Training Program Impacts and the

Onset of the Great Recession

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ABSTRACT

In the context of the Great Recession, we examine how the impacts of training shifted during a period when theory suggests they might have the greatest potential to improve individual and societal well-being. Using particularly rich data from the state of Missouri for participants in the WIA Adult and Dislocated Worker and the Trade Adjustment Assistance programs over the period 2007-2010, we estimate program impacts, comparing outcomes for participants receiving training in one of these programs with a comparison group of individuals seeking job search services through job offices, or those receiving Unemployment Insurance payments. Individuals who have the same demographic characteristics, prior employment and earnings histories, and local labor markets are matched to maximize the likelihood that the estimates reflect causal training impacts. Making comparisons of impacts before and after the onset of the recession allows us to test the claim that the net benefits of training increase during recessionary periods.

Introduction

By most measures, the economic downturn of 2007-2009, often referred to as the "Great Recession," was one of the most severe since the Great Depression, inducing a decline of 3 percent in U.S. gross domestic product and a decline of more than 8 percent in personal disposable income. Labor market distress has been particularly acute, with average duration of unemployment during the recession higher than in any post-war recession. U.S. unemployment peaked near 10 percent in late 2009; as of the spring of 2014, it has fallen below 7 percent, although some of this decline is attributed to workers exiting the labor market. Indeed, the number of workers that have left the labor market is substantial, causing a decline in the employment-to-population ratio from 63.0 to 59.3 percent (Moffitt, 2013).

The American Recovery and Reinvestment Act (ARRA) of 2009 allocated $2.95 billion in additional funds to the Workforce Investment Act (WIA), approximately doubling the 2008 level of funding, in an effort to raise individual skill levels and improve job seekers' prospects (National Skills Coalition, 2011). Although this funding was motivated in part by a concern to provide benefits to those facing economic hardship, it is widely believed that increased emphasis on training during a recession may be efficient, in large part due to reduced opportunity costs of training. However, there is little empirical evidence on this issue, as we discuss below, especially as it relates to the U.S.

In the analysis here, we examine impacts of training of training using particularly rich data from the state of Missouri for participants in the Workforce Investment Act Adult (WIA Adult) and Dislocated Worker (WIA DW), and the Trade Adjustment Assistance (TAA) programs over the period 2007-2010. We estimate program impacts, comparing outcomes for participants receiving training in these programs with a comparison group of individuals who did

not participate as the local economy declined and then began to slowly recover. Individuals who have the same demographic characteristics, prior employment and earnings histories, and local labor markets are matched to maximize the likelihood that the estimates reflect causal training impacts.

If we were to find that the net benefits of training were greater during the recent Great Recession, this would argue for a set of activities that governments could usefully undertake during economic downturns to promote additional skills acquisition through training, mitigate negative effects of being out of work and pave a pathway to stronger future growth. However, our findings provide only limited evidence that training is particularly beneficial during a recession.

Evidence on Training Program Impacts and the Role of the Business Cycle

Approximately four decades of research on employment and training programs confirms that adults benefit, on average, from training. The bulk of average impact estimates come from U.S. program evaluations (of the Job Training Partnership Act and WIA) and range from $320 to $887 in earnings per quarter for participants (Andersson et al. 2013; Bloom et al., 2003; Decker, 2011; Heinrich et al., 2013; Hollenbeck et al., 2005). Some of these studies also translate earnings effects into percentage terms, with estimated effects (earnings increases) of training programs in the U.S. and abroad ranging from about 5 to 26 percent of average earnings (Bloom et al., 2003; Decker, 2011; Greenberg et al., 2005; Haelermans and Borghans, 2011; Heinrich et al., 2013; Hollenbeck et al., 2005). Estimated effects of training on the probability of employment are also positive and statistically significant across a majority of studies. The estimates of employment increases range from about 5 to 29 percentage points (measured monthly or quarterly), with some differences observed between women and men, and by specific

training type and time following program entry (Card et al., 2010; Decker, 2011; Heinrich et al., 2013; Hollenbeck et al., 2005).

One of the most commonly provided types of training is vocational training, which a majority of studies find to be effective in increasing adult earnings. However, the research base also consistently reports that there are initial "lock-in" effects of vocational training, with early negative impacts that turn positive and increase over time (Andersson et al., 2013; Card et al, 2010; Decker, 2011; Heinrich et al., 2013; Schochet et al., 2006; van Ours, 2004). Participation in training tends to reduce job search, and employment and earnings in the short run, but by about 18-24 months after program entry, program impacts typically turn positive and then grow for at least several years.

The evidence base is also fairly consistent in finding considerably smaller impacts on employment and little or no impacts on earnings of training programs targeted toward dislocated workers in the U.S. (Andersson et al., 2013; Decker et al., 2011; Heinrich et al., 2013; Hollenbeck and Huang, 2006; Social Policy Research Associates, 2013). In general, it appears that the "lock-in effects" (or foregone earnings associated with training) are more costly for dislocated workers, who tend to have stronger (higher) earnings histories than the average training program recipient. The most recent study of U.S. trade adjustment assistance programs suggests that dislocated worker trainees fare better after training when they find employment in their training field and when they receive a degree or certificate through training, particularly women who receive training in health care professional fields (Social Policy Research Associates, 2013).

These findings on job training program effectiveness raise the question of whether the opportunity costs of training might be lower, and the ultimate impacts larger, when training is

undertaken when labor market prospects are poorer. However, if employers are not hiring or opening jobs following voluntary quits, improving one's skills may be of little help when one subsequently pursues employment. Thus, the timing of labor market entry in the course of the business cycle is likely to play a critical role in determining training program effects, and the magnitude and direction of those effects are probably best explored empirically in a given local labor market context.

Only a few studies directly address the importance of the business cycle for individual outcomes of training programs. Hollenbeck and Pavelchek (2011) looked at participants exiting training programs in Washington State over the period 1997-2008, finding weak evidence that program impacts were greater for those entering the market during a stronger economy. However, their methods did not allow for estimates of forgone earnings during training, potentially an important factor in causing differential returns.[1]

Kluve (2007) undertook a meta-analysis of European program evaluation studies using unemployment rate to capture business cycle differences. In his most comprehensive model, program effects did not differ significantly by unemployment, and the study concluded that other factors were more important in explaining effect differentials. It is not clear these results are directly applicable to the kinds of adult training programs considered here, as such programs made up only half of the programs considered, and differentials by business cycle for those programs may have been overwhelmed by variation across other programs.

In a study using Norwegian data, covering the years 1991-1997, Raaum et al. (2002) investigated the role of business cycles for short-term and medium-term individual outcomes of a labor market training program. The unemployment rate had increased from 1.5 percent in 1987

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[1] Their data provided information only on date of exit from the program. For this reason, estimates of post-program benefits may be biased because of the endogeneity of date of exit and the difficulty of identifying an appropriate comparison group.

to a peak of 5.5 percent in 1993, before declining to 3.3 percent in 1997. The average impact of

the program on annual earnings over the period of their study was positive and statistically

significant, and the effect of training on the trained varied substantially over the business cycle.

Training program participants gained more when job opportunities in the post-training period

were favorable, while program effects were significantly lower when national or local labor

markets were experiencing high unemployment and few transitioned from unemployment to

jobs.[2]

Lechner and Wunsch (2009), in a study of participants entering job training programs

over the period 1986-1995 in West Germany, found substantially greater program impacts during

economic downturns. For participants starting the programs at times of high unemployment,

they found both smaller negative lock-in effects—as theory might predict—as well as larger

positive long-run effects. These relationships were robust to controls for changes over time both

in the characteristics of participants and the type of job training provided.

The recent Great Recession presents a unique opportunity to investigate the influence of

the business cycle on public training program effects in the U.S. Although it might be of interest

to use variation in the depth or extent of the recession across states and localities to explore these

relationships, the detailed data necessary for these analyses are hard to come by. We take

advantage of the availability of rich training program and wage record data made available by

the state of Missouri, as well as a sharp increase in unemployment in Missouri during the

recession, to undertake these analyses.

Study Data

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[2] Herbst (2008) found that welfare reform policies in the U.S. over the period 1986-2005 were more likely to raise levels of employment when economic growth was greater. His measures of policy focused almost exclusively on reforms that altered individuals' incentives, such as benefit receipt time limits, so his results say little about training program impacts.

Data used in these analyses were produced by Missouri's Department of Economic Development as part of the Workforce Data Quality Initiative pursuant to funding by the U.S. Department of Labor. The ultimate source for each dataset was a Missouri agency charged with maintaining the data for the purpose of administering programs focused on serving residents in the state. Lists of participants providing demographic and related information for those entering the WIA Adult, WIA Dislocated Worker, Trade Adjustment Assistant and Employment Services (ES) programs, in the period July 2007-June 2010 were provide by the Division of Workforce Development. Wage record data, information on quarterly earnings in the State of Missouri maintained in support of the state's Unemployment Insurance (UI) system, and information on UI recipients were provided by the Department of Labor and Industrial Relations. Wage record data provide information on all individuals working in firms within the state that are required to report information under UI legislation. Omitted are earnings from informal and illegal employment, federal or military employment, and employment outside the state. Notwithstanding these omissions, earnings measures based on these kinds of data are comparable in accuracy to those obtained in surveys, and studies suggest that program evaluations using such data do not suffer important biases (Wallace and Haveman, 2007).

The Training Programs and Economic Environment in Missouri

These training programs faced particularly dramatic challenges with the onset of the Great Recession. Although the National Bureau of Economic Research declared the recession's start to be in December 2007, the recession had only a modest impact on the unemployment rate in the beginning of 2008. Figure 1 shows that unemployment in Missouri increased moderately through the middle of 2008, gradually accelerating and then jumping dramatically at the end of the year and in the first months of 2009. The recession formally ended in June 2009 as the U.S.

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gross national product began to grow again. Missouri reached a peak unemployment rate of 9.7 percent in August of 2009, but the unemployment rate in Missouri was over 9 percent through 2010 and remained over 7 percent through most of 2012.[3]

The three programs differ somewhat in their target populations. The WIA Adult program is focused on individuals who have faced labor market difficulties for extended periods, frequently those who have suffered repeated periods of unemployment and low-wage employment. The WIA Dislocated Worker program is designed to aid workers who have lost their jobs, often as a result of layoffs associated with business cycles or industry-specific declines. Many of these individuals had extended periods of stable employment at relatively high wage levels prior to getting laid off. Finally, the TAA program is concerned with helping those who have lost their jobs because of increased import competition or shifts in production to outside the U.S. Like WIA DW participants, prior earnings for this group were often substantial. Notwithstanding these differences, the goal for each program is to provide training and related services to help workers achieve labor market success.

For the WIA programs, the Missouri Career Center (or One-Stop center) that operates under the Employment Service is often an initial point of contact for individuals expressing an interest in training, and they are often referred to WIA program representatives within the center. Admission decisions are made by staff based on eligibility criteria, and admission may be selective during times when slots are scarce. In contrast, federal certification identifies individuals who are eligible to participate in the TAA program, and individuals are informed that they are eligible for the program.

Information on the three programs over the period July 2007-June 2010 is provided in Table 1. First implemented in Missouri in 2000, the two WIA programs provided services for up

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[3] Based on seasonally adjusted monthly unemployment.

to 15,000 participants per year during this period. In most years, 35-50 percent of participants received training. The TAA program remained small throughout the period, averaging about 2,000 annual participants and never serving over 4,000 in a year.

A glance at the first column of figures in Table 1 listing numbers of participants shows that the two WIA programs grew dramatically in the first two years with the onset of the Great Recession. Looking at year-on-year growth, we see that between program years 2007 (PY2007) and 2008 (PY2008),[4] the total number of WIA Adult participants grew by 40 percent, whereas the WIA DW program doubled in the same period. Given the focus on job losers, the relatively greater growth in the latter program is expected. The growth in the TAA program was ultimately even greater, but perhaps most notable was the extraordinary spike in the last quarter of calendar year 2008 and especially the subsequent quarter, when the financial crisis was most acute.

Table 1 also provides a portrait of the kinds of individuals who participated in the programs each quarter over the three years of our study. Throughout the period, the average participant was between 35 and 50 years of age, with the Adult program at the lower end of that range and the TAA program at the upper end. In all the programs, a majority of participants were female at the beginning of our period, although the proportion was substantially higher in the WIA Adult program. Similarly, the proportion African-American was higher in the WIA Adult program, initially over 40 percent, as compared to under 20 percent in the other programs.

With the recession, the character of the program participants changed. The proportion male increased in all programs with the recession, exceeding 50 percent in the DW and TAA programs. This presumably reflects the relatively greater increase in male unemployment associated with the recession, which led some to dub this period a "mancession" (Rampell,

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[4] Program years begin in July of the specified year and extend to June of the following year, so, for example, PY2007 is July 2007-June 2008.

2009). The proportion African American in the WIA Adult program declined several percentage

points with the onset of the recession, whereas in the other programs it increased slightly or

showed little trend from its lower base point.

The last two columns of Table 1 indicate the kinds of services individuals received. WIA

offers three levels of services. By definition, all individuals who enter the program receive

"core" services, which are similar to basic labor market information and job search services

provided to any individual who seeks labor market assistance at a state-run career center. In

addition, WIA participants may also receive "intensive" services, which involve more extensive

counseling, including personalized vocational testing, short courses and the like. Finally, those

receiving intensive services may receive training as well, which includes classroom instruction,

often provided under a voucher system, and on-the-job training. The proportion receiving either

intensive services or training was in the range of 70-90 percent, with the proportion 5-10

percentage points higher for the DW program than the Adult program. In both programs, the

proportion increased when the recession hit. The proportion receiving training varied over time

in the two programs, but it appears to have increased quite substantially over the period of our

study. The classification of services was somewhat different in the case of the TAA program.

We see that generally about half of participants receive occupational or on-the-job training,

whereas 5-15 percent attend remedial or English as a second language classes.

Figure 2 indicates the median length of time individuals were registered as participating

in each of the three programs in the 12 quarters of our analysis. In the first year, prior to the start

of the recession, differences in time are substantial, with TAA participants staying in the

program for nearly three years, WIA DW one to two years, and WIA Adult about a year. Over

time, there is convergence, and during the last six quarters of our data, there are no systematic

differences in program length. Length of time in the program is both a function of the type of training undertaken and the availability of good employment options. The decline in length of time in the program is at least partly due to the improving labor market facing more recent program participants.

It is widely recognized that individuals who participate in training programs have often experienced recent labor market setbacks, so that their earnings decline over the several months prior to entry into a program. The decline in earnings has been referred to as the "Ashenfelter Dip" (Heckman and Smith, 1999). Although it might be assumed that such a decline would occur only for programs focused on displaced workers, this occurs with almost all training programs, including the WIA Adult program. Figures 2-4 provide information about earnings and employment for participants in each of the three programs by program year of entry, both prior to and after program entry. The Ashenfelter dip was present in a dramatic way for all three programs, and the patterns were at least broadly similar for those entering the program regardless of the program year.

There were important differences by program, however, especially in the levels of earnings and employment. In the WIA Adult program, four quarters prior to program entry, participants' quarterly earnings averaged between about $3,300 and $4,100, whereas in both other programs, earnings four quarters prior averaged between $7,000 and $13,000. In separate tabulations, we found that between half and three quarters of TAA participants had worked for the same employer for over four years, whereas this figure was less than two-fifths for WIA DW and only 10-15 percent for WIA Adult.

The figures confirm that employment levels also differed in expected ways. For WIA Adult participants, employment (defined as the proportion with earnings during the quarter) was

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seldom over 70 percent four quarters prior to entry, whereas, in the other two programs, this measure was generally over 90 percent. This is in keeping with the focus of the WIA Adult program on those with prior labor market difficulties, and the WIA DW and TAA programs on those who had lost jobs.

Figures 2-4 also suggest some interesting differences by entry period. In the WIA Adult program, those entering in PY2007 experienced an immediate improvement in earnings in the quarter following entry, with steady if declining growth over the following three years. For those entering in PY2008 and PY2009, during the worst labor market, earnings continued to decline in the subsequent quarter before beginning a gradual improvement. In the case of the WIA DW and TAA programs, recovery was delayed an additional quarter for participants entering in *any* of the three periods. In all three programs, in the third year after program entry, earnings of the two groups that entered during the worst of the recession had caught up with those of earlier participants. This reflects the fact that in the third year after program entry, earlier participants were searching for employment in a very challenging labor market, whereas those who entered later were in a period when growth had begun to occur.

Although the patterns of employment and earnings are similar to one another in most cases, for the WIA Adult program there is a notable exception. Among participants entering in PY2007, the proportion employed remained over 60 percent during program participation and almost the entire follow-up period, with only a small dip in the quarter immediately prior to program entry. Of those entering the program in PY2008, in the four quarters prior to participation, close to 70 percent were employed, but employment declined to 60 percent in the quarter of program entry, and continued to decline to under 50 percent in the subsequent four quarters. The comparison between employment and earnings patterns suggests that although

program participants prior to the recession experienced difficulties in finding *good* employment (in terms of wages or sufficient hours), they did not have trouble finding some kind of employment. Once the recession hit, a much larger proportion of participants had difficulty finding *any* employment.

In the case of the WIA DW and TAA programs (Figures 3 and 4), we see for participants in every period that job loss had an important role in inducing individuals to pursue training. For the TAA program, however, the decline was more dramatic, and employment was more central to explaining earnings declines. TAA participants' quarterly earnings four quarters before entry were $9,000-$13,000, but they declined to under $3000 in the quarters after entry, and earnings displayed only modest recovery in the three following years. Levels of employment for TAA participants entering in PY2008 and PY2009 were in the range of 20-30 percent for several quarters following program entry, some 15-20 percentage points lower than comparable employment figures for the WIA DW program.

Program Effects

The patterns reviewed in the previous section reflect a combination of participants' personal economic circumstances and the broad economic environment they face. The Ashenfelter Dip is understood to reflect the fact that individuals participate in a training program when they face setbacks in their employment circumstances, whether reflected in the loss of a long-time job, declining hours, or stagnating earnings. Since, even in the absence of effective training, circumstances tend to improve relative to such a trough, the growth in earnings and employment for program participants described above tells us very little about program effects.

In the case of the WIA Adult program, we use participants in the U.S. Employment Service (ES) system who receive job search services under Wagner-Peyser legislation in order to

estimate the likely outcomes that would have been achieved by program participants in the absence of participation.[5] This group, which we will refer to as the "ES comparison group," is appropriate as a comparison group because the Employment Service attracts individuals seeking job search assistance. Like job training participants in general, they experience a dip in earnings and employment around the time of service receipt. In common with WIA Adult program participants, a substantial minority are receiving Unemployment Insurance benefits when they seek ES services. As a group, they do differ from WIA Adult program participants both in terms of their particular employment difficulties and in their characteristics, but our methods identify those in the comparison group who have closely matched demographic characteristics, prior employment experiences, including prior efforts to obtain job search assistance. Although job search services may be of substantial value relative to their cost (often estimated to be a few hundred dollars per individual), they are low-intensity services relative to training and are available to any individual who seeks them. If training is of value, the benefits of training are expected to overwhelm those produced by job search services, so we do not expect serious bias due to receipt of such services in the comparison group.

In the case of the WIA Dislocated Worker and TAA programs, we use Unemployment Insurance (UI) recipients as the comparison group. The overwhelming majority (over 80 percent) of participants in these programs are receiving UI benefits during the quarter in which they enter the program, reflecting the fact that many WIA Dislocated Worker and TAA program participants held stable jobs for extended periods, and so are very likely to be eligible. We omit the small proportion of participants in the programs who do not receive UI compensation at some

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[5] Some individuals admitted into the WIA programs receive only core services, which are essentially the same as those provided under ES. However, since WIA participants contribute to performance measures used to evaluate the WIA program, staff are likely to follow them more closely, so there may be additional value added even for these individuals. As noted above, the majority of WIA participants receive services beyond the core level.

point during the quarter. Our focus on UI recipients makes our analysis comparable to those undertaken in many European countries, where participation in such training programs is often tied to eligibility for unemployment benefits (Lechner and Wunsch, 2013; Biewen et al., 2014). As noted above, we use matching methods to identify comparison group participants who have the same characteristics and prior labor market experiences as participants.

We limit the comparison group to individuals who do not enter any of these three training programs during the quarter in question, but we do include comparison cases that later enter one of these programs. Fredriksson and Johansson (2008) show that, if later participants are omitted from the comparison, this may induce bias if those with poor labor market outcomes are particularly likely to ultimately participate. By including subsequent participants, our approach avoids this bias, but it requires that we interpret our estimates as the return of entering training in the current period, where the alternative is waiting and possibly receiving training at a later point (Sianesi, 2004).[6] Notwithstanding this formal interpretation, since these programs serve only a small proportion of participants in the comparison sample, the inclusion of those with subsequent program participation has essentially no impact on our results.[7]

Although the comparison group is important, participants differ in many measured ways from comparison group members. Our analyses will control for such differences, and it is

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[6] Lechner and Wunsch (2013) require that comparison group members not enter training for the twelve months following the start of unemployment. They find that modifying this window to 6 months or 18 months does not alter their substantive conclusions. However, Biewen et al. (2014), show that omitting subsequent participants does alter results substantially relative to an analysis where the comparison group includes all those who participate at any subsequent point. Because we do omit subsequent participants within the same quarter, our estimates would appear to be subject to such bias. However, the density of program participation in our comparison sample is quite small in comparison to the German programs considered in these studies. In Germany, those who remain unemployed are much more likely to participate in government-sponsored training programs than in the U.S. See also Fitzenberger, Osikominu, and Völter (2008) for a discussion of these issues with regard to German training programs.
[7] It is important to keep in mind that, although inclusion in the comparison group of later program participants does not substantially influence our results, some comparison individuals undertake training through other means, and we are not able to measure this. Our estimates of program impact are properly interpreted as incremental relative to a baseline that includes some level of training that would occur in the absence of the program, i.e., they are estimates of program impact in the observed environment.

necessary to assume that, conditional on the control variables, the outcomes that would occur in the absence of participation in the program are independent of participation.[8] Whether this conditional independence assumption is justified depends critically on the particular variables that are controlled in the analysis.

It is widely recognized that basic demographic factors, human capital measures and labor market region must be controlled (Heckman and Smith, 1999; Mueser, Troske and Gorislavsky, 2007). Our data include information on gender, age, race, and education. All of our analyses are undertaken separately by gender, and we include flexible controls for age, race, and education. We also control for 14 regions, corresponding roughly to labor markets within the state of Missouri. We limit the sample to individuals at least 18 but less than 70 on the date they end the program.

It is also critical that prior employment experiences be controlled, and it appears that including a flexible specification is important (Dolton and Smith, 2011). We use three prior years of quarterly earnings information, and include dummies for employment (identified by nonzero earnings in a quarter), linear and square terms for earnings in each quarter, indictors for transitions between employment and nonemployment over the prior six quarters, and measures identifying stability of employment, as captured by interactions for all patterns of employment in the prior four quarters.[9] Although we do not have occupation information, we are able to control for certain information about the employer. We control for the major industry of the employer

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[8] This assumption is sometimes called unconfoundedness. For the analysis here, which focuses on mean outcomes, a weaker assumption, mean independence, is sufficient. In addition, it is also necessary that there be strict overlap between participants and the comparison sample (see Busso, DiNardo and McCrary, 2009). In the case at hand, where we are seeking to estimate the effect of the treatment on the treated, this means roughly that the predicted probability of participation based on control variables (in the sample that combines participants and the comparison group) be less than unity for all participants. In practice, this condition is violated for some participants, and so our estimates of program effect only apply to the subset of participant for whom this applies.

[9] Analyses based on European data often have more extended prior employment information. Biewen et al. (2014) control for seven years of employment, although they find that such detailed information is not very important when the other measures included here are controlled.

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providing the largest prior quarter earnings, and the number of employees in the largest firm that the individual received payment from in the prior two quarters.

Using somewhat different approaches, Lechner and Wunsch (2013) and Biewen et al. (2014) both confirm the importance of the measures identified above, but they also find that it is particularly valuable to have details of the participant's current unemployment spell. As noted above, WIA Adult program participants may or may not be receiving UI benefits when they enter the program, and we control for UI benefit receipt in the current quarter, along with prior quarters. The overwhelming majority of participants in the WIA DW and TAA programs are receiving UI in the current quarter, and we have omitted those participants who were not receiving UI benefits at some time during the quarter of entry. For all three programs we control for whether the individual received UI benefits in either of the prior two quarters. In addition, for those entering the DW or TAA programs while receiving UI benefits, we include a count of the number of weeks they had been receiving UI benefits.

The WIA Adult program targets individuals with prior employment difficulties, whereas the other two program target those facing layoffs, who often had extensive tenure with a single employer. We have several measures designed to capture the extent of such stable employment attachments. Identifying the employer providing the greatest earnings in the prior quarter, we count the number of continuous prior quarters in which this one employer provided earnings (up to a maximum of 16). Since there is evidence that individuals may enter training programs several months after facing a layoff, we also have similar measures calculated for employment ending the two quarters prior to program entry, and for employment ending three quarters prior to program entry.

Those seeking prior job search services may differ from others in several ways, indicating both prior difficulties in the labor market and active job search. We therefore have controlled for ES activities in each quarter as far back as two years prior to the current quarter. Among those receiving UI benefits, ES participation may also signal whether the individual was awaiting recall from a prior employer. Most UI recipients are required to seek ES services, whereas those awaiting recall are not. Although we cannot identify this latter group directly, failure to participate in ES serves as a proxy for this group. In fact, for UI recipients, we found that, among those with no ES activity, more than half returned to their prior employer in the two quarters after UI receipt, whereas this figure was below one in five for those who had ES activity.

A small portion of participants entering each program had participated in one of the training programs in a prior year, and we controlled for such participation in either of the prior two years.

Subject to identifying assumptions, our estimates measure the effect of the training program for those who participate ("the effect of the treatment on the treated") in each program year. If the characteristics of participants entering the programs change over time, and if the efficacy of the program varies by type of participant, selection effects may be partly responsible for any observed variation in program effects. To adjust for such differences, we have constructed a set of weights for participants in PY2008 and PY2009 so that the distribution of independent variables corresponds to that for the initial program year 2007. We have then estimated program impacts for this weighted population, providing a measure of effect that removes the impact of participant composition. Although differing in the details of

implementation, this adjustment approach corresponds to that used in Lechner and Wunsch (2009) and Rinne, Uhlendorff, and Zhao (2013).

These analyses are focused on the returns for program participants, and, as Table 1 shows, only about half of these participants actually receive training. Although, those individuals who do not receive training may obtain counseling or other services, the latter effects are likely to be less pronounced—at least in the long run—than training, given that these services are of short duration. If we ignore the impacts of these lesser services, our estimates are, in essence, "intent to treat" estimates, similar in spirit to those reported by Doerr et al. (2014), who identify the impacts of receiving a training voucher when not all recipients redeem it. Under this approach, insofar as entry into the program satisfies the conditional independence assumption, estimates identify the impact of program participation even if selection into training among participants is associated with unmeasured factors that predict ultimate employment success.[10] This latter selection is of some concern, since the decision not to enter training for program participants may be influenced by the opportunity to obtain employment, which may in turn be associated with long-term employment success.

Acknowledging that such selection may bias our estimates, we present results from an analysis that focuses on the subset of individuals who obtain training. This analysis uses the same comparison groups and control variables identified above. In order to limit the extent to which selection may represent labor market opportunity, we limit consideration to those who begin training in the first three months after entering the program. While the reader is warned to consider the caveat that selection into training could be important, one benefit of this approach is that, by focusing on training participants, results may be more nearly comparable to other

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[10] If it is assumed that those who do not enter training do not receive services that provide benefits, it is straightforward to estimate the effect of training, *per se*, by multiplying estimated program effects by the inverse of the proportion of participants who receive training.

training program evaluations that focus on individuals who actually engage in training (Lechner and Wunsch, 2009, 2013; Biewen et al., 2014).

Our discussion above underscores the critical role of the macroeconomy in determining employment outcomes for training program participants. The methods we use ensure that participants are matched with comparison individuals who are seeking job search aid through ES (Adult program) or are receiving UI benefits (DW and TAA programs) at the same time that participants enter the program, so that, in comparing subsequent earnings and employment, we are comparing individuals who are facing the same economic environment.

In considering job training impacts, we need to recognize that, for many participants, earnings benefits may occur only with a substantial lag. This is both because time and attention are diverted from job search and work effort to classroom activities during the period of active participation (the "lock-in" effect), and because the benefits of training may not be fully realized at the completion of the program. Finding appropriate employment may be time consuming and training returns may accrue slowly even in the best job. Figure 2 shows that the median program participant generally spends over a year in the program, so it should not be surprising if average earnings should be depressed, relative to not obtaining training, for over a year. It is important to stress that these costs are an important element in evaluating a program; the strategy of measuring outcomes from the date of program completion would provide an incomplete measure of program impact.[11]

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[11] Measuring outcome from program completion is also problematic because length of time in the program is partly a choice, and it may be influenced by the individual's market opportunities.

Methods

For each of the three programs, we undertook propensity score matching of participants with the

comparison group (ES for the WIA Adult program, UI for WIA DW and TAA) by gender and

entry date.

We began with a sample consisting of participants of one gender who entered the

program in one of the 12 calendar quarters over the period July 2007-June 2010, or, in the case

of TAA, for two calendar quarters.[12] We then combined this sample of participants with the

comparison sample observed during that same quarter (or pair of quarters in TAA) and fitted a

logit regression predicting participation in the training program, using as independent variables

the control variables described above. We used the estimated propensity score (the predicted

probability from this logit regression) to omit cases from each sample that were off the common

support and then reran the logit regression on the remaining sample. We next weighted each

comparison case by the odds ratio of the predicted propensity score (sometimes referred to as

"inverse probability weighting") applying the adjustment to the weights recommended by Busso,

DiNardo and McCrary (2009). If the logit specification is correct, theory assures us that the

weighted comparison sample will have the same distribution on all control variables (i.e., the

logit variables) as the sample of participants. On the assumption of conditional independence,

average earnings or employment obtained for the matched comparison group provide an

unbiased estimate of what these outcomes would have been for participants.

In order to assess whether the logit specification was correct, we undertook balancing

tests. First we combined all quarters for a given gender and program, and performed a t-test on

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[12] For example, those participants entering the TAA program in the third and fourth quarters of calendar year 2007 were matched with a comparison group observed in those same quarters. A dummy indicating quarter was included as a matching variable.

each mean for the difference between the participant samples and the weighted matched comparison sample. We were particularly concerned with assuring that earnings in the 12 quarters prior to program entry were properly controlled, and we examined these differences for each quarter. If any differences were statistically significant, we modified the logit specification, often omitting those participant cases with extreme values of propensity scores, which would be less likely to have good matches. In most cases, our final specification had no statistically significant differences between the participant and weighted matched comparison samples, although we accepted some specifications where the number of statistically significant differences could have been due to chance. In most cases, the standardized differences[13] in means for all variables in the accepted specifications were extremely small, almost always less than 0.01.

Our use of probability weighting reflects the findings of Hirano, Imbens and Ridder (2003) that weighting using probability predictions based on a nonparametric specification is asymptotically efficient, in combination with the supportive simulation results of Busso, NiNardo and McCrary (2009). However, Huber, Lechner and Wunsch (2013) obtain simulation results suggesting that radius matching is preferable to such weighting. In discussing their results, they suggest that the failure of weighting to dominate in their analysis may reflect the parametric estimation of the propensity score or the inclusion of cases off the common support. As noted above, in the analysis here, we re-estimate the propensity score after cases off the common support are omitted. Perhaps most important, we find that our weighting approach is highly successful in producing variable means for the comparison sample that correspond to

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[13] The standardized differences for a variable is the difference in the mean for the two samples divided by a measure of the standard deviation, calculated as sd= SQRT(0.5 v1 + 0.5 v2), where v1 and v2 are the variances for the training program sample and the matched comparison group, respectively.

those of the participants, so it would appear unlikely that our estimates are seriously biased due to out use of these methods.

In order identify the effects of compositional changes in participants caused by the recession, we use a weighting procedure to adjust the participant samples in the second and third program years to correspond to the characteristics of the participants in the first year. In particular, we create a sample consisting of all individuals participating in PY2007 that is on the common support for all 12 quarters. We then run a logit for each quarter in PY2008 and PY2009, combined with this PY2007 sample of participants, calculating the weight based on the propensity score, using this weight for each entry quarter of participants to reproduce the variable distributions in the PY2007 sample. These weighted samples of participants are then matched to the appropriate comparison sample quarter by quarter, and program effects are estimated as indicated above.

Our initial analyses indicated unusual patterns of returns due to severance pay received by program participants and comparison group members, for some individuals resulting in reported earnings in a single quarter that were appreciably greater than the annual earnings previously received by the individual from that same firm. Since individuals with severance pay would be expected to respond differently to job opportunities, we omitted anyone from both the participant and comparison group who appeared to receive severance pay.[14] In addition, for the

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[14] Although newspaper account identified some severance pay arrangements, we had no direct measure. We developed a simple proxy to identify most cases of severance pay. We examined each quarter in the interval four quarters prior to program entry through four quarters following program entry (nine quarters). If payment from a single employer in that quarter was over $25,000, the four quarters prior to that quarter were examined to see if any earnings were received from that employer. If that large payment was more than twice that of the maximum payment received from the employer in any of the prior four quarters, and the employer provided payments in at least two of those four quarters, then the payment was classified as a severance payment, and the individual was removed. The same criterion was used for comparison cases, although in this case the reference quarter replaced the quarter of program entry. This approach missed severance payments less than $25,000, but our view was that small payments would be hard to distinguish from regular earnings and would be less important in any event. Presumably, some cases where earnings were highly variable from quarter to quarter were also omitted by this procedure.

WIA DW and TAA program participants and comparison cases, we found that one large employer (we call it Firm A), which laid off workers, recalled them, and then laid them off again, altered our results in varying ways. We ultimately omitted any case from both the participant sample and the comparison group that received any earnings from Firm A.[15]

The estimate of the program's impact on subsequent earnings (employment) for a given gender and quarter of entry (the average effect of the treatment on the treated) is the difference in earnings (employment) for the participants in the training program and the weighted comparison sample for that quarter and gender. This approach produces 12 estimates for each gender and training program for each subsequent quarter of earnings (up to 16). In presenting effect estimates, we aggregate the 12 quarters of entry into three program years, PY2007, PY2008, and PY2009.

As noted above, in order for our estimates of impact to be unbiased, it is necessary that the matched comparison group not differ in unmeasured ways from program participants. We have controlled for earnings in each of the 12 quarters prior to program entry (among other control variables), so our methods assure that differences between the participant and comparison group earnings during this three-year period will not be substantial. To examine whether unmeasured factors influencing earnings differ for the treatment and the comparison group, we examined earnings in quarters 13-16 previous to program entry, that is, in the year prior to the quarters of pre-program earnings for which we control in our models. If participants and the comparison cases differ in terms of stable characteristics that influence earnings and are not fully captured by the measured variables in our specification, we would expect to see these reflected in earnings differences for quarters 13-16 prior to program entry. In effect, we

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[15] We did not apply this selection to the WIA Adult program, since very few cases receive earnings from Firm A.

undertake "impact estimation" on these prior earnings quarters as a kind of specification test of our model.

Table 2 provides statistics on the sample sizes used in these analyses, identifying the impacts of the various restrictions. Looking at the top panel, we see that omitting cases receiving severance pay had a substantial impact on the WIA DW sample, but proportionally, a much larger impact on the TAA sample. The losses in the TAA sample due to omission of those receiving payments from Firm A were also of importance. The second panel shows that for the two WIA programs, additional losses due to failure of matching with the comparison sample were very small, and losses in the TAA sample were modest. This indicates that our large comparison sample allowed us to find appropriate matches for all but a small number of comparison cases.

The next panel shows the effect of composition adjustment on the participants entering the programs in PY2008 and PY2009. Although relatively few cases were omitted among WIA Adult program participants, more than a quarter of DW participants and over a fifth of TAA participants were omitted. This indicates that during the recession many of the individuals observed in these latter programs were so different from earlier participants that no comparable case in the earlier period existed. This is not surprising, since during the recession, a large number of people were experiencing extended unemployment spells that would have been very unusual prior to the recession. The analysis addresses the question of what the training outcomes were for recession participants who were similar to earlier participants, so this omission is appropriate.

The bottom panel shows that the samples of those receiving training (and beginning training within three months of program entry) were appreciably smaller than the full set of participants, although the proportion successfully matched to comparison cases was comparable.

Results

WIA Adult program

Figures 6-8 present the earnings for male WIA Adult program participants following their entry into the program, by program year. Also presented on each graph are earnings for the matched (ES) comparison group, as well as the difference in earnings between those receiving training and the comparison group, i.e., the estimate of the program's effect, along with the 0.05 (two tailed) confidence intervals based on bootstrap standard errors.[16] As indicated above, we separately consider participants entering the program in PY2007, PY2008, and PY2009. The horizontal axis identifies the quarter relative to the quarter of entry.

For males entering in PY2007 (Figure 6), both participant and comparison cases had quarterly earnings in the range $2000-$3000 during the full four-year period, and we see little trend. Although participant earnings exceeded those of the comparison group in most of the quarters, the differences were quite modest, and the confidence intervals include zero for all but the first quarter. We conclude that there may be modest benefits for males entering training before the recession. Comparable statistics for PY2008 and PY2009, presented in Figures 7 and 8, yield rather different patterns. First, we see that in both years, there is substantial growth in earnings for both participants and comparison group members. We also see that comparison group members' earnings are generally higher than participants', implying negative program effects, although the effect estimates were smaller for quarters more distant from program entry.

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[16] These standard errors are based on bootstrap methods that resample the population of individuals. We use 20 replications.

Figure 9 presents the effect estimates for males for the three program years on one graph (disregard the adjusted estimates for now). The differences in estimated effects for the 1-2 years following entry are substantial, and these differences are easily statistically significant, implying that the cost of participation (in terms of foregone earnings) is greater for those entering during PY2008 and PY2009 than in PY2007. One is certainly unlikely to infer that the benefits of training were greater after the onset of the recession.

In considering the importance of the recession in explaining the returns to training, our discussion of the theory focused on forgone earnings and the possibility that the value of skills obtained in training would be influenced by the economic environment. In addition to such factors, the recession altered the kinds of people who selected into training programs. Table 1 shows that the gender, age and race composition of the WIA Adult participants shifted. In addition, Figure 3 shows that those entering the program at the height of the recession had greater prior earnings, confirming the view that an increasing number of previously successful individuals were drawn into training as a result of the recession. If the efficacy of training varied across individuals, such changes in participant composition could be partly responsible for any changes in training effectiveness.

Figure 9 provides impact estimates for PY2008 and PY2009 that adjust for differences between the population composition in these two periods and that in PY2007. The method estimates the training return in these latter two periods for individuals observed in those periods but who had the same characteristics as participants in PY2007. The characteristics of the later group differs both because a different set of individuals is selected and because changes in the economy altered the experiences of individuals. By FY2009, many more individuals had experienced extended unemployment, for example, than had those in FY2007.

Adjusting for participant composition reduces the lock-in costs appreciably for those entering after the onset of the recession. Estimates that do not control for composition imply that quarterly earnings were reduced for participants by $500-700 in the first six quarters, whereas the increment was only $200-$300 when composition was adjusted to correspond to that for PY2007.

Figure 10 provides estimates of program effects by period of entry for female participants in the WIA Adult program. Here we see that, for those entering in PY2007, there was a positive increment of about $100 in the first two quarters, although it was not statistically significant. The increment for those undertaking training increased to about $500 after quarter 5. In contrast, for those entering the program in PY2008 and PY2009, after the onset of the most serious phase of the recession, earnings for participants were appreciably below those in the comparison group. The *decrement* was over $500 in quarters 1 and 2 for those entering in PY2008, but impact estimates improved in subsequent quarters after entry, turning positive at quarter 7. A very similar pattern applies to females entering the program in PY2009.

The adjustment for the change in the composition of participants after onset of the recession, as in the case for males, improves the return. In this case, the period of negative net impacts extended only through the year after program entry. Overall, the effect estimates for participants when the adjustment is undertaken were between the unadjusted estimates and those for PY2007.

Our conclusions for men and women are very similar: We do not find evidence of greater training impacts during the recession. This is largely because the lock-in effects were somewhat greater during the recession, i.e., participants during the recession experienced greater forgone earnings. About half of this difference is due to the fact that participants drawn into training

during the recession were less likely to benefit from training than those participating during the prior period.

Figures 11 and 12 present results that limit the analysis to participants who actually obtained training. Lock-in effects were apparent for both men and women in all periods, reflecting the constraints imposed by training. In addition, insofar as individuals who go into training were those having a harder time obtaining employment, this difference may also reflect selection. Although the earnings effects increased much faster for women than for men, implying strong positive effects of training after the first year, both male and female estimates were similar in suggesting that training benefits were no higher—and probably lower—for those entering training during the recession than before.

We have also undertaken analyses where the dependent variable is employment, measured as having earnings during the quarter. The substantive conclusions are essentially unchanged.

WIA Dislocated Worker program

Figures 13 and 14 provide program effect estimates for participants in the WIA Dislocated Worker program who received UI benefit during the quarter they entered the program. Usually these are workers who were displaced from jobs. For men, looking across all three program years, we see that effect estimates for those in the WIA DW program were negative initially and improved over the follow-up period, although differences by entry year in level and growth were substantial. For those entering in PY2007, prior to the onset of the recession crisis, forgone earnings were nearly $1200 in the initial quarter, gradually approaching zero around the end of the third year, with program effects reaching a positive value over $300 at the end of four years, although they are not statistically significant. Those entering during the most severe stage of the

recession had greater forgone earnings in the first year, but the slope of the return was somewhat greater, with the final effect estimates approaching $800 four years after program entry. Finally, for those entering in PY2009, we see that forgone earnings were smaller than for other participants, and that positive, statistically significant effects occurred by quarter 6, reaching $800 by the end of the second year after entry.

Effect estimates for women entering the WIA DW program (Figure 14) were quite similar, although both forgone earnings and positive effect estimates are somewhat smaller. One difference is that effect estimates for PY2007 are positive and statistically significant in the last six quarters of our follow-up period, and the effect estimates are greater in PY2007 than PY2008, in contrast to the case for men. As is the case for men, estimates for the last entry period are more favorable to the program than in both prior periods.

When the composition of participants during the recession is adjusted to correspond with that for PY2007, the program effects decline for both men and women (see adjusted estimates in Figures 13 and 14). This implies that, in contrast to the case of the WIA Adult program, the kinds of participants entering the WIA DW program during the recession experienced greater benefits from training than pre-recession participants would have. If the same kinds of individuals had been participating in PY2008 as in PY2007, the returns from training would have been lower. Similarly, this adjustment causes a substantial decline in the effect estimate for PY2009, even though adjusted program effects remain above those of pre-recession participants.

Subject to the caveat that selection may bias results, Figures 15 and 16 show that when we focus on those receiving training, the program return were also more favorable for those entering after the onset of the recession. This was due both to smaller forgone earnings and greater benefits, causing the crossover point to occur in 1-2 years rather than 2-3 years for pre-

recession participants. Returns for training in PY2009 were appreciably greater than for either of the other years.

Perhaps the most striking consistency in the WIA DW program results is that participants during PY2009, those entering into an improving labor market, gained appreciably more from the program than pre-recession participants. They appear to have had smaller forgone earnings and larger returns than the other groups, and the greater returns are survive adjustments for change in composition. Comparisons between pre-recession participants and those entering during the height of the economic crisis were mixed. This supports the view that training at a time when job opportunities are limited may entail important risks if this requires job search in a stagnant or slow-growing economy.

Trade Adjustment Assistance program

The TAA program focuses on individuals who have faced layoffs resulting from international trade competition. As noted above, prior earnings were substantially higher for participants in this program than the other training programs, and participants were much more likely to have extended tenure with a single employer. They were also very likely to be receiving UI benefits, with the proportion receiving benefits during the quarter of entry in the range of 85-95 percent. The analyses here omit those were not receiving UI benefits.

Turning first to men, Figure 17 shows that the loss of earnings due to lock-in was appreciably greater for those entering the program prior to the recession than the other groups, with quarterly forgone earnings averaging over $2000 in the first year after entry. Losses for those entering during the depth of the recession (PY2008), were generally less than $1000 per quarter, and for those entering in FY2009, losses were in the range of $1400. By the end of the third year after entry, losses were no longer statistically significant for any of the groups, and

program effects were within a few hundred dollars of zero (and not statistically significant) for the remainder of the follow-up period. The pattern of these results is consistent with the view that forgone earnings are predicted by current opportunities, in that those participating during the worst period of the recession experienced the smallest forgone earnings.

Results for females (Figure 18) also imply that forgone earnings were greatest prior to the recession, with losses similar but slightly smaller than for men, consistent with lower average female earnings. However, in contrast to the case for men, forgone earnings are greater for those entering in the worst of the recession than for those entering in during the slow recovery.

Adjusting the composition of participants entering after the start of the recession to correspond with the composition of pre-recession participants alters results for both genders in relatively minor ways (we do not present the results in the figure). Perhaps the only notable difference is that, for women, those entering the program in PY2009 have somewhat greater estimated lock-in effects as well as greater returns when the composition is adjusted.

Finally, Figures 19 and 20 provide estimates for TAA participants who received training (including remedial, English as a second language, occupational, or on-the-job training). Although forgone earnings were substantially larger for this group, the basic pattern of effects corresponds closely with that reported in the prior figures for TAA. In the third and fourth years after program entry, program effect estimates were not significantly different from zero.

In earlier work (Heinrich et al., 2013), we found that training programs for laid-off workers sometimes had positive impacts on employment even when they did not increase mean earnings. In the case of the TAA, we found the patterns of estimates for effects on employment were very similar to estimated effects on earning reported above. In analyses parallel to those reported in Figures 17-18, none of the effect estimates were positive and statistically significant.

Overall, our results are consistent with a recent national study of the TAA (D'Amico and Schochet. 2012), which found substantial forgone earnings, no positive earnings effects, even in the fourth year of involvement in the program, and little or no effect on employment.

Specification tests

Table 3 provides estimates of the difference in earnings between the participants and the matched comparison group in quarters 13-16 prior to program entry, our specification test. As noted above, if these estimates are statistically significant, it suggests that participants differ from the matched comparison group in stable unmeasured ways that influence earnings, implying that our impact estimates may be biased.

For the WIA Adult program, of the estimated differences in earnings for the prior quarters 13-16, only two of 24 are statistically significant, supporting the view that the comparison group is comparable in terms of stable factors influencing labor market success. In contrast, seven of the analogous estimates for the WIA Dislocated Worker program are positive and statistically significant, and coefficients are overwhelmingly positive, suggesting that those entering the program—especially males entering in PY2008, the worst period of the recession— had positive stable attributes, relative to the matched comparison group, which could influence earnings. The bottom panel of Table 3 presents estimates for the TAA program, indicating four positive and statistically significant estimates of prior earnings.

These results suggest that impact estimates reported for the WIA DW program in PY200 and PY2008 may overstate the program's impact. However, if this is the case, it does not alter our basic conclusions. In particular, in most of the analyses, effect estimates for those participating in the last period (PY2009) are relatively greater than for the first period of the

recession, yet estimates of impact do not suggest that such participants are more positively selected.

In the case of the TAA program, it would appear that males entering in PY2009 are positively selected on stable, long-term measures affecting market success. However, what is notable about the comparison of participants by date of entry is the difference in opportunity costs, which are less likely to be tied to such long run measures. Perhaps most notable, by the fourth year after program entry, the estimates reported in Figures 17 and 18 show that none of the impact estimates is positive and statistically significant. If any of these groups is positively selected, our conclusions that the TAA program does not have a positive impact on outcomes is strengthened.

Conclusion

Our findings suggest that there are important differences between the three programs. In particular, results for the Adult program, which serves disadvantaged workers, do not suggest that the benefits of training are greater during a recession. In fact, forgone earnings are larger for participants during the recession, although most of this difference it due to changes in the composition of the participants drawn into the program.

In contrast, analyses of both the WIA DW and the TAA programs suggest the possibility that training during a recession may be more beneficial—or at least less detrimental—than at other times. This is of obvious importance, since these programs are designed to serve individuals who have lost their jobs, so the growth of participants in these programs during recessions is particularly great.

In the case of the WIA DW, the overall program effects are greatest among participants in PY2009, the final period of our study, who entered the program during the first year of the

economy's recovery, most returning to the labor market in the following year. It appears that a substantial part of the observed improvement, however, derives from changes in the composition of participants. Interestingly, these results suggest that the WIA DW workers program not only exhibits lock-in effects but also provides substantial quarterly earning benefits in the third and fourth years after program entry.

TAA program participants during the recession have smaller forgone earnings than those prior to the onset of the financial crisis, although ultimate earnings gains, in the fourth year after program entry, are essentially zero for all participants. In essence, participating in the program during the recession serves to reduce the harm associated with TAA participation, but there is little evidence of real benefits.

Our findings are at least broadly similar to those of Lechner and Wunsch (2009), who find smaller forgone earnings and larger benefits for unemployed workers entering training during a recession. They also support the arguments in Raaum et al. (2002), who emphasize that training program participants may suffer if they face limited job prospects when entering the labor market after training. Both men and women entering the WIA DW training programs in the second year of the recession (PY2009) appear to gain more from their training than those in the prior years, perhaps reflecting an improvement in economic conditions. Given the remarkably slow pace of hiring since the Great Recession officially ended, such benefits may have been even greater in a "normal" recession.

Undertaking training during a recessionary period when employment prospects are poorer and the opportunity costs of engaging in training are lower makes intuitive sense, and this is reflected in sharp increases in the number of individuals participating in training during the recent deep recession. However, as prior work has suggested, the timing of subsequent labor

market entry (in terms of the business cycle) may determine whether improving one's skills yields returns in the form of higher earnings. If the impacts of training are greater with program entry in a recessionary period, policymakers could encourage and support higher take up of training during economic downturns to mitigate negative effects (e.g., depreciation of skills) and pave a pathway to stronger future growth (with a better trained workforce). Indeed, it was the intent of the ARRA fund injection into WIA to help a greater number of individuals increase their skill levels and improve their chances of regaining employment.

Taking advantage of the steep decline in employment in Missouri in late 2008 and early 2009 and the availability of data over a broader period (2007-2010), we investigated the relationship of training program impacts to macroeconomic changes. Our findings suggest that although disadvantaged workers do not benefit by training during a recession, those workers facing layoffs may experience benefits. Of course, the experience during the recent recession may not be typical. National labor market data suggest that the economic recovery stuttered in early 2010 and that employment growth for the most part was weak thereafter (Heinrich and Houseman, 2013).

In addition, there is ongoing debate about the extent to which recent labor market challenges faced by workers and those looking for work are *cyclical vs. structural* (Autor, 2010; Farber, 2011). Considerable research has documented the diminished importance of the manufacturing sector, which has long been a source of high-wage jobs, and the roles of globalization and skill-biased technical change that have moderated employment and wage-growth for less skilled workers (Damme, 2011). If public employment and training programs are not helping individuals to acquire skills in demand in the labor market, the opportunity costs of training (even if lower) will be unlikely to be offset by higher future earnings. Holzer (2013: 6)

identifies "a growing complementarity over time between personal skills and firm wage premia" and suggests that U.S. competitiveness in the global labor market is being limited by its public policies that have been ineffectual in increasing human capital and preparing our workforce for available jobs. At the same time, the degree to which structural vs. cyclical factors are playing out in an individual's employment and earnings prospects could also vary from one local labor market to another, as recent research suggests that local labor markets may be subject to differential trade shocks that depend on initial patterns of industry specialization (Autor, Dorn and Hanson, 2013).

We also recognize that the generalizability of our results may be limited by our focus on a single state (Missouri) and an unusually severe recessionary period with a long, slow recovery. There is considerable variation in the implementation of training programs across U.S. states, and correspondingly, in regional and local labor market growth and rates of recovery following the onset of the recession. Ideally, we would like to replicate these analyses in different states and/or regions and in other time periods (pre-, during and post-recession) to assess to whether our finding that the impacts of undertaking training during a recession are not greater (than entering training at other times) holds more generally.

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Table 1. WIA Adult, WIA DW and TAA Programs: Caseload Characteristics by Quarter of Program Entry

	Quarter of Entry	N	Male	Age (Mean)	African American	Education (Mean)	Intensive Services (No Training)	Training
				Participant Characteristics			**Services Received**	
				WIA Adult Program				
Program Year 2007	2007:3	1412	36%	35.2	42%	12.6	27.0%	49.9%
	2007:4	939	42%	36.9	45%	12.5	32.0%	36.2%
	2008:1	887	40%	37.1	47%	12.7	33.4%	37.9%
	2008:2	710	40%	36.9	46%	12.7	43.4%	33.7%
Program Year 2008	2008:3	1356	37%	35.6	36%	12.7	34.8%	50.7%
	2008:4	1327	46%	37.6	42%	12.7	39.3%	46.2%
	2009:1	1368	48%	39.1	36%	12.8	37.8%	45.9%
	2009:2	1485	46%	38.7	32%	12.8	32.1%	56.5%
Program Year 2009	2009:3	2174	47%	37.0	30%	12.9	21.6%	69.0%
	2009:4	1777	50%	37.5	38%	12.7	31.3%	54.9%
	2010:1	1948	49%	38.5	44%	12.7	39.3%	46.1%
	2010:2	1496	52%	39.0	42%	12.7	31.8%	45.9%
				WIA Dislocated Worker Program				
Program Year 2007	2007:3	931	37%	44.1	16%	12.8	37.0%	49.6%
	2007:4	787	48%	44.3	19%	12.8	41.6%	38.3%
	2008:1	933	53%	43.8	30%	12.9	48.5%	37.5%
	2008:2	540	36%	43.9	29%	13.1	48.5%	38.5%
Program Year 2008	2008:3	1156	45%	43.4	26%	13.1	43.8%	45.8%
	2008:4	1469	58%	43.3	25%	13.1	43.8%	48.9%
	2009:1	1757	52%	43.5	22%	13.3	39.3%	52.8%
	2009:2	1928	51%	43.9	21%	13.4	29.6%	54.6%
Program Year 2009	2009:3	2458	56%	43.0	18%	13.2	23.4%	68.8%
	2009:4	1875	55%	43.9	26%	13.3	40.8%	49.2%
	2010:1	1545	55%	43.8	30%	13.4	36.3%	52.2%
	2010:2	1335	52%	44.2	24%	13.3	34.3%	51.1%
				Trade Adjustment Assistance Program			Remedial and ESL Classes	Occupational Training and OJT
Program Year 2007	2007:3	289	44%	46.6	4%	12.1	19.4%	55.0%
	2007:4	220	51%	47.6	7%	12.2	17.3%	44.6%
	2008:1	383	61%	45.1	20%	12.3	7.3%	54.3%
	2008:2	488	50%	46.6	16%	12.3	5.9%	55.9%
Program Year 2008	2008:3	293	53%	44.2	21%	12.4	4.8%	59.7%
	2008:4	968	69%	44.5	16%	12.4	3.6%	57.8%
	2009:1	1437	63%	46.0	16%	12.3	6.7%	41.1%
	2009:2	647	55%	45.5	12%	12.3	14.7%	46.5%
Program Year 2009	2009:3	675	63%	46.8	9%	12.3	10.1%	37.6%
	2009:4	472	61%	46.5	15%	12.3	5.7%	38.1%
	2010:1	220	46%	47.4	17%	12.3	8.6%	41.4%
	2010:2	238	43%	48.7	15%	12.5	3.4%	45.0%

Table 2. Analysis Sample Sizes: Omissions and Losses Due to Matching

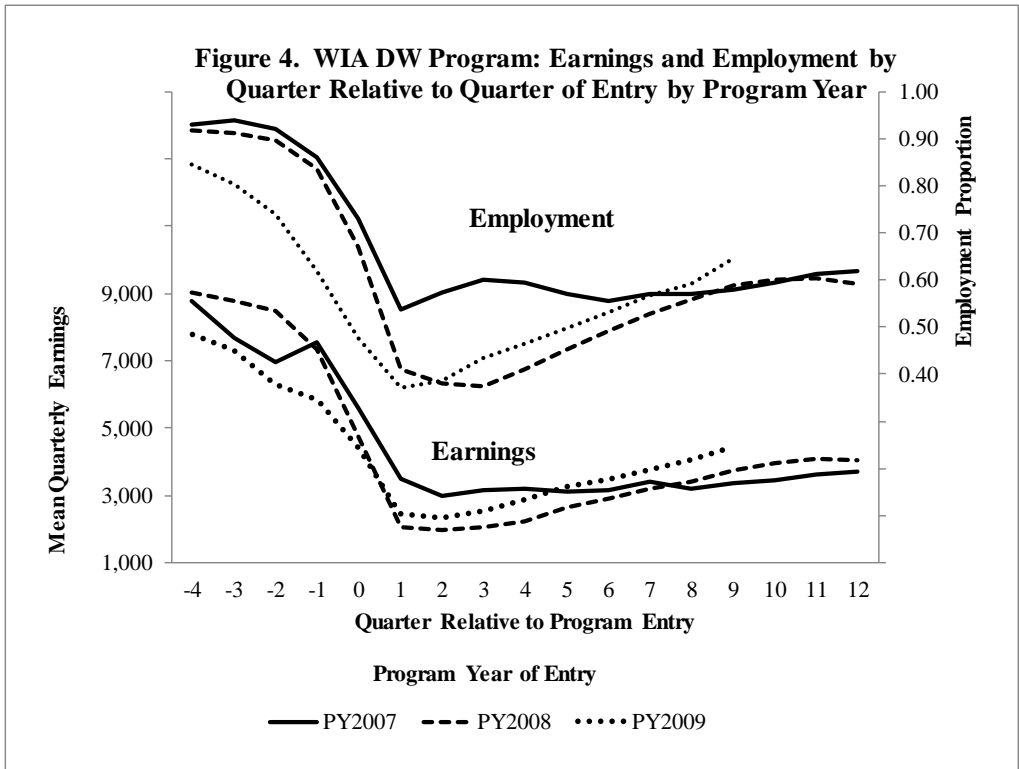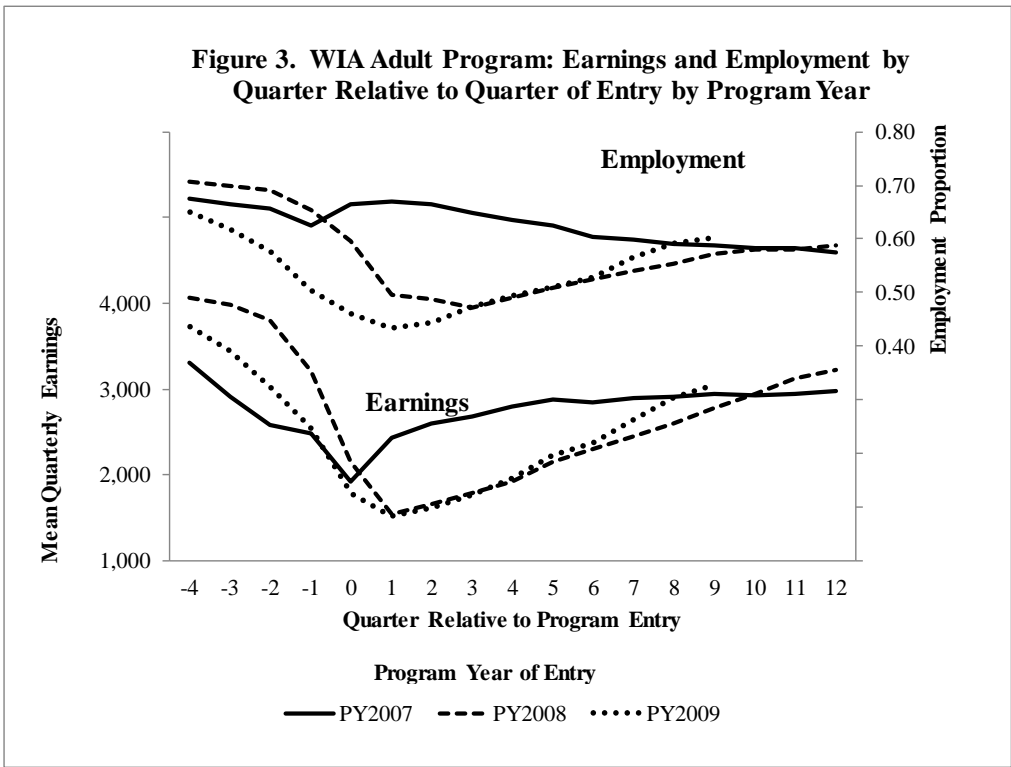| Main Analysis	WIA Adults		WIA Dislocated Workers		TAA	
Cases in original file	16,879		16,714		6,330	
Cases omitted because of missing data on gender		1		0		0
Cases omitted because age was under 18 or 70 or older at entry		174		42		24
Cases omitted because of incomplete earnings information*		765		287		12
Cases omitted because severance pay was received		437		1,530		1,515
Cases omitted due to earnings received from Firm A				839		1,300
Cases omitted because did not receive UI benefit				2,520		242
Case available for matching/total percent omitted	15,502	8%	11,496	31%	3,237	49%
Matching: Effects of Participation on Participants						
Cases that could not be matched with comparison		95		590		410
Cases matched/percent not matched	15,407	1%	10,906	5%	2,827	13%
Matching: Effects of Participation, Composition Adjusted to PY2007						
PY2008, PY2009 cases available for matching	11,826		9,254		2,440	
Cases that could not be matched with PY2007		577		2,804		468
Cases that could not be matched with comparison		71		20		110
Cases matched/total percent omitted	11,178	5%	6,430	31%	1,862	24%
Matching: Effect on Participants Engaged in Training						
Training cases available for matching	5,882		4,192		1,341	
Cases that could not be matched with comparison		55		213		352
Cases matched/percent not matched	5,827	1%	3,979	5%	989	26%

*Due to our data extraction procedures, any individual without earnings in the period 2007-2013 was dropped from the analysis.

Table 3. Average Earnings Difference Between Participants and Matched Comparison Group, Year Prior to Earnings Match
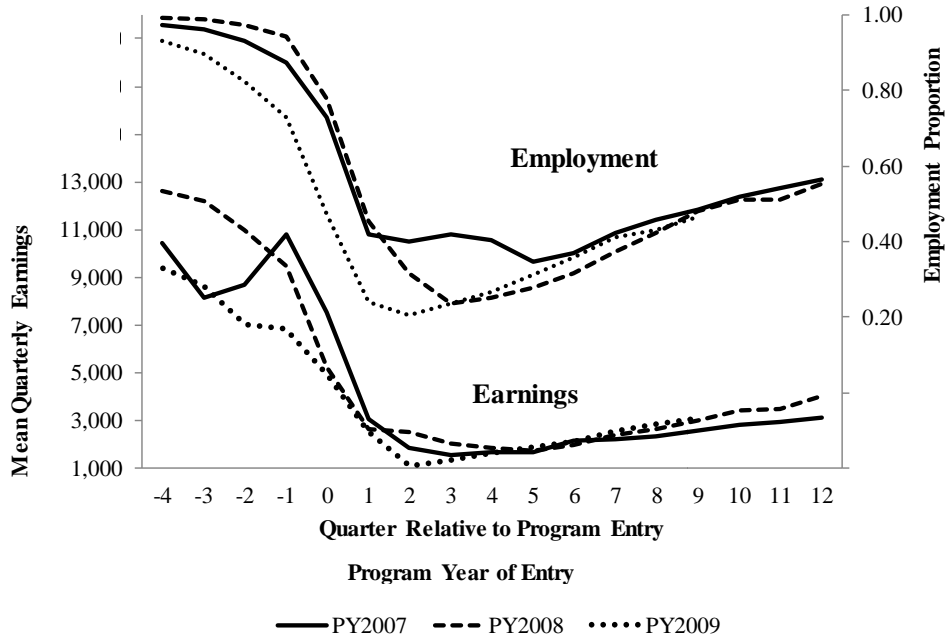
	Men			Women		
WIA Adult	PY2007	PY2008	PY2009	PY2007	PY2008	PY2009
Prior Quarter 16	47	81	-139 *	-46	-41	49
Prior Quarter 15	79	33	-84	-24	-51	55
Prior Quarter 14	109	-22	-123 *	-36	-48	77
Prior Quarter 13	-19	25	-70	-34	14	55
WIA DW						
Prior Quarter 16	177	163 *	53	108	183 *	151 *
Prior Quarter 15	159	257 *	192 *	42	113	121
Prior Quarter 14	79	110	-33	-57	66	46
Prior Quarter 13	34	187 *	-15	140 *	54	64
TAA						
Prior Quarter 16	-8	106	292	-259	-54	70
Prior Quarter 15	146	246	407 *	-414	22	412
Prior Quarter 14	2	383 *	307 *	-518	-33	160
Prior Quarter 13	93	295	291 *	-215	101	133

*Statistically significant at the 0.05 level.

Figure 1. Missouri Statewide Monthly Unemployment Rate: Seasonally Adjusted

Figure 2. Length of Time in Program by Quarter of Entry

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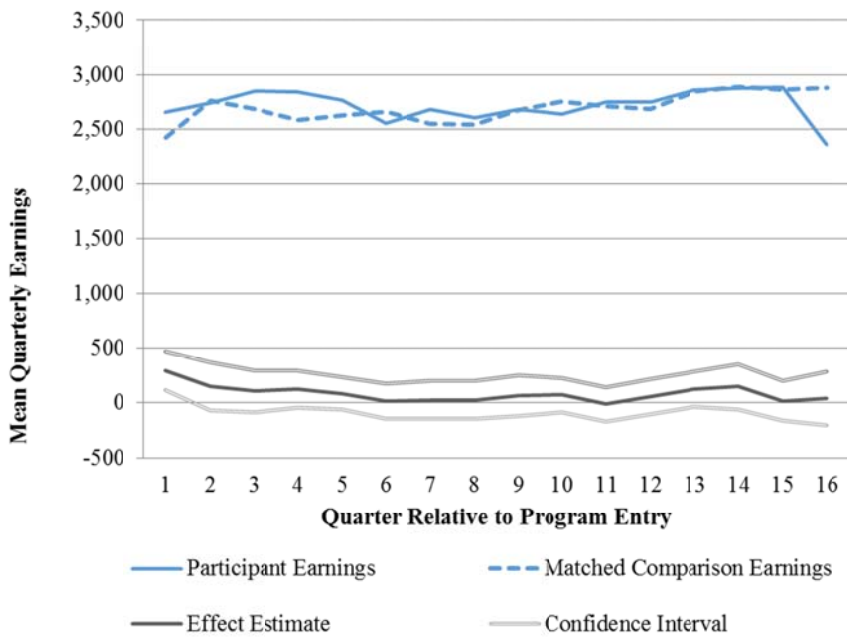
Figure 3. WIA Adult Program: Earnings and Employment by Quarter Relative to Quarter of Entry by Program Year

Figure 4. WIA DW Program: Earnings and Employment by Quarter Relative to Quarter of Entry by Program Year
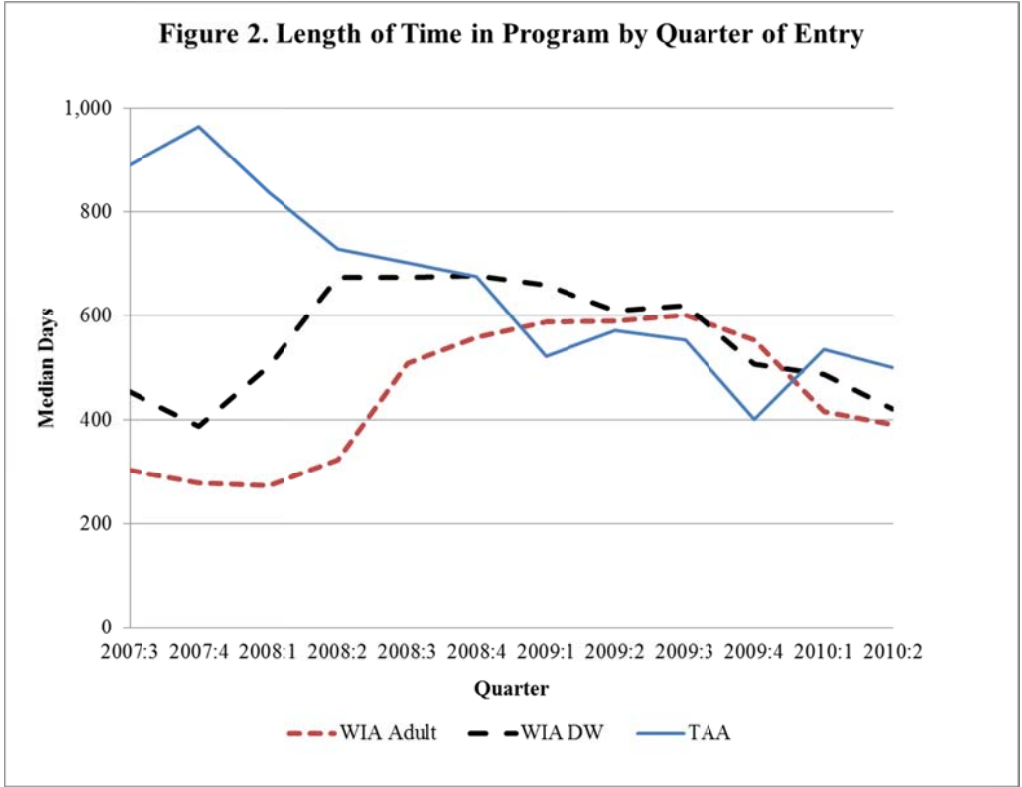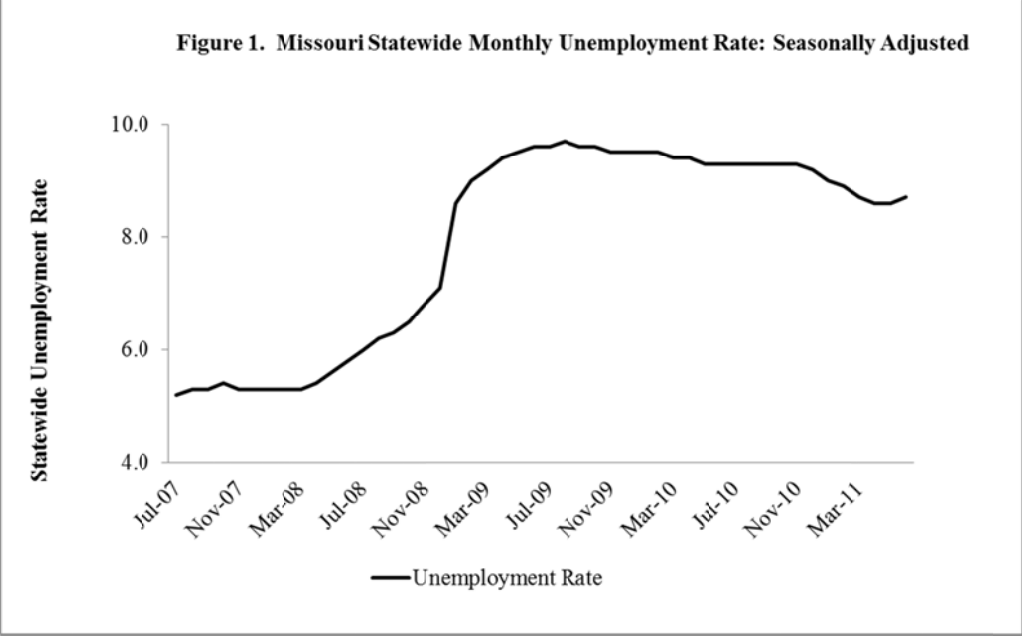
Figure 5. TAA Program: Earnings and Employment by Quarter Relative to Quarter of Entry by Program Year

Employment

Earnings

Mean Quarterly Earnings: 13,000 · 11,000 · 9,000 · 7,000 · 5,000 · 3,000 · 1,000

Employment Proportion: 1.00 · 0.80 · 0.60 · 0.40 · 0.20

Quarter Relative to Program Entry: -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12

Program Year of Entry

——— PY2007   - - - PY2008   ·····PY2009

Figure 6. WIA Adult Males, Participant and ES Comparison Group Earnings: Entrants PY2007

Mean Quarterly Earnings: 3,500 · 3,000 · 2,500 · 2,000 · 1,500 · 1,000 · 500 · 0 · -500

Quarter Relative to Program Entry: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

——— Participant Earnings   - - - Matched Comparison Earnings

——— Effect Estimate   ——— Confidence Interval

46

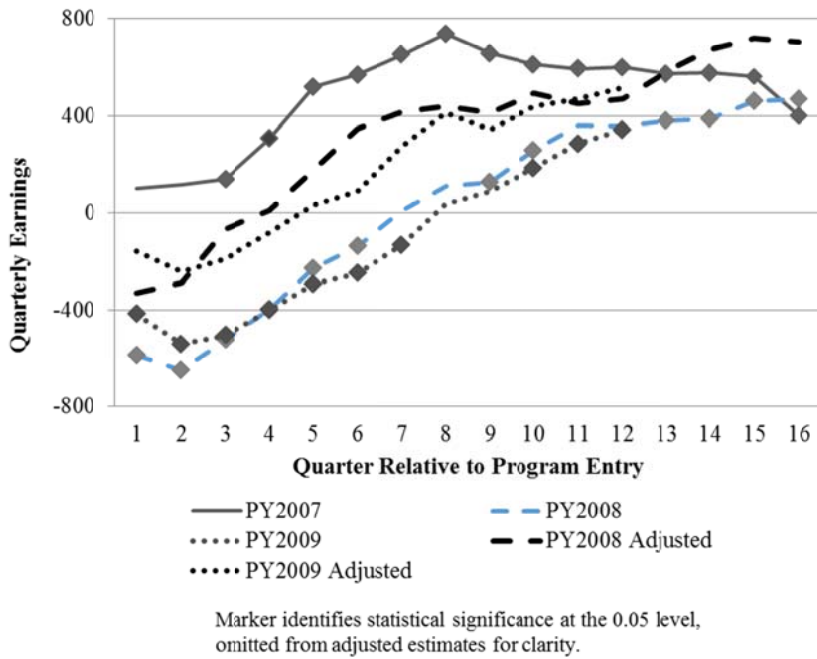Figure 7. WIA Adult Males, Participant and ES Comparison Group Earnings: Entrants PY2008
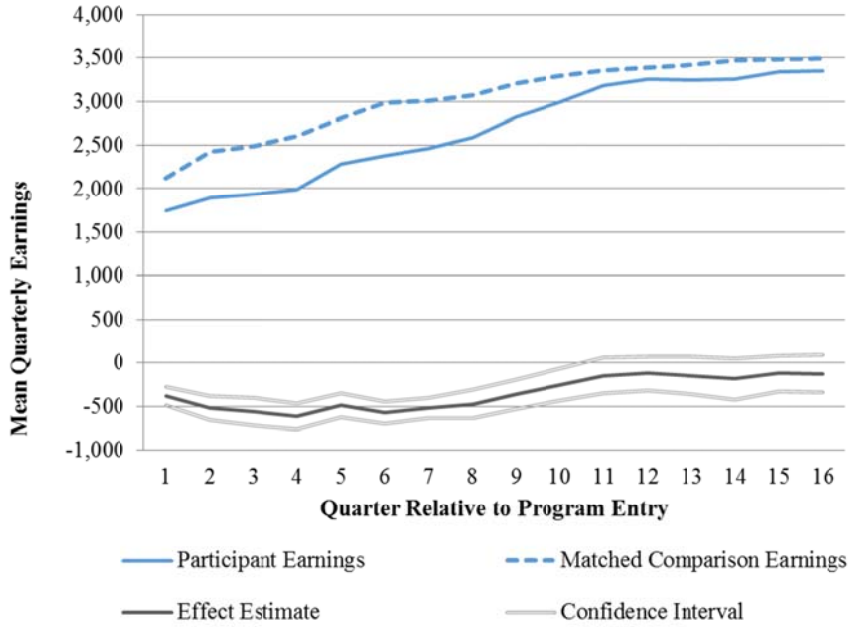
Figure 8. WIA Adult Males, Participant and ES Comparison Group Earnings: Entrants PY2009

47
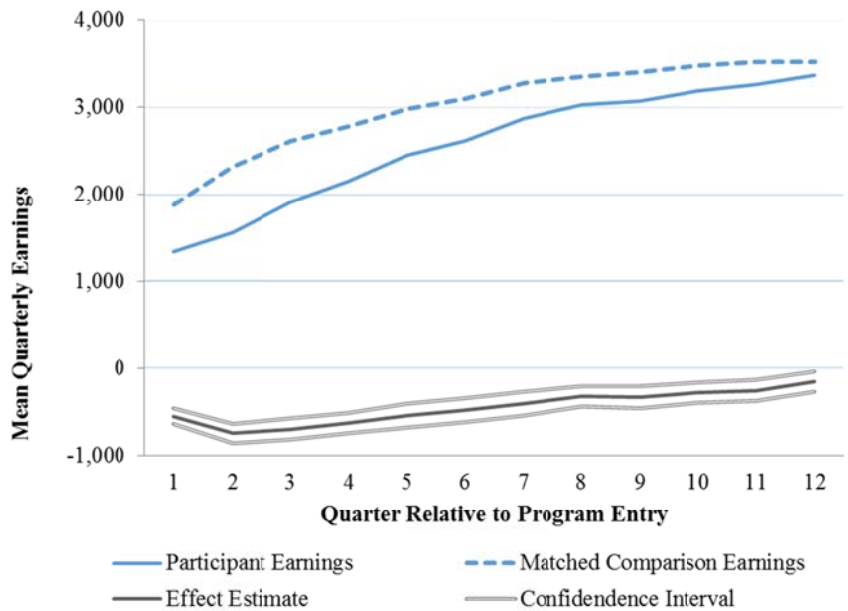
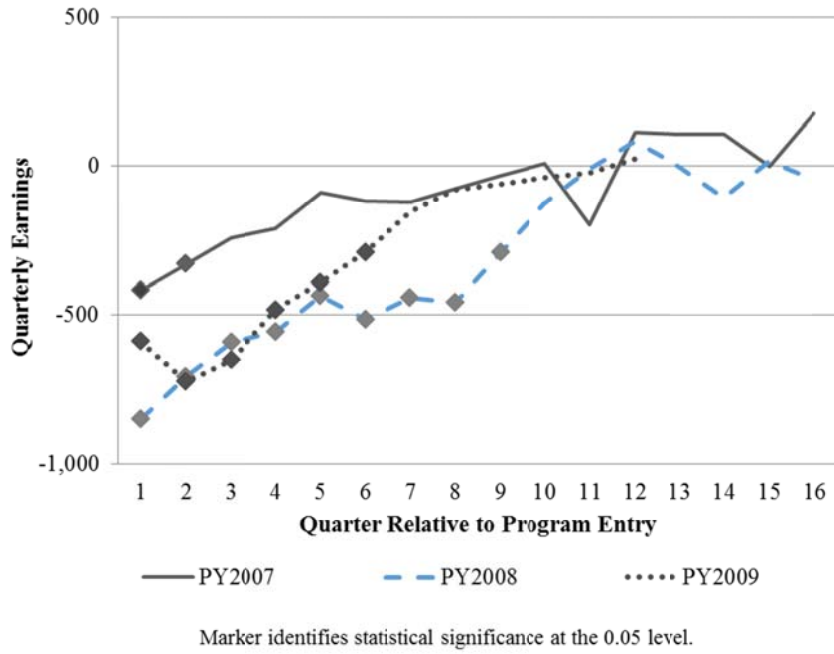**Figure 9. WIA Adult Males: Program Effects on Earnings**

Marker identifies statistical significance at the 0.05 level,
omitted from adjusted estimates for clarity.
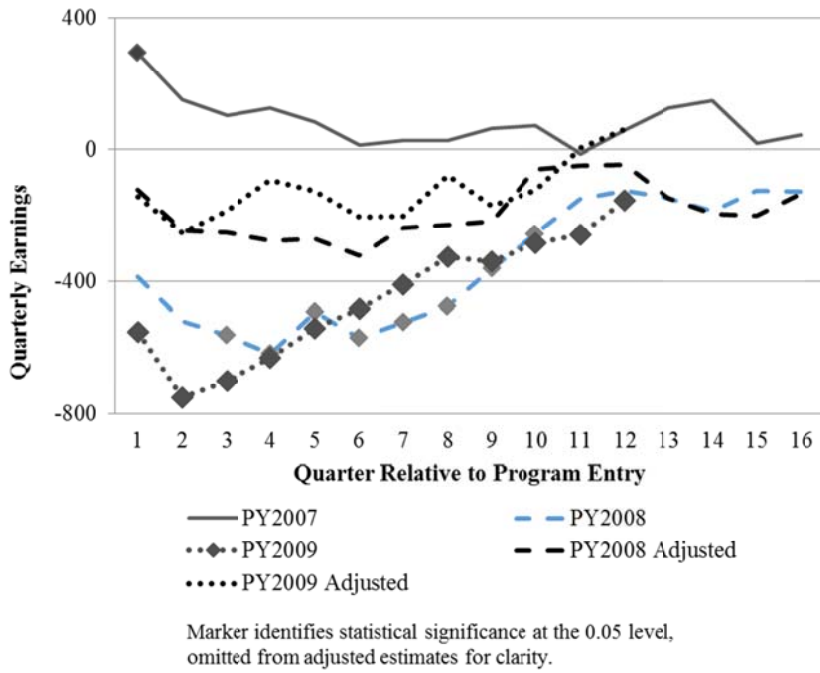
Figure 10. WIA Adult Females: Program Effects on Earnings

Marker identifies statistical significance at the 0.05 level,
omitted from adjusted estimates for clarity.

Figure 11. WIA Adult Males: Training Effects on Earnings

Marker identifies statistical significance at the 0.05 level.

Figure 12. WIA Adult Females: Training Effects on Earnings
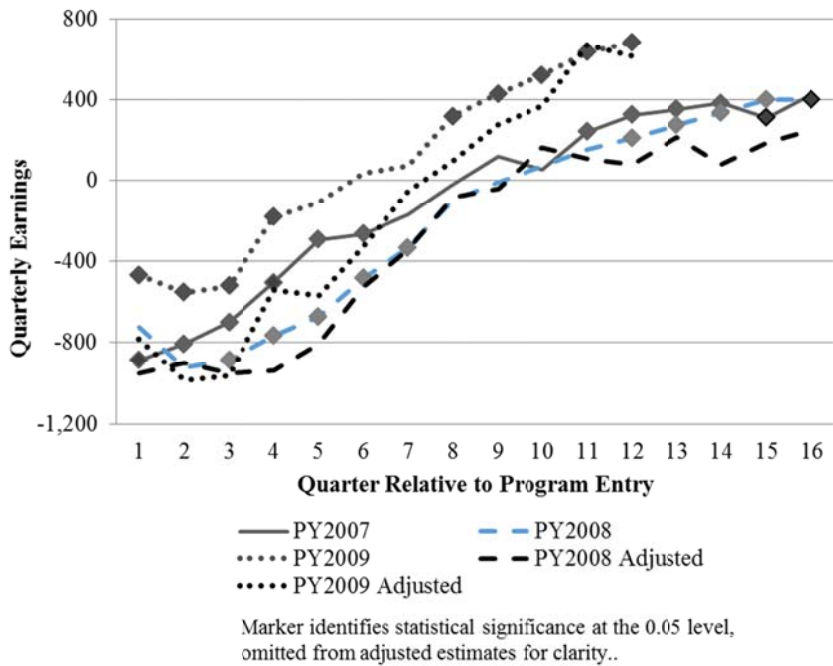
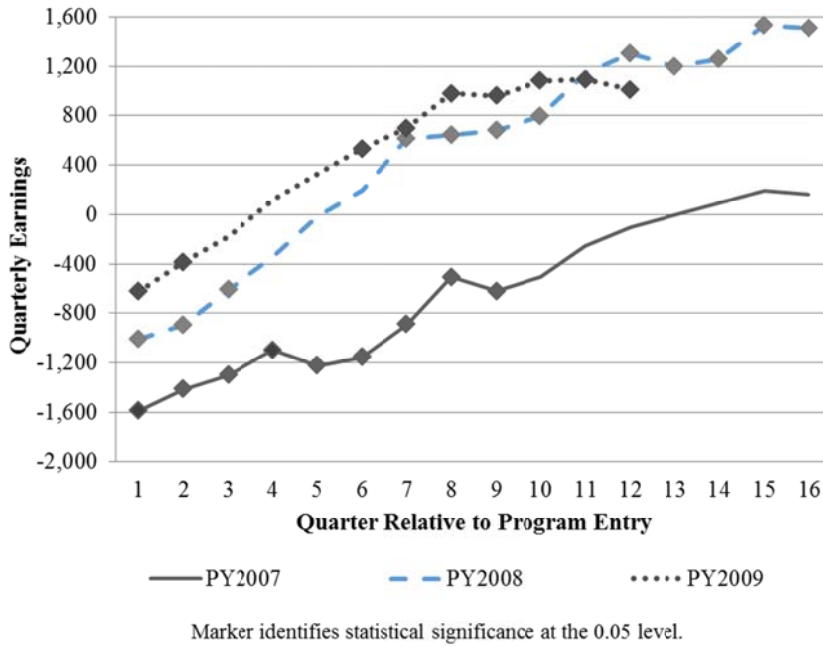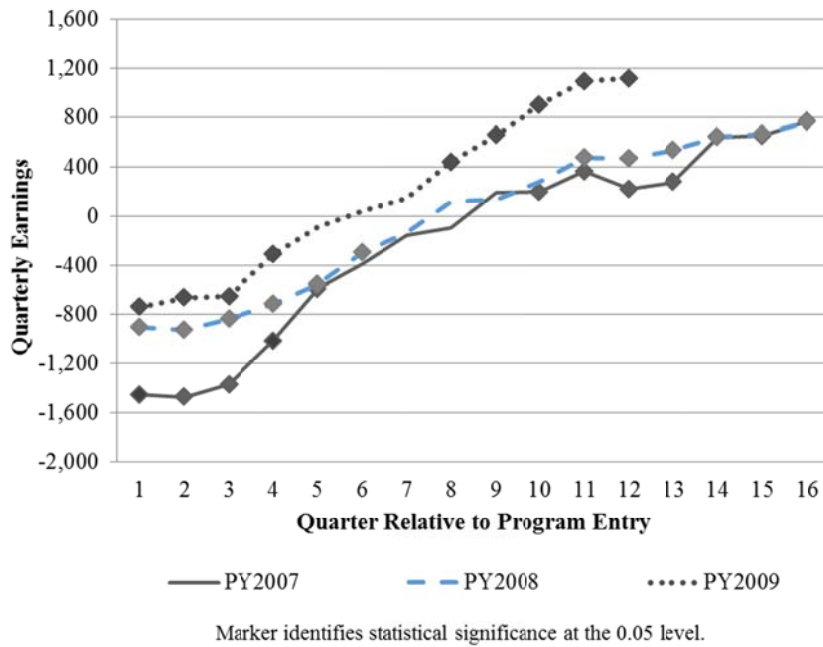Marker identifies statistical significance at the 0.05 level.
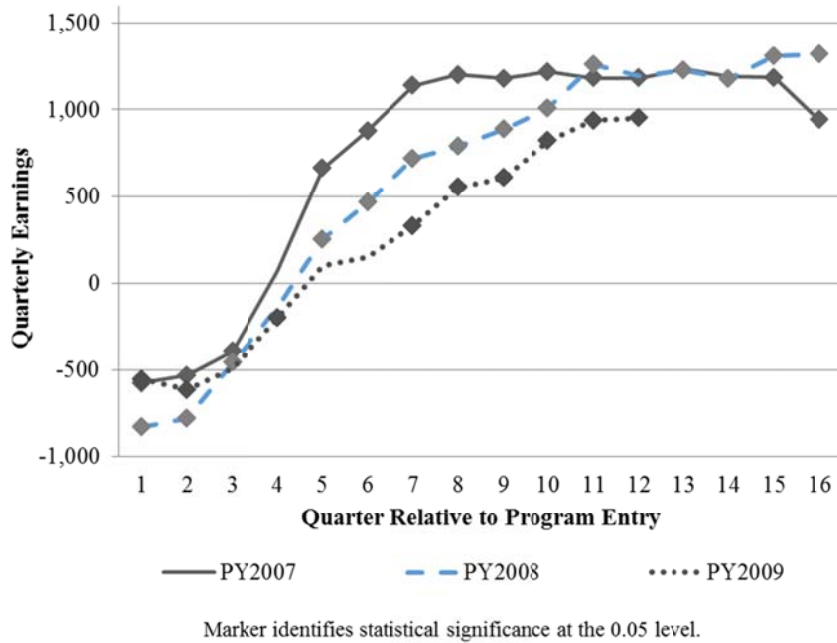
Figure 13. WIA DW Males: Program Effects on Earnings
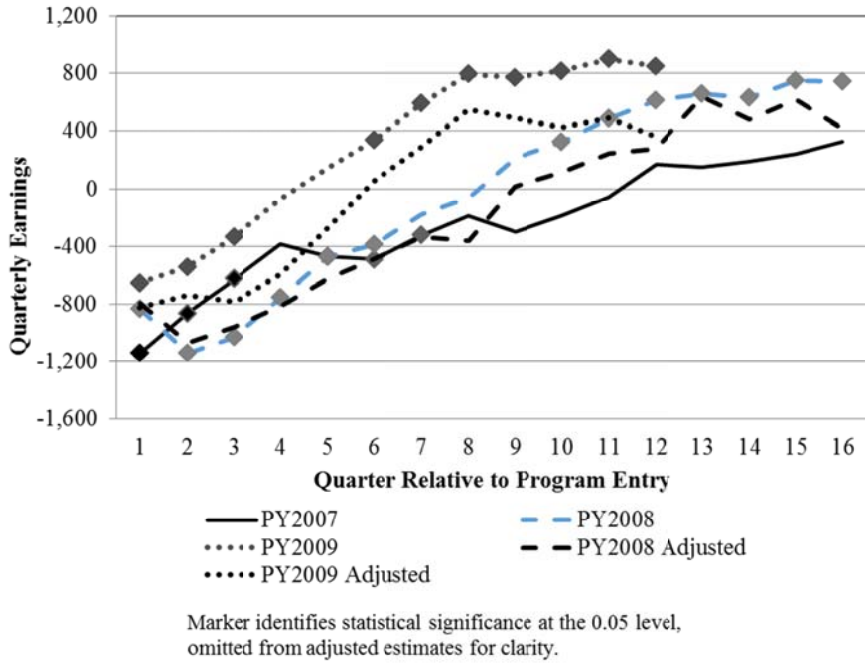
Figure 14. WIA DW Females: Program Effects on Earnings

50
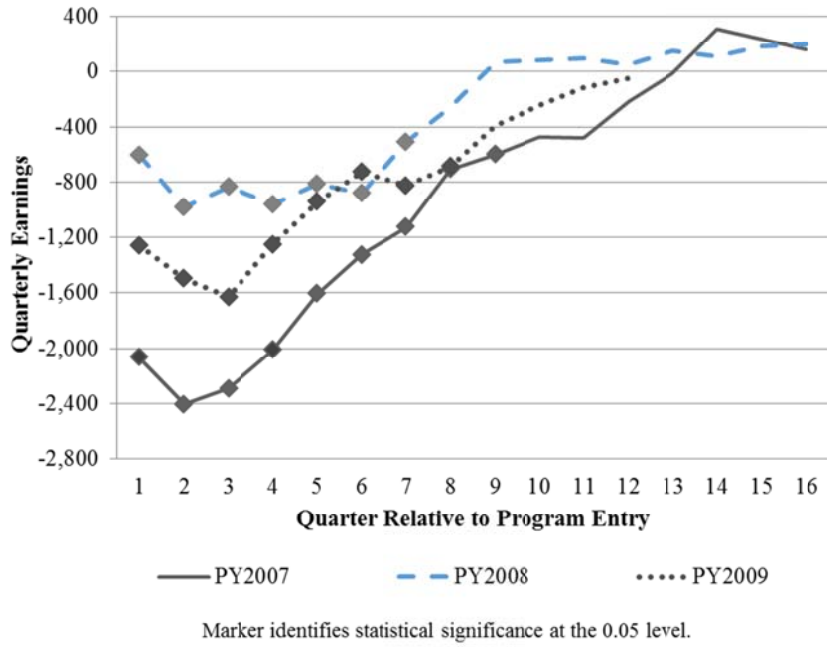
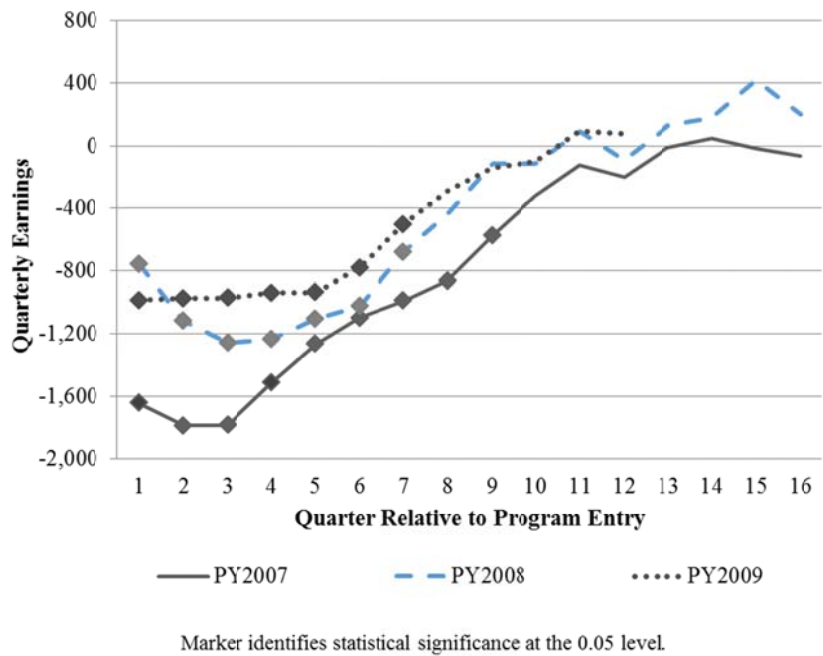**Figure 15. WIA DW Males: Training Effects on Earnings**

Marker identifies statistical significance at the 0.05 level.

Figure 16. WIA DW Females: Training Effects on Earnings

Marker identifies statistical significance at the 0.05 level.

51

Figure 17. TAA Males: Program Effects on Earnings

Marker identifies statistical significance at the 0.05 level.

Figure 18. TAA Females: Program Effects on Earnings

Marker identifies statistical significance at the 0.05 level.

52

Figure 19. TAA Males: Training Effects on Earnings

Quarterly Earnings

Quarter Relative to Program Entry

——— PY2007   — —PY2008   ·····PY2009

Marker identifies statistical significance at the 0.05 level.
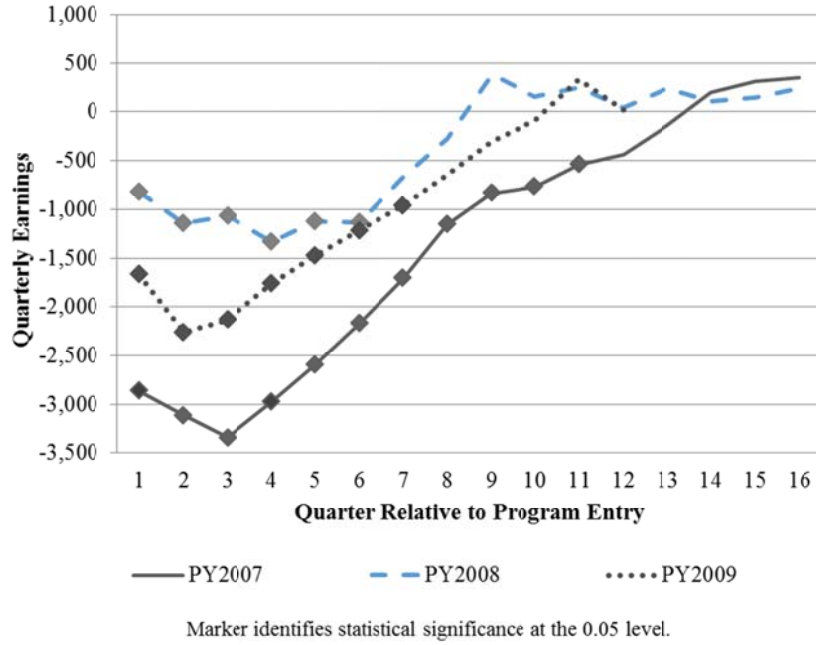
Figure 20. TAA Females: Training Effects on Earnings

Quarterly Earnings

Quarter Relative to Program Entry

——— PY2007   — —PY2008   ·····PY2009

Marker identifies statistical significance at the 0.05 level.

53