0.166	(0.177)	0.476**	(0.272)
Number of Observations	70,783		44,357	
Pseudo R^2	0.585		0.605	
F-Test	15,699		9,624	

[a] *, ** indicate those parameters significant at the 1 percent and 5 percent levels, respectively.

Table 5
Indicators of Covariate Balancing, Before and After Matching

	Obtain Employment	Replace Wages
Before Matching		
Pseudo R^2	0.585	0.605
F-Test[a]	15,699.460	9,624.220
Mean of Standardized Bias[b]	77.483	79.740
Median of Standardized Bias	53.296	61.761
After Matching		
Pseudo R^2	0.008	0.013
F-Test	24.210	22.060
Mean of Standardized Bias	1.997	4.211
Median of Standardized Bias	1.851	3.362

[a] The degrees of Freedom for F-Test is 18.

[b] Mean standardized bias has been calculated as an unweighted average of all covariates. The standardized bias is calculated as $(\bar{x}_{tapr} - \bar{x}_{cps}) / \sqrt{(Var_{tapr}(x) - Var_{cps}(x))/2}$.

Table 6
Program Evaluation: Re-employment

	TAA	Controls (CPS)	Difference	Std. Error	T-Stat
Full Sample					
No. of Obs.	67,182	3,343			
Unmatched	0.780	0.758	0.023	0.007	3.100
Matched	0.781	0.731	0.050	0.022	2.240
December 2005					
No. of Obs.	5,324	3,327			
Unmatched	0.789	0.758	0.031	0.009	3.330
Matched	0.790	0.731	0.059	0.025	2.240
Training (12/05)					
No. of Obs.	4,128	3,327			
Unmatched	0.838	0.758	0.080	0.009	8.72
Matched	0.839	0.737	0.101	0.024	4.300

Table 7
Program Evaluation: Wage Replacement

	TAA	Controls (CPS)	Difference	Std. Error	T-Stat
Full Sample					
No. of Obs.	42,147	1,936			
Unmatched	-0.297	-0.095	-0.202	0.019	-10.370
Matched	-0.297	-0.200	-0.097	0.042	-2.330
December 2005					
No. of Obs.	3,519	1,927			
Unmatched	-0.294	-0.096	-0.199	0.021	-9.530
Matched	-0.298	-0.205	-0.092	0.040	-2.250
Training (12/05)					
No. of Obs.	2,960	1,927			
Unmatched	-0.287	-0.096	-0.191	0.022	-8.860
Matched	-0.286	-0.190	-0.097	0.042	-2.280

Figure 1
Industry of Lost Employment:TAA Participants

TAA Industry of Lost Employment

- Electronic component and product manufacturing 9%
- Motor vehicles and motor vehicle equipment 8%
- Machinery manufacturing 7%
- Fabric mills, except knitting 6%
- Furniture manufacturing 5%
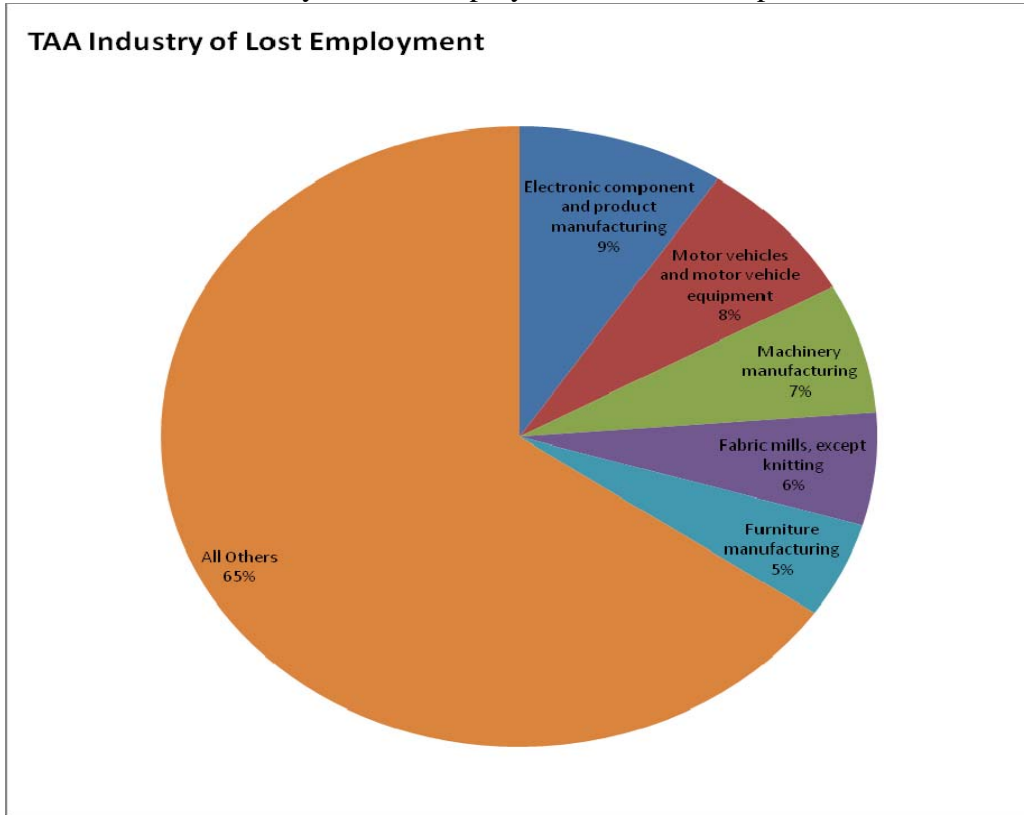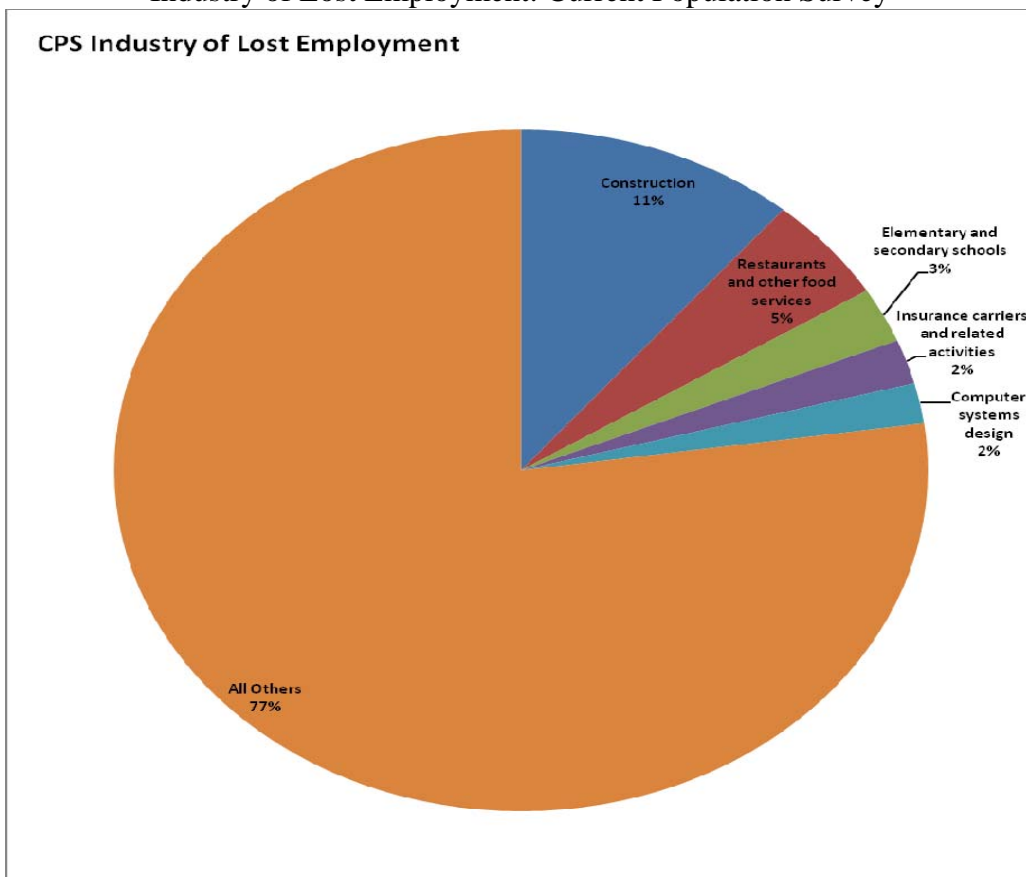- All Others 65%

Figure 2
Industry of Lost Employment: Current Population Survey

Figure 3
Distribution of Propensity Scores