

# Evaluating the Earnings Impacts of the Massachusetts Workforce Development System

Steven Raphael

Goldman School of Public Policy  
University of California, Berkeley

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Michael A. Stoll

School of Public Policy and Social Research  
Center for the Study of Urban Poverty  
University of California, Los Angeles



## Principal methodological challenge faced by non-experimental training evaluations:

Defining an adequate group of non-participants against which the outcomes of program participants can be compared.

**Gold Standard:** Control group of individuals that have been randomized out of the program

Benefits of a randomized experiment

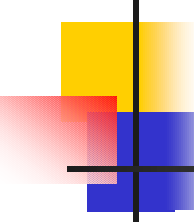
- The treatment and control groups are comparable along observable and unobservable dimensions
- Data are collected in a uniform manner for treatment and control group subjects
- Both groups are exposed to similar economic environments



## Assessing Program Effects in the Absence of Experimental Data

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- **External comparison groups** – drawn from non-participating eligible individuals or otherwise comparable individuals having nothing to do with the program under study
- **Internal Comparison groups** – drawn from non-participants in a program's applicant pool or some subset thereof.



## **Academic Research Finds that Internal Control Groups Consisting of Program No-Shows Often Provide Reasonable Approximations to Experimental Estimates (Heckman et. al. 1997, Bell et. al. 1996)**

### **Benefits of Using Program No-Shows as a Quasi-Experimental Comparison Group**

- Well matched, in terms of geography and observable characteristics, to program participants
- Experience similar pre-program employment and earnings dynamics as program participants
- Data are collected in a similar manner



## What we do:

We estimate the earnings and employment effects of receiving JTPA training services in Massachusetts during the late 1990s using non-experimental methods

- We use individuals that complete an objective assessment of their eligibility, are offered services, yet do not participate as the principal comparison group.
- We estimate before-after changes in the earnings differentials between program participants and no-shows.
- We refine our estimates using probabilistic matching techniques and information on individual characteristics.



## Treatment and comparison groups and the dimensions of our panel data set

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- **Program participants:** over seven thousand people who participate in a Massachusetts workforce development program in the late 1990s. We refer to this group as “**program exits**”.
- **The Comparison group:** over five thousand individuals who were offered training during the same time period yet did not participate. We refer to this group as the “**objective-assessment-only (OAO)**” group.

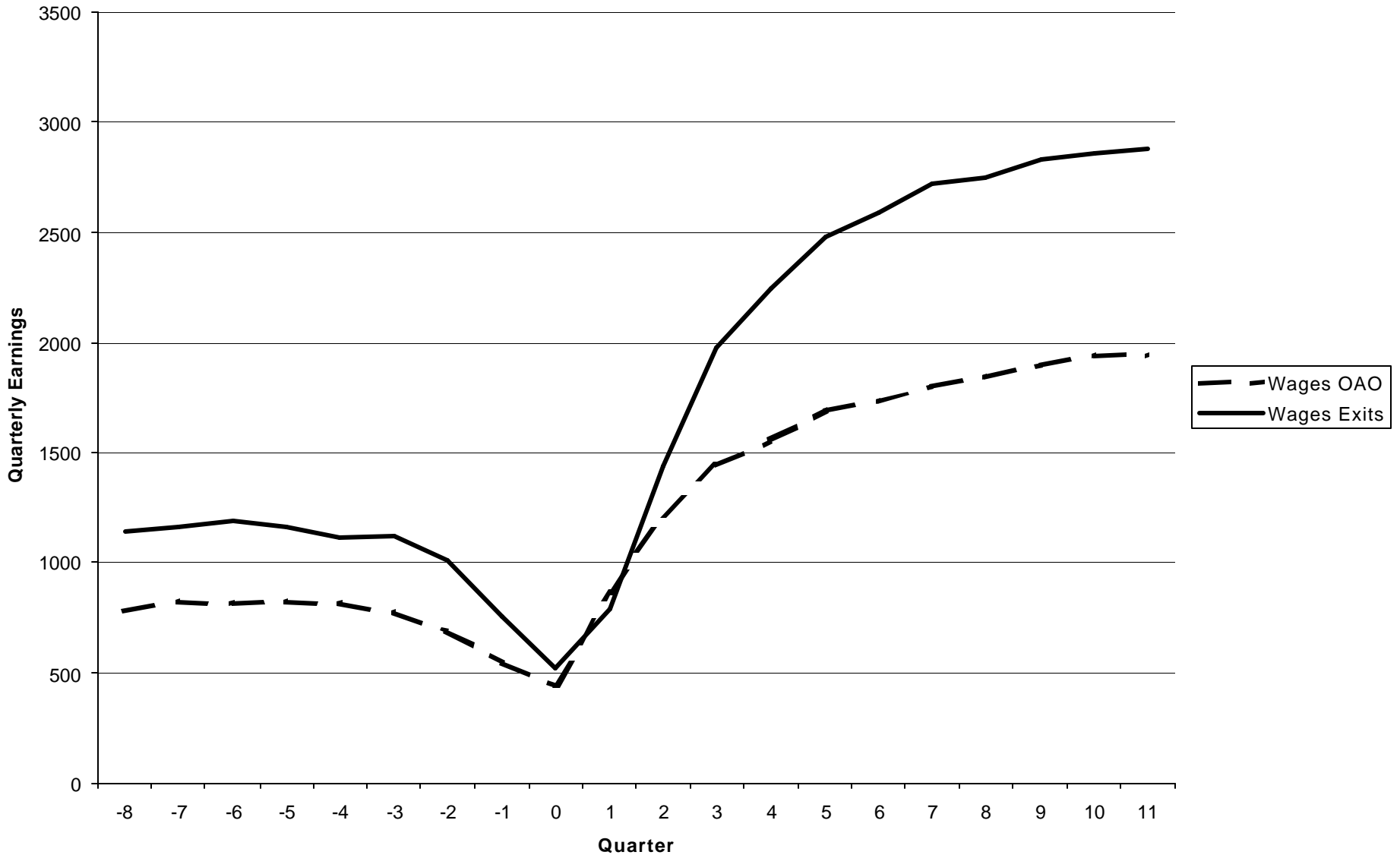


## Aligning the earnings paths of treatment and comparison group members

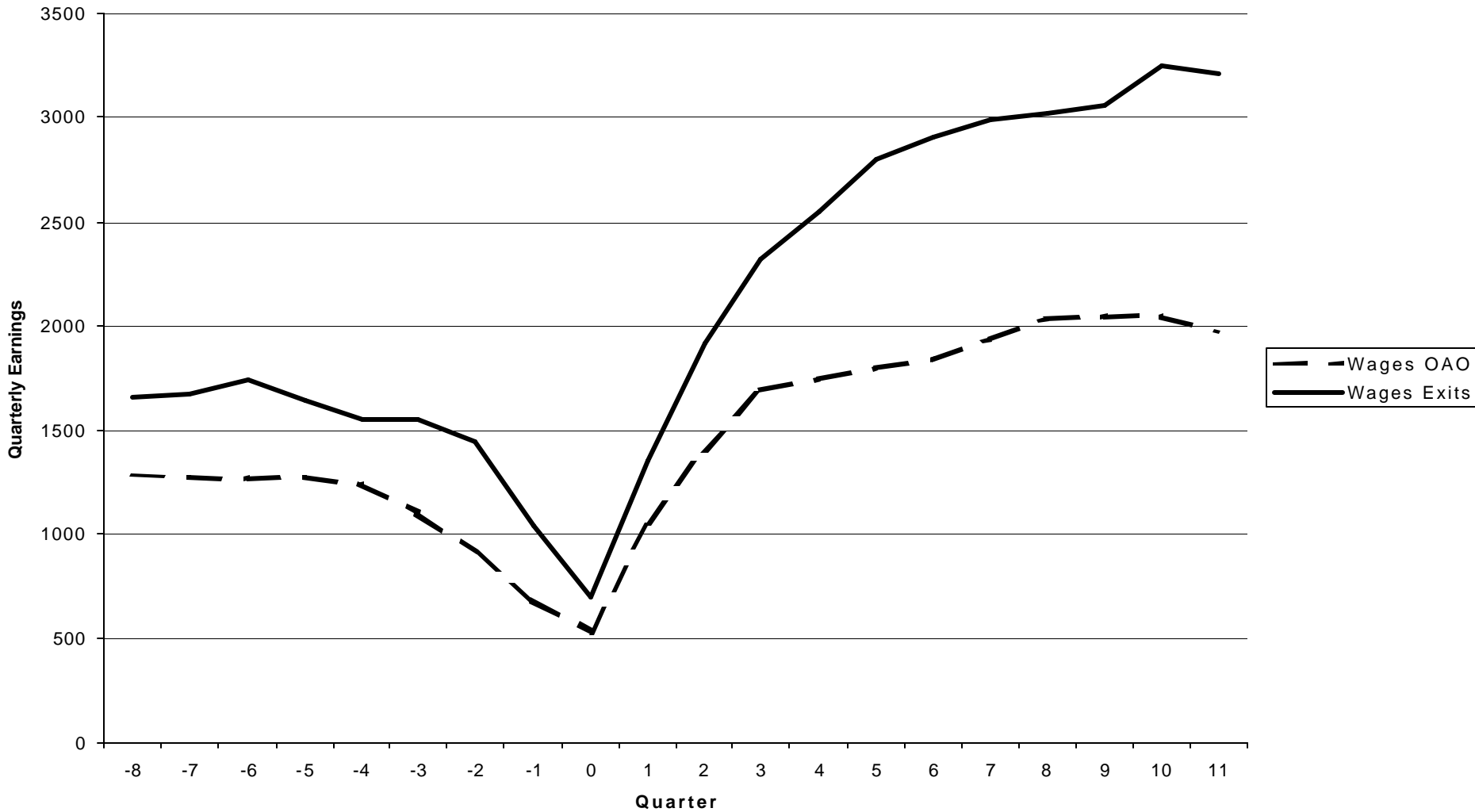
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- For program exits, the date of objective assessment corresponds to the begin date of training.
- For the OAO group, there is no begin date for training yet a date for an objective assessment.
- Thus, the date of objective assessment provides a natural point in time along which to align our treatment and comparison groups.

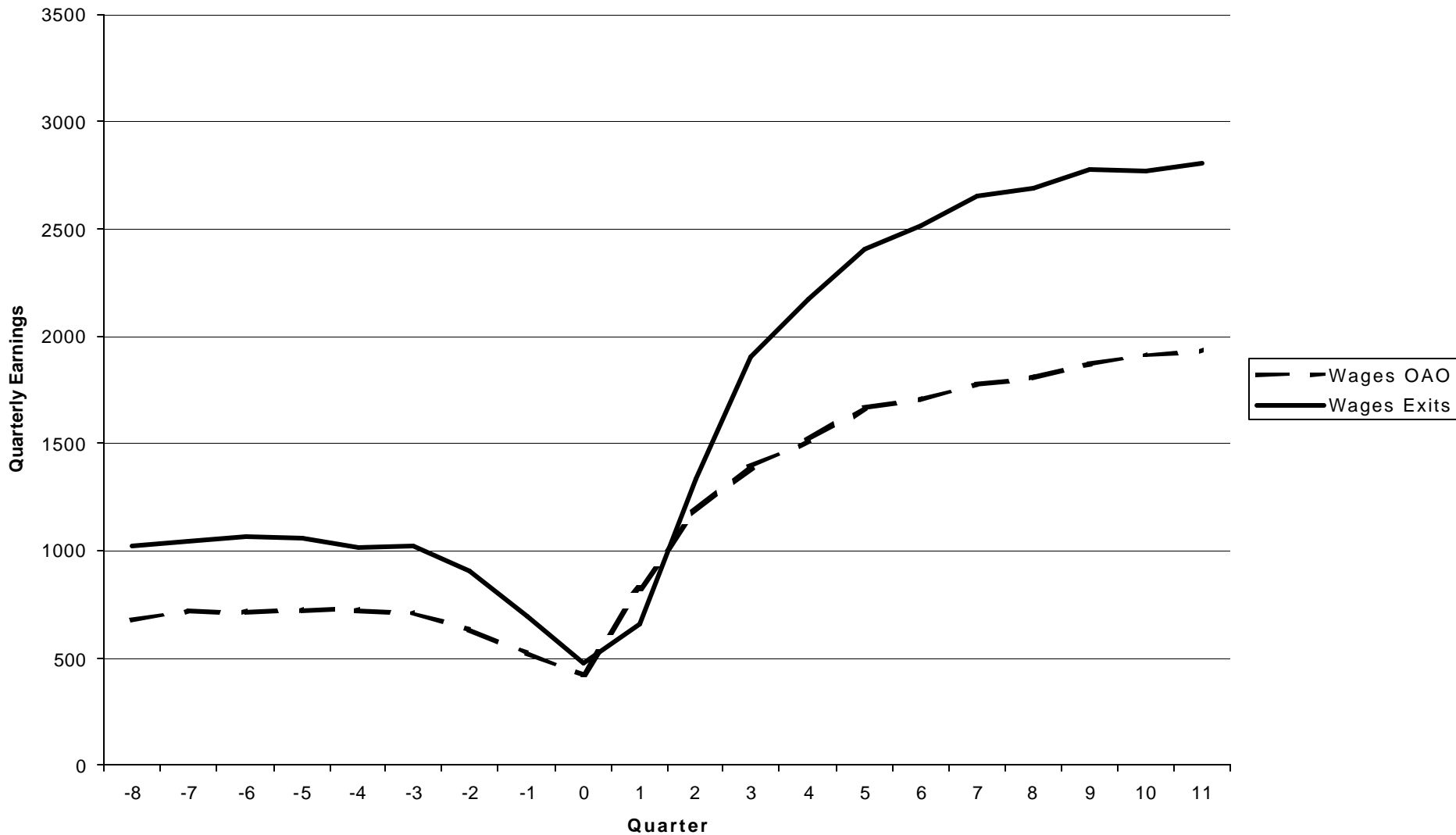
**Figure 1: Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, All Observations**



**Figure 2: Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Men**



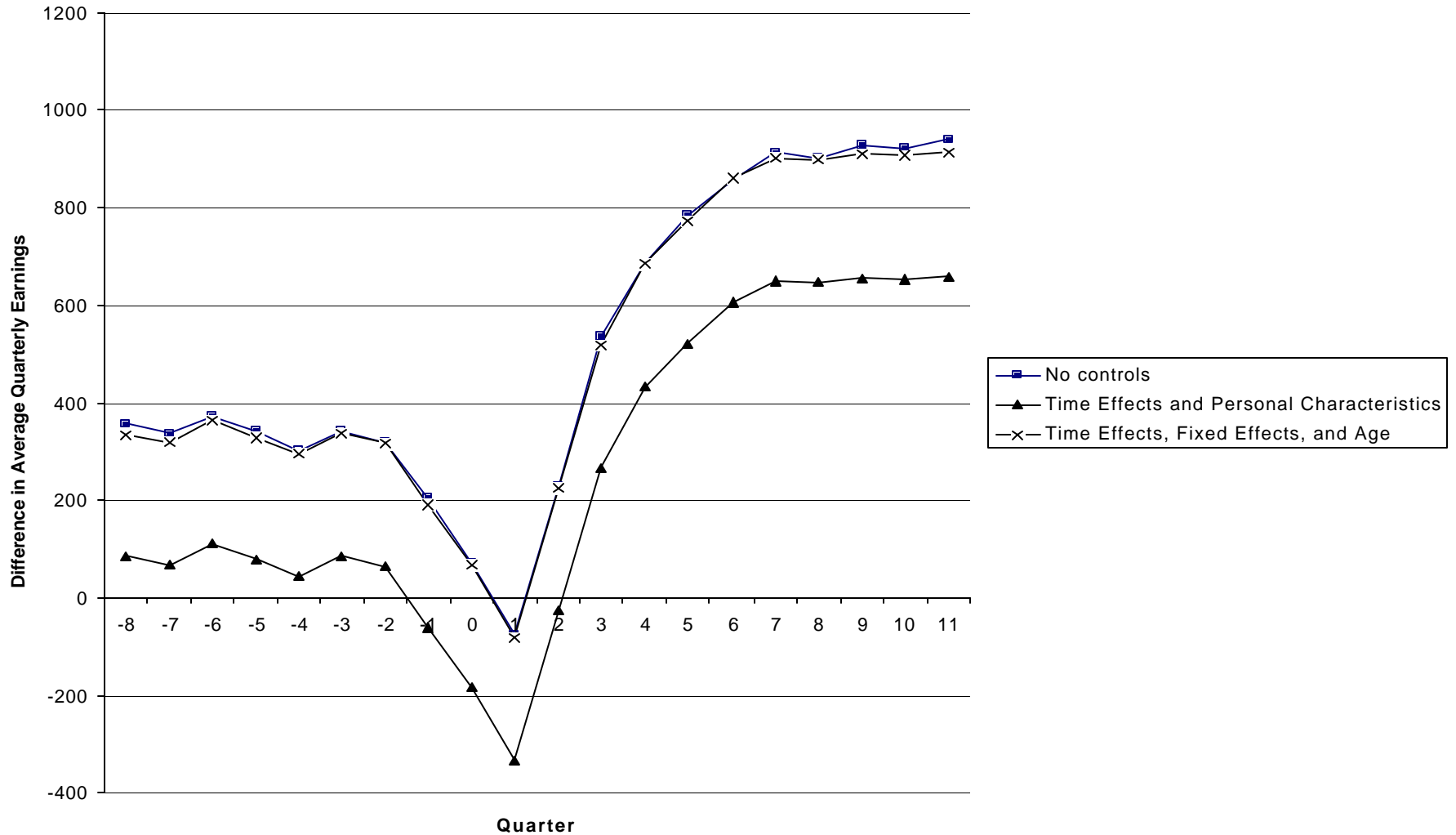
**Figure 3: Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Women**



**Table 3**  
**Average Annual Earnings For Exits and OAO Samples by Year and Unadjusted Estimates of the Training Earnings Effects, All Observations and by Gender**

	Pre-Intervention Years		Post-Intervention Years			Differences in Earnings Relative to Year One		
	Year One	Year Two	Year Three	Year Four	Year Five	Three - One	Four - One	Five - One
<b>Entire Sample</b>								
Exits	4,654 (88)	4,000 (89)	4,728 (89)	10,027 (89)	11,321 (88)	74 (69)	5,372 (69)	6,666 (69)
OAO	3,243 (104)	2,833 (104)	3,967 (104)	6,782 (104)	7,627 (104)	723 (81)	3,539 (81)	4,384 (82)
<b>Diff-in-Diff</b>	-	-	-	-	-	-650 (107)	1,833 (107)	2,282 (107)
<b>Men</b>								
Exits	6,708 (252)	5,590 (252)	6,294 (252)	11,229 (252)	12,527 (253)	-413 (194)	4,520 (194)	5,818 (194)
OAO	5,109 (306)	3,942 (306)	4,683 (307)	7,322 (306)	8,099 (306)	-425 (236)	2,212 (236)	2,989 (236)
<b>Diff-in-Diff</b>	-	-	-	-	-	12 (306)	2,307 (306)	2,829 (306)
<b>Women</b>								
Exits	4,181 (91)	3,634 (91)	4,367 (91)	9,749 (91)	11,043 (92)	185 (72)	5,568 (73)	6,861 (73)
OAO	2,843 (107)	2,595 (107)	3,813 (107)	6,667 (107)	7,526 (107)	970 (85)	3,823 (85)	4,682 (85)
<b>Diff-in-Diff</b>	-	-	-	-	-	-784 (111)	1,744 (111)	2,178 (111)

# Difference in Average Quarterly Earnings Between Program Exits and OAO Groups, No Controls, the Random Effects Model, and Fixed Effects Model, All Observations



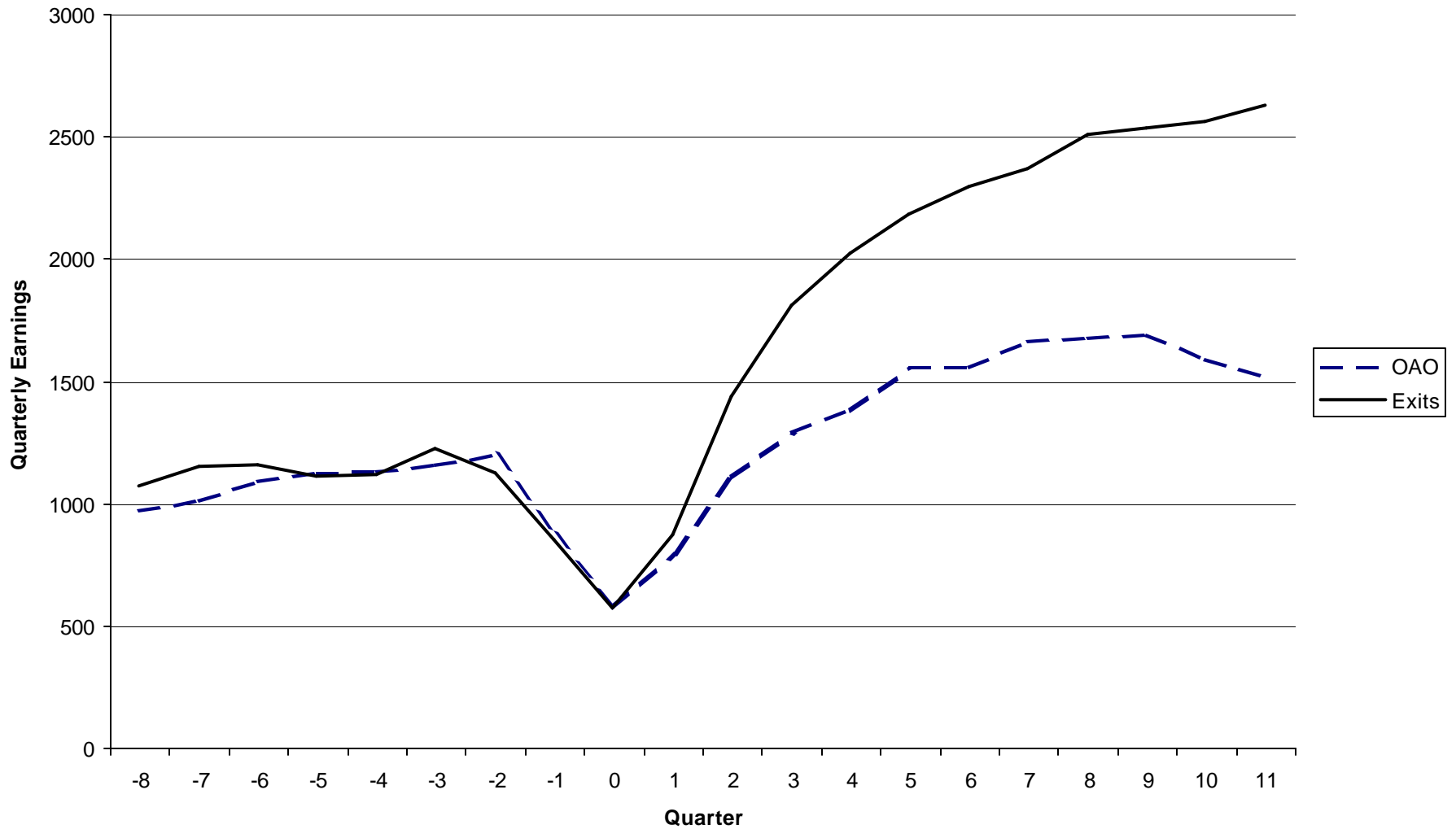


# Reproducing Results for a Single Service Delivery Area

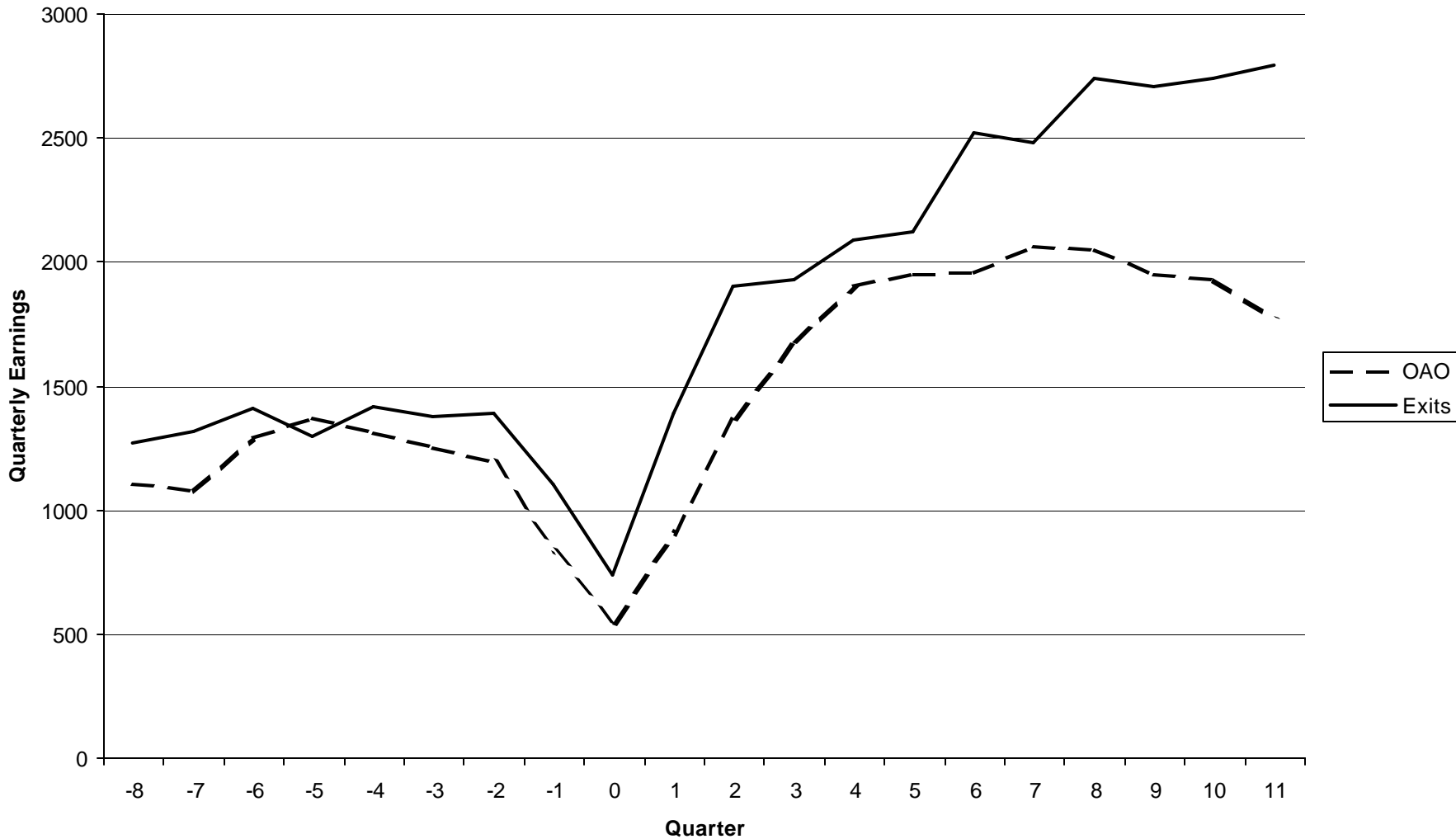
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- So long as the SDA retained information on no-shows, one can easily reproduce these program effect estimates.
- SDA must be of sufficient size to generate enough observations to estimate a statistically significant program effect.
  - The larger the program effect, the smaller the sample size needed to empirically detect the impact.
  - Given the observed program effects for the state as a whole, several hundred observations for OAO only and program exits should be sufficient to detect significant changes in quarterly earnings

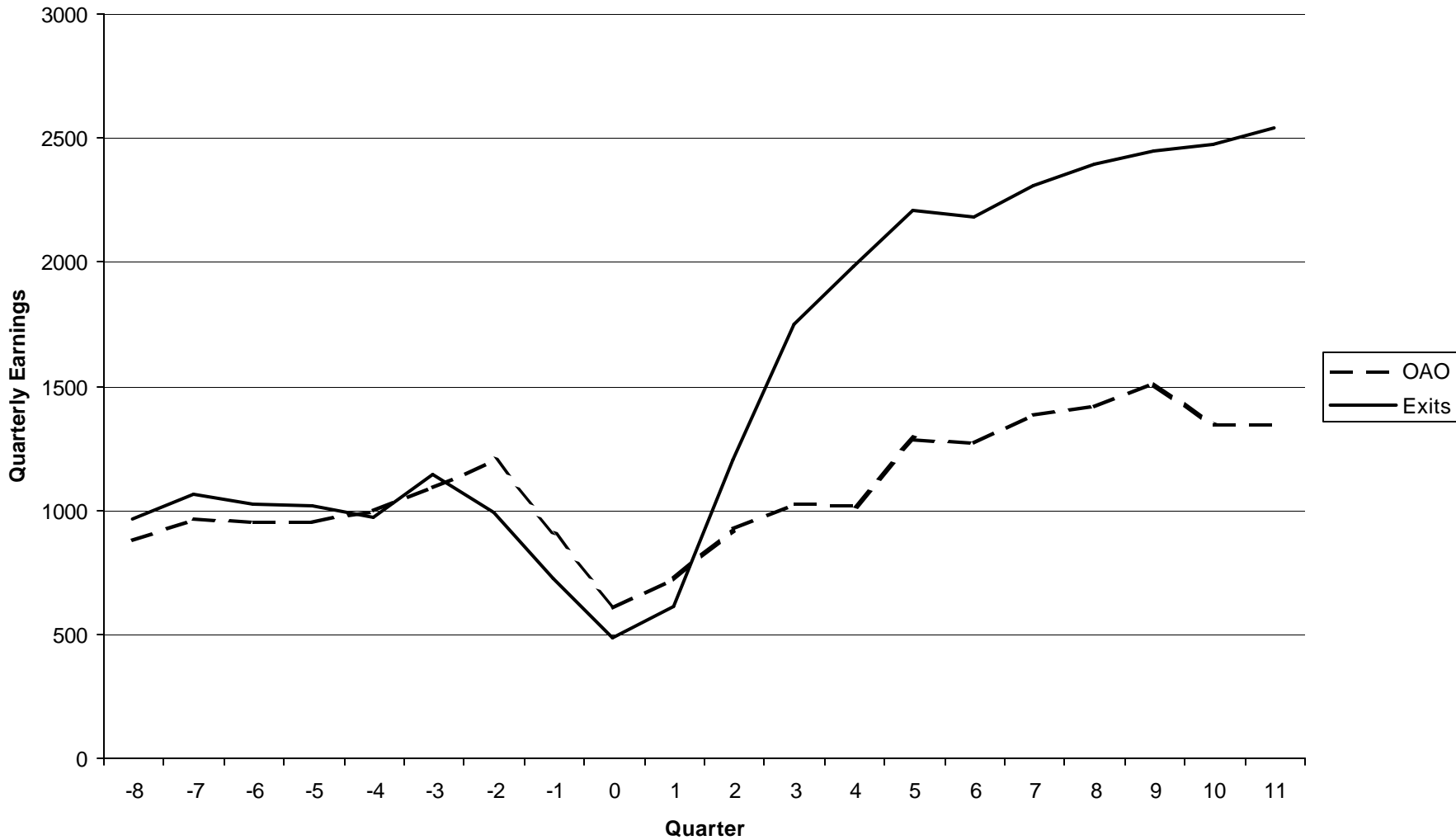
**Average Quarterly Earnings for OAO and Exits Groups, Two Years Pre and Three Years Post Program Intervention, All Observations from the Hampden SDA**



**Average Quarterly Earnings for OAO and Exits Groups, Two Years Pre and Three Years Post Program Intervention, Male Observations from the Hampden SDA**



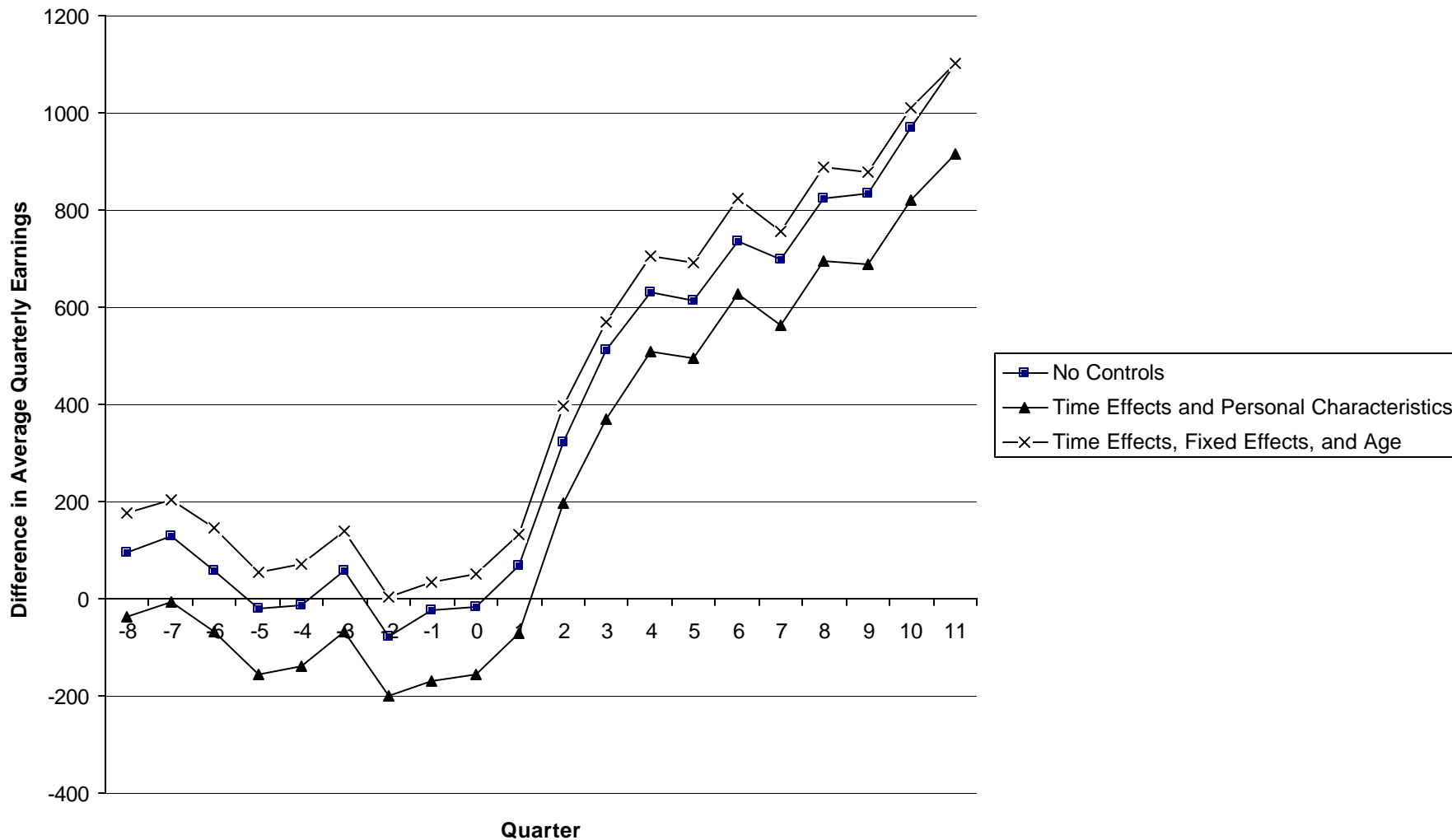
**Average Quarterly Earnings for OAO and Exits Groups, Two Years Pre and Three Years Post Program Intervention, Female Observations from the Hampden SDA**



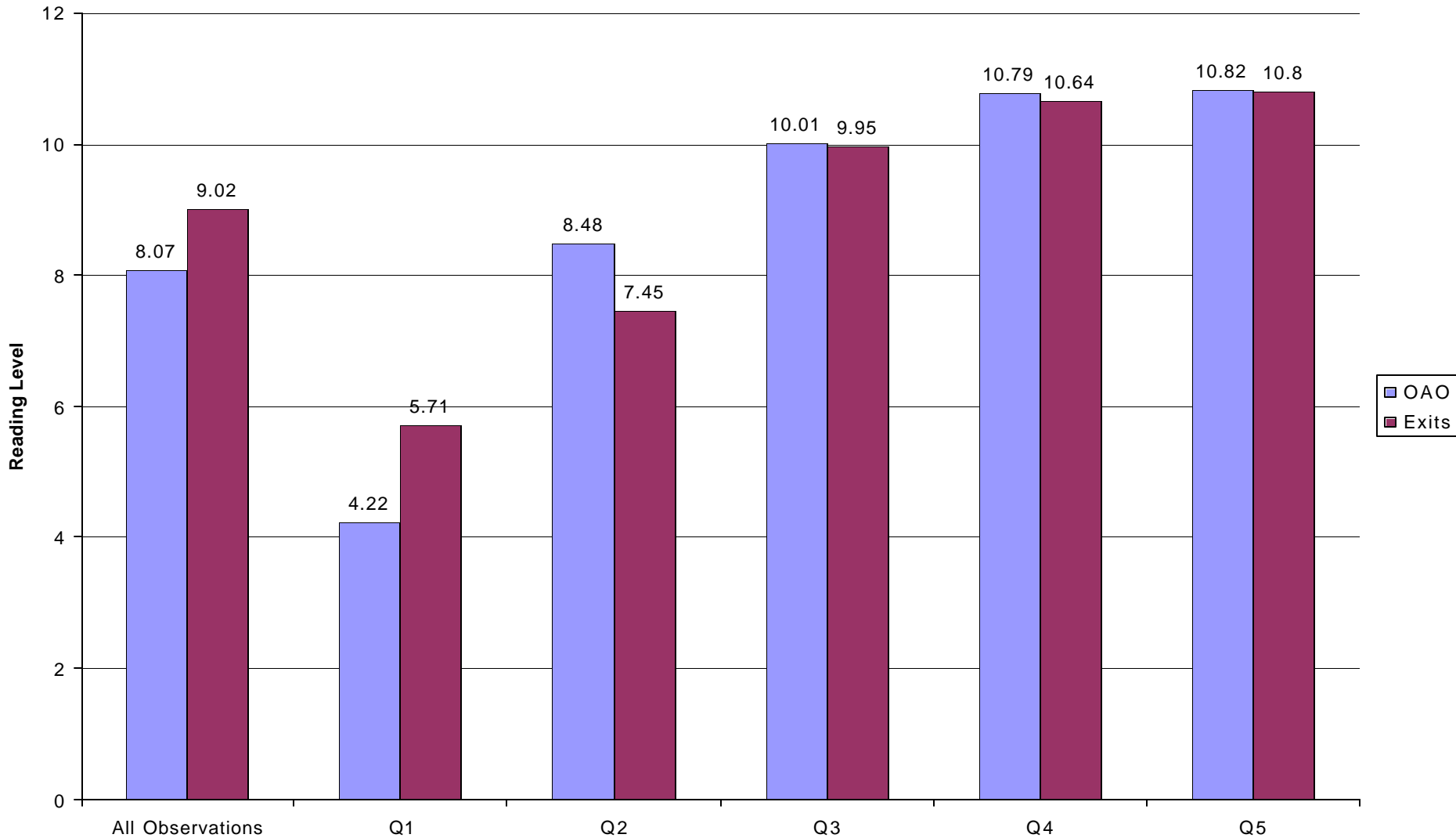
**Table 1**  
**Average Annual Earnings For Exits and OAO Samples from Hampden County by Year and Unadjusted Estimates of the Training Earnings Effects, All Observations and by Gender**

	Pre-Intervention Years		Post-Intervention Years			Differences in Earnings Relative to Year One		
	Year One	Year Two	Year Three	Year Four	Year Five	Three - One	Four - One	Five - One
<b>Entire Sample</b>								
Exits	4,458 (264)	4,294 (264)	4,662 (265)	8,836 (264)	10,204 (265)	204 (197)	4,378 (197)	5,746 (197)
OAO	4,196 (301)	4,352 (301)	3,778 (301)	6,160 (301)	6,474 (301)	-417 (224)	1,964 (224)	2,277 (224)
<b>Diff-in-Diff</b>	262 (401)	-59 (401)	883 (401)	2,676 (401)	3,730 (401)	622 (298)	2,414 (298)	3,468 (298)
<b>Men</b>								
Exits	5,270 (518)	5,254 (518)	5,925 (518)	9,194 (518)	10,952 (519)	655 (394)	3,924 (394)	5,681 (394)
OAO	4,842 (531)	4,588 (531)	4,488 (531)	7,864 (531)	7,696 (531)	-353 (403)	3,022 (403)	2,853 (404)
<b>Diff-in-Diff</b>	427 (742)	666 (742)	1,437 (742)	1,330 (742)	3,255 (742)	1,009 (564)	902 (564)	2,827 (564)
<b>Women</b>								
Exits	4,048 (293)	3,809 (293)	4,024 (293)	8,656 (293)	9,827 (293)	-24 (216)	4,608 (216)	5,779 (216)
OAO	3,741 (355)	4,187 (355)	3,279 (355)	4,961 (355)	5,613 (355)	-462 (261)	1,219 (261)	1,871 (261)
<b>Diff-in-Diff</b>	306 (460)	-378 (460)	744 (460)	3,649 (460)	4,213 (460)	438 (339)	3,388 (339)	3,907 (339)

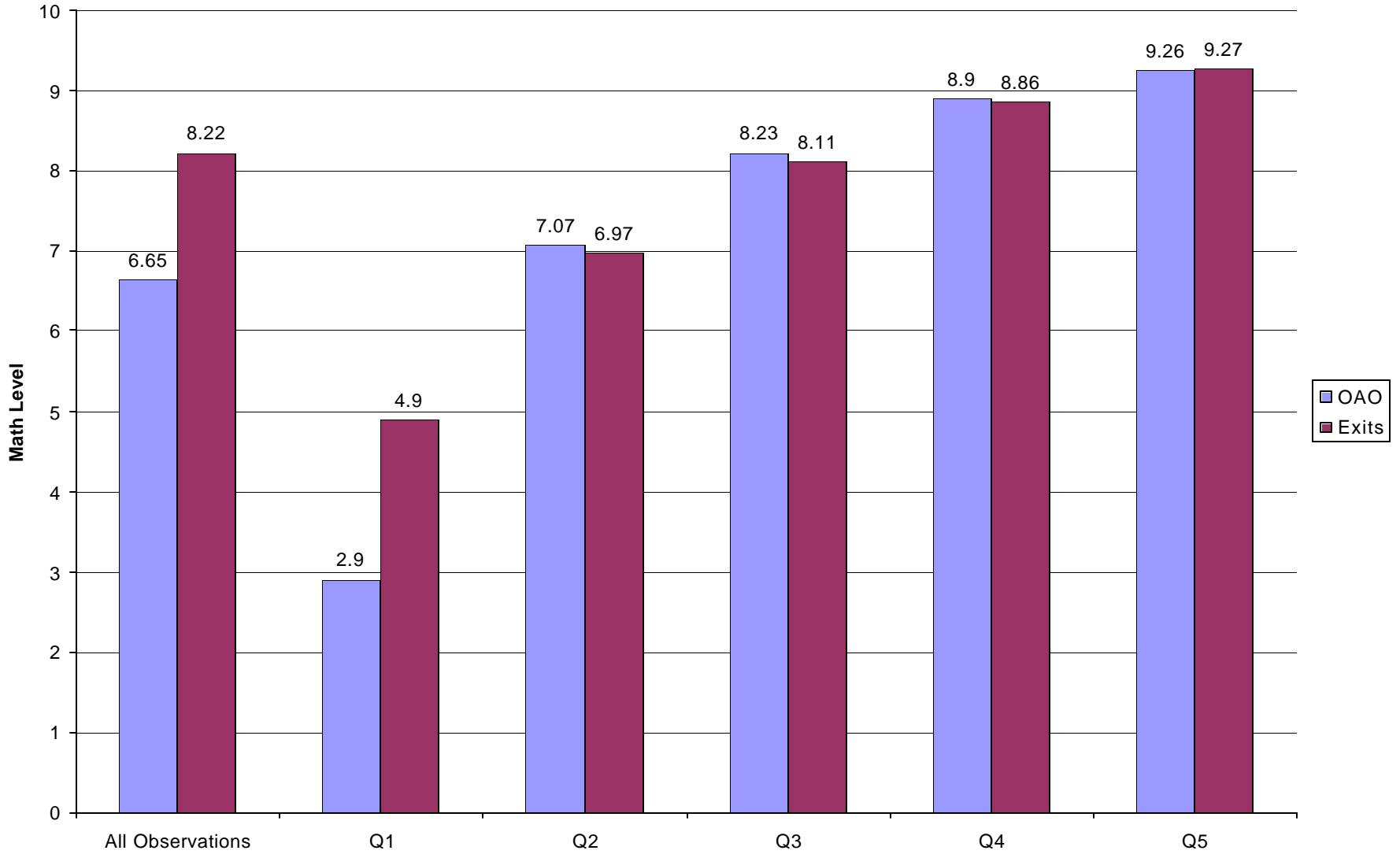
### Difference in Average Quarterly Earnings Between Program Exits and OAO Observations from the Hampdon SDA, No Controls, the Random Effects Model, and the Fixed Effects Model



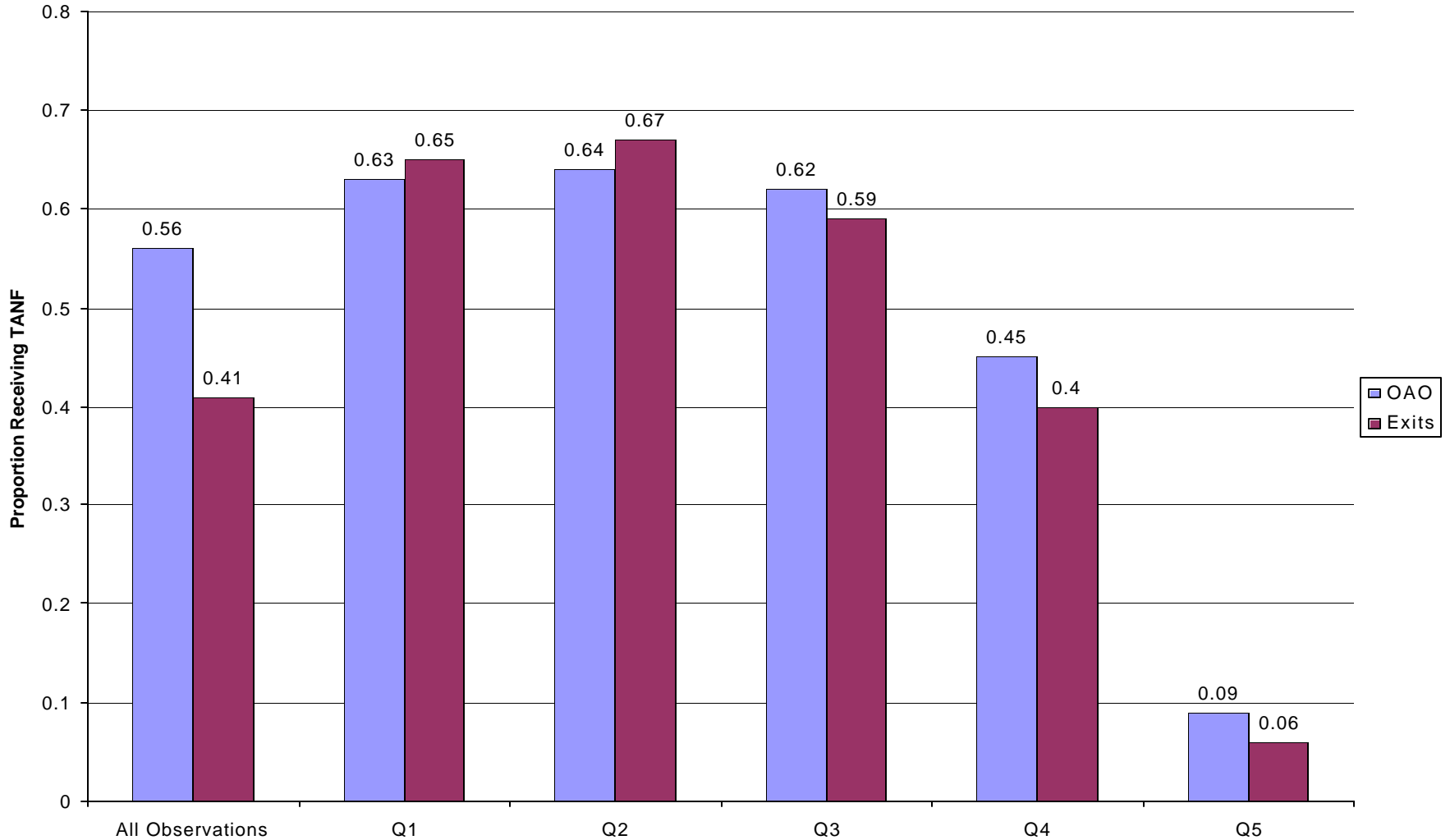
# Average Reading Levels by Predicted Probability Quintile



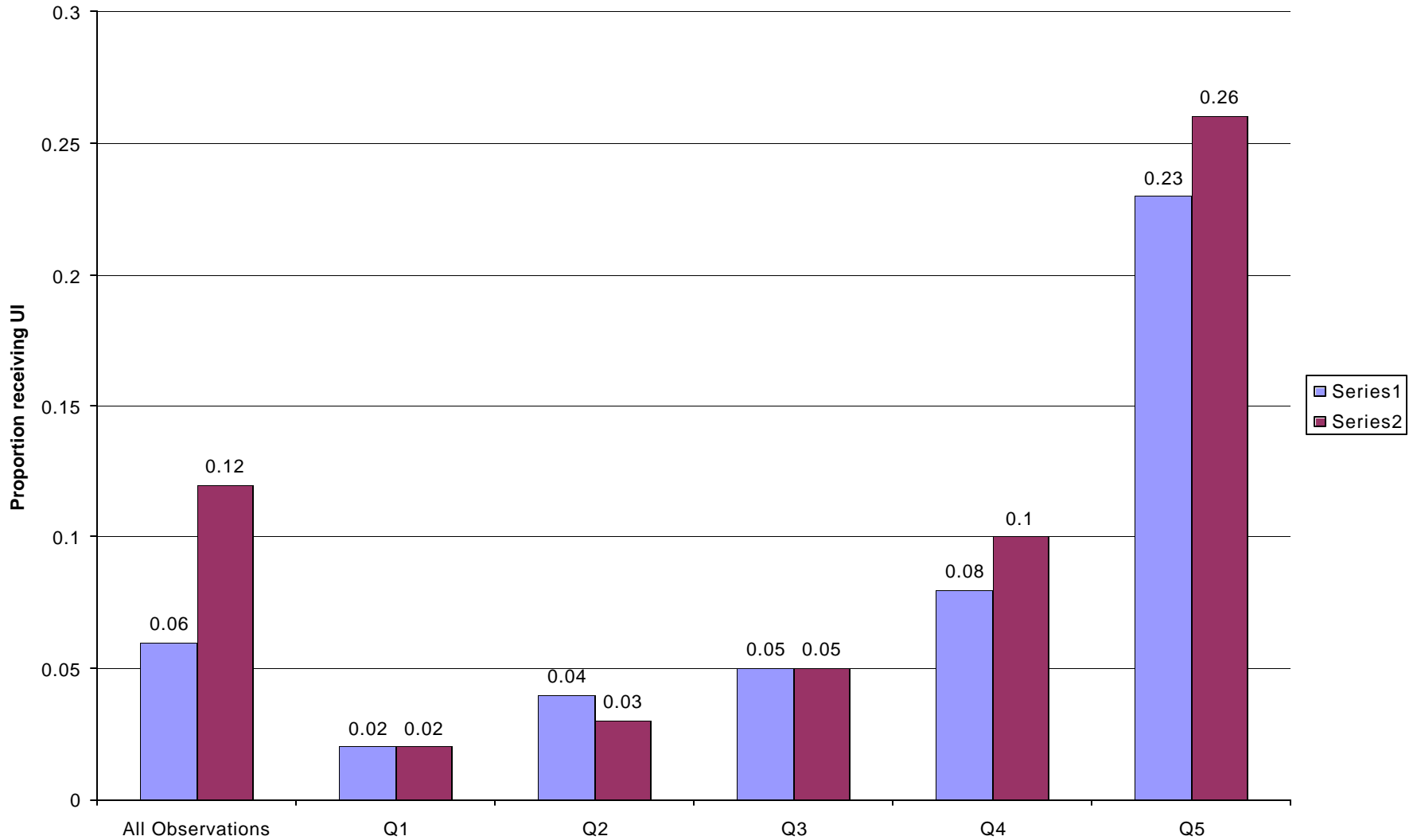
# Average Math Level by Predicted Probability Quintile



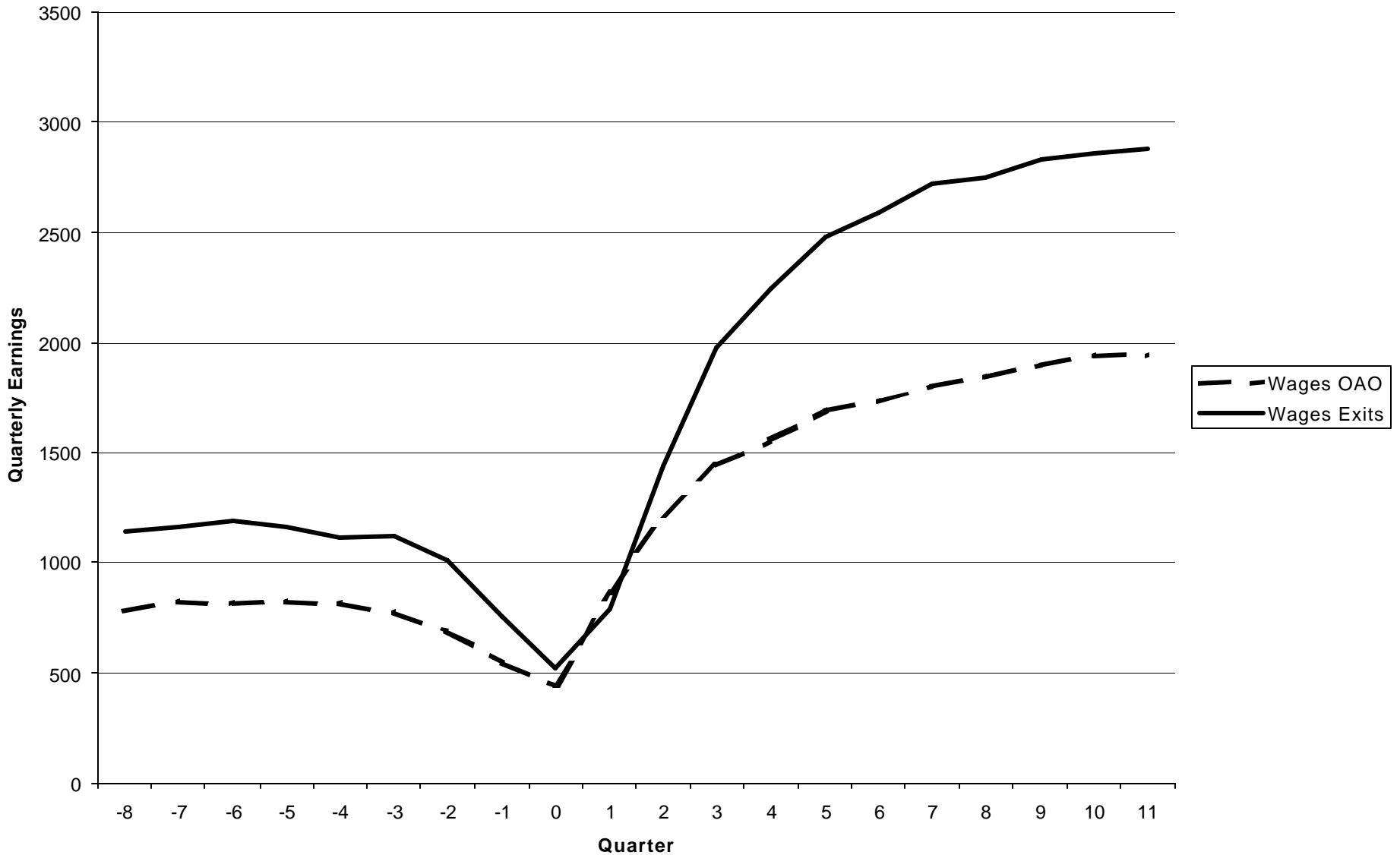
# Proportion of Individuals who are TANF Recipients by Predicted Probability Quintile



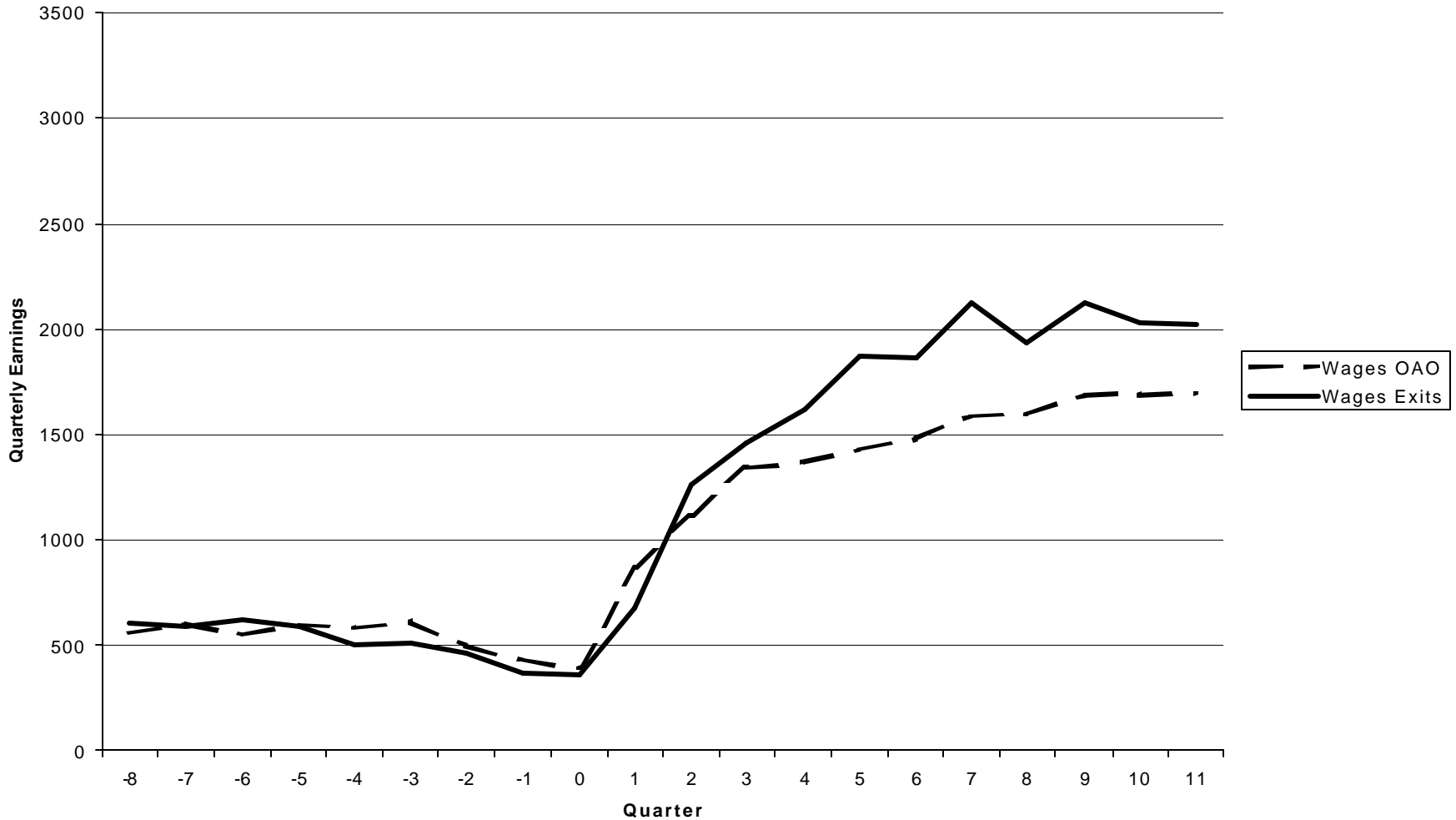
# Proportion of Individuals who Filed UI Claims by Predicted Probability Quintile



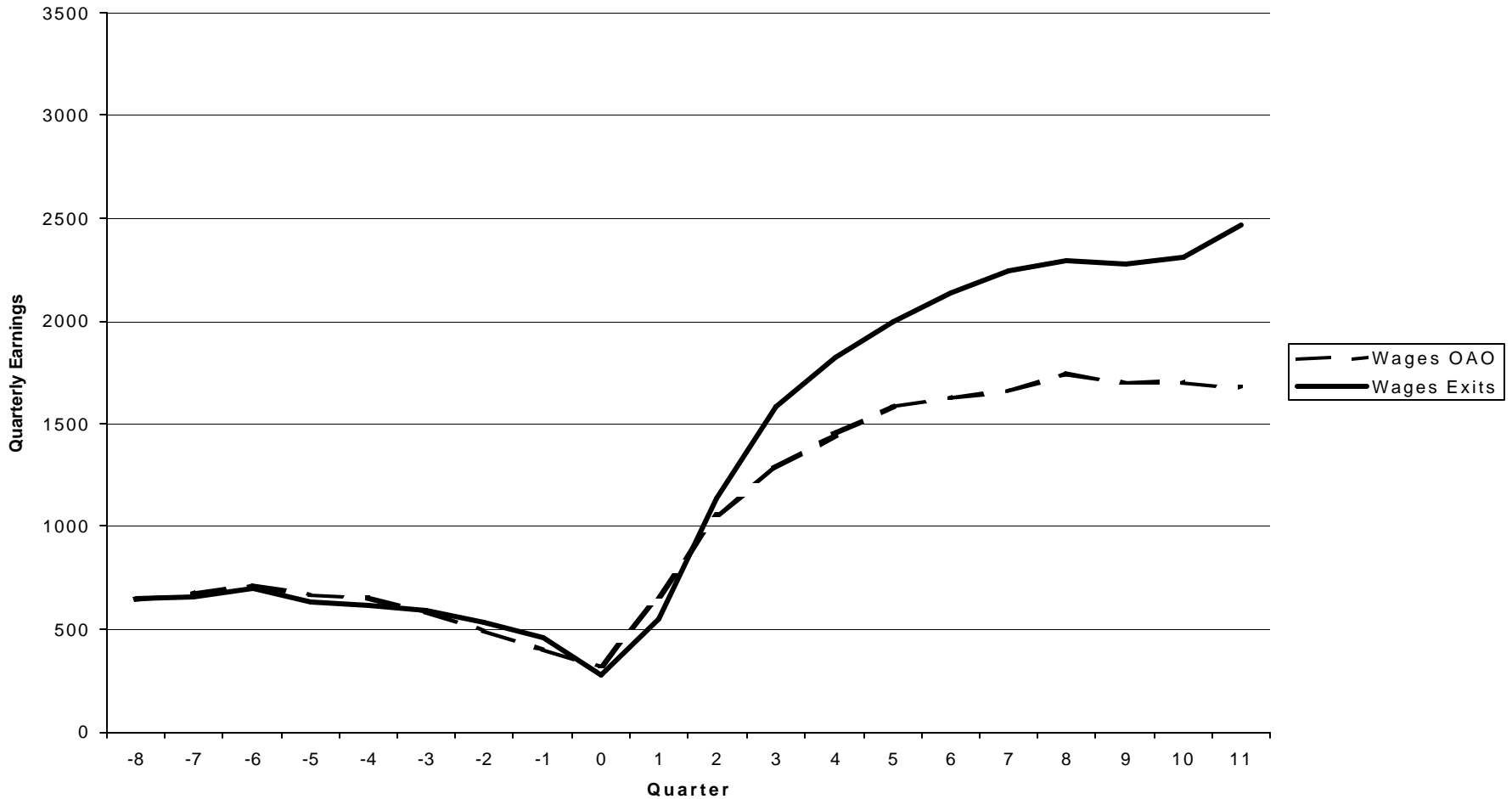
**Figure 1: Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, All Observations**



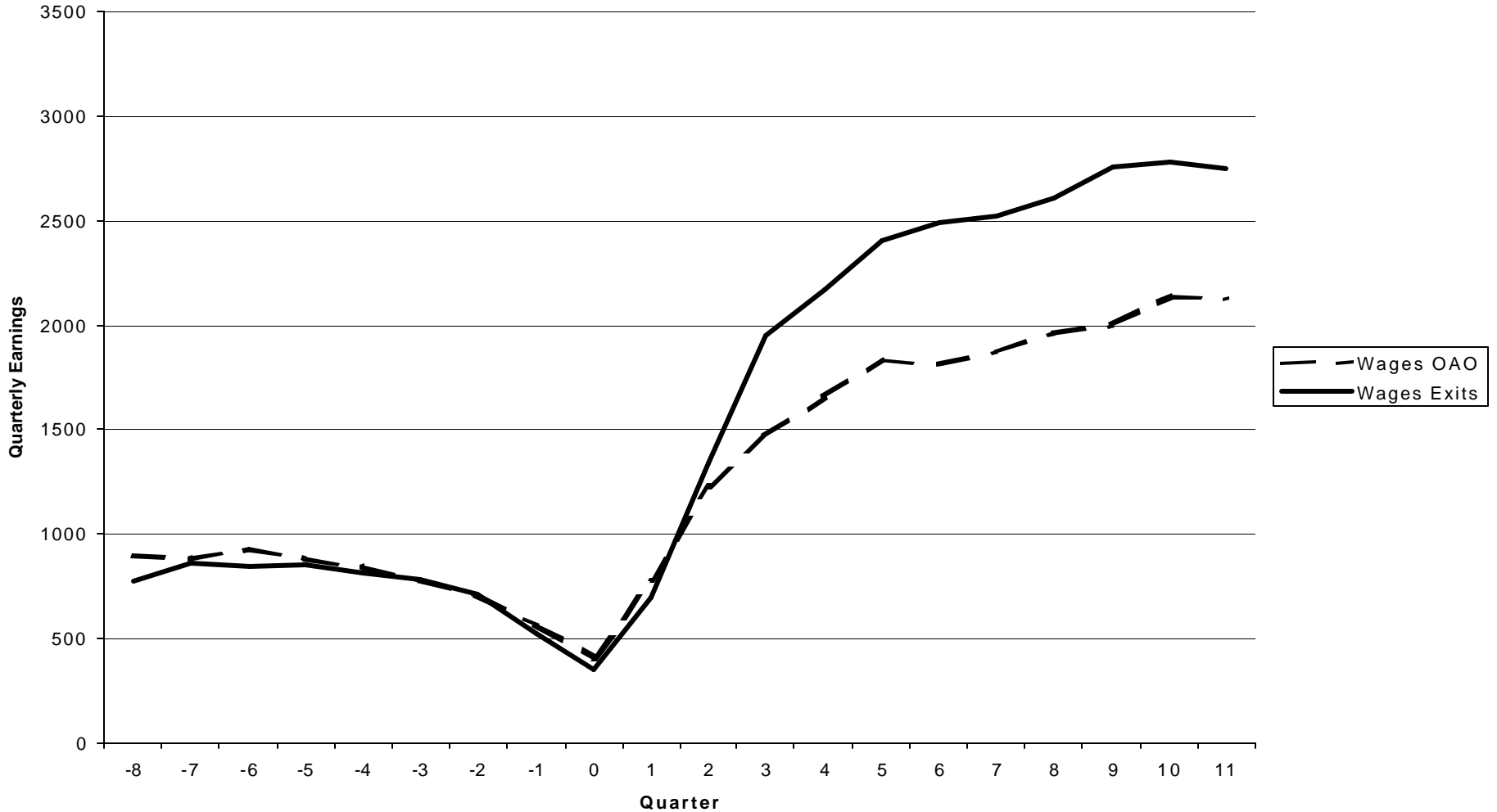
# Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, First Quintile



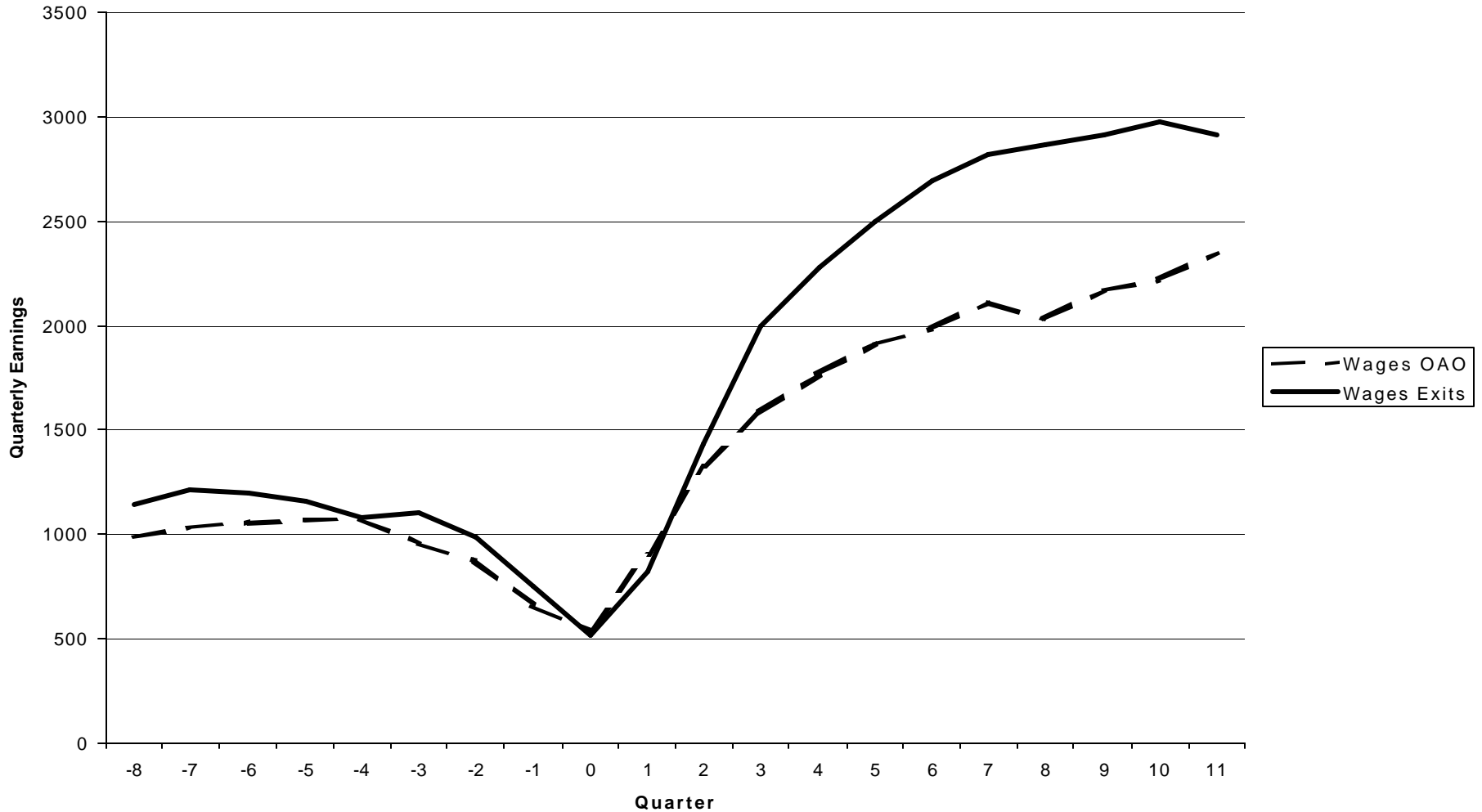
# Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Second Quintile



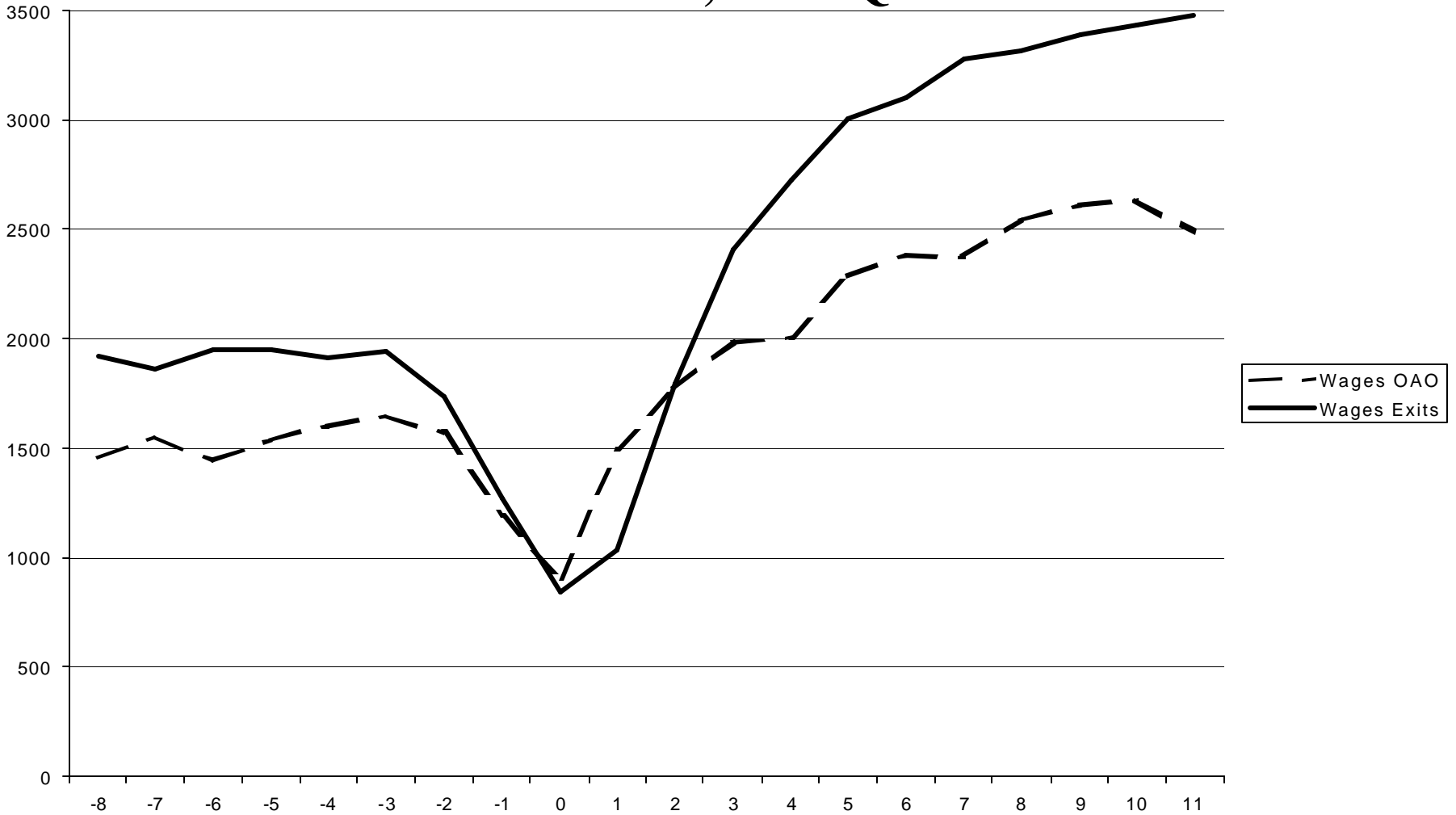
# Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Third Quintile



# Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Fourth Quintile



# Average Quarterly Earnings for OAO and Exits Sample Two Years Pre and Two Years Post Program Intervention, Fifth Quintile



**Table 4**  
**Average Annual Earnings For Exits and OAO Samples by Year and Unadjusted Estimates of the Training Earnings Effects, by Predicted Probability Quintile**

	Pre-Intervention Years		Post-Intervention Years			Differences in Earnings Relative to Year One		
	Year One	Year Two	Year Three	Year Four	Year Five	Three - One	Four - One	Five - One
<b>First Quintile</b>								
Exits	2,387 (247)	1,823 (247)	3,762 (247)	7,469 (247)	8,104 (247)	1,374 (204)	5,082 (204)	5,717 (204)
OAO	2,302 (144)	2,126 (144)	3,722 (144)	5,863 (144)	6,652 (144)	1,419 (118)	3,560 (118)	4,349 (118)
<b>Diff-in-Diff</b>	-	-	-	-	-	-45 (236)	1,521 (236)	1,367 (236)
<b>Second Quintile</b>								
Exits	2,634 (167)	2,201 (167)	3,556 (167)	8,201 (167)	9,339 (167)	922 (140)	5,567 (140)	6,704 (140)
OAO	2,710 (172)	2,151 (172)	3,333 (172)	6,319 (172)	6,829 (172)	622 (145)	3,608 (145)	4,119 (145)
<b>Diff-in-Diff</b>	-	-	-	-	-	299 (201)	1,958 (201)	2,585 (202)
<b>Third Quintile</b>								
Exits	3,328 (176)	2,825 (176)	4,332 (176)	9,594 (176)	10,892 (175)	1,004 (146)	6,265 (146)	7,562 (146)
OAO	3,589 (221)	2,894 (221)	3,876 (221)	7,167 (221)	8,234 (221)	286 (184)	3,578 (184)	4,645 (184)
<b>Diff-in-Diff</b>	-	-	-	-	-	717 (236)	2,687 (236)	2,917 (236)
<b>Fourth Quintile</b>								
Exits	4,705 (184)	3,907 (184)	4,752 (184)	10,281 (184)	11,673 (184)	47 (142)	5,575 (143)	6,967 (143)
OAO	4,150 (281)	3,561 (281)	4,350 (281)	7,773 (281)	8,773 (281)	200 (217)	3,623 (217)	4,622 (218)
<b>Diff-in-Diff</b>	-	-	-	-	-	-153 (260)	1,952 (261)	2,345 (261)
<b>Fifth Quintile</b>								
Exits	7,688 (212)	6,870 (212)	6,091 (212)	12,127 (212)	13,635 (212)	-1,597 (162)	4,438 (162)	5,945 (162)
OAO	6,012 (439)	6,023 (439)	6,166 (439)	9,064 (439)	10,286 (439)	153 (336)	3,051 (336)	4,273 (336)
<b>Diff-in-Diff</b>	-	-	-	-	-	-1,751 (374)	1,387 (374)	1,672 (373)

**Table 9**

**Average Quarterly Employment Rates For Exits and OAO Samples by Year and Unadjusted Estimates of the Training Employment Effects, All Observations and by Gender**

	Pre-Intervention Years		Post-Intervention Years			Differences in Earnings Relative to Year One		
	Year One	Year Two	Year Three	Year Four	Year Five	Three - One	Four - One	Five - One
<b>Entire Sample</b>								
Exits	0.407 (0.004)	0.403 (0.004)	0.482 (0.004)	0.665 (0.004)	0.642 (0.004)	0.075 (0.004)	0.258 (0.004)	0.235 (0.004)
OAO	0.337 (0.005)	0.345 (0.005)	0.460 (0.005)	0.544 (0.005)	0.524 (0.005)	0.123 (0.005)	0.207 (0.005)	0.188 (0.005)
<b>Diff-in-Diff</b>	-	-	-	-	-	-0.048 (.008)	0.051 (0.006)	0.047 (0.006)
<b>Men</b>								
Exits	0.466 (0.010)	0.453 (0.010)	0.529 (0.010)	0.616 (0.010)	0.580 (0.010)	0.064 (0.009)	0.150 (0.009)	0.114 (0.009)
OAO	0.416 (0.013)	0.388 (0.013)	0.470 (0.013)	0.506 (0.013)	0.481 (0.013)	0.055 (0.010)	0.090 (0.010)	0.066 (0.011)
<b>Diff-in-Diff</b>	-	-	-	-	-	0.009 (0.014)	0.060 (0.014)	0.048 (0.014)
<b>Women</b>								
Exits	0.393 (0.005)	0.391 (0.005)	0.471 (0.005)	0.676 (0.005)	0.656 (0.005)	0.078 (0.004)	0.282 (0.004)	0.262 (0.004)
OAO	0.320 (0.006)	0.336 (0.006)	0.458 (0.006)	0.552 (0.006)	0.534 (0.006)	0.138 (0.005)	0.232 (0.005)	0.214 (0.005)
<b>Diff-in-Diff</b>	-	-	-	-	-	-0.060 (.007)	0.050 (0.007)	0.049 (0.007)

**Table 10**  
**Average Quarterly Employment Rates For Exits and OAO Samples by Year and Unadjusted Estimates of the Training Employment Effects, by Predicted Probability Quintile**

	Pre-Intervention Years		Post-Intervention Years			Differences in Earnings Relative to Year One		
	Year One	Year Two	Year Three	Year Four	Year Five	Three - One	Four - One	Five - One
<b>First Quintile</b>								
Exits	0.284 (0.015)	0.278 (0.015)	0.413 (0.015)	0.586 (0.015)	0.578 (0.015)	0.129 (0.013)	0.301 (0.013)	0.293 (0.013)
OAO	0.279 (0.009)	0.302 (0.009)	0.457 (0.009)	0.516 (0.009)	0.490 (0.009)	0.179 (0.008)	0.237 (0.008)	0.212 (0.008)
<b>Diff-in-Diff</b>	-	-	-	-	-	-0.050 (.016)	0.064 (0.016)	0.081 (0.016)
<b>Second Quintile</b>								
Exits	0.296 (0.010)	0.301 (0.010)	0.418 (0.010)	0.613 (0.010)	0.607 (0.010)	0.122 (0.009)	0.318 (0.009)	0.312 (0.009)
OAO	0.310 (0.010)	0.303 (0.010)	0.419 (0.010)	0.531 (0.010)	0.502 (0.010)	0.108 (0.009)	0.220 (0.009)	0.192 (0.009)
<b>Diff-in-Diff</b>	-	-	-	-	-	0.014 (0.013)	0.098 (0.013)	0.120 (0.013)
<b>Third Quintile</b>								
Exits	0.332 (0.009)	0.333 (0.009)	0.451 (0.009)	0.664 (0.009)	0.636 (0.009)	0.118 (0.008)	0.332 (0.008)	0.303 (0.008)
OAO	0.357 (0.012)	0.351 (0.012)	0.459 (0.012)	0.569 (0.012)	0.559 (0.012)	0.102 (0.010)	0.213 (0.010)	0.202 (0.010)
<b>Diff-in-Diff</b>	-	-	-	-	-	0.016 (0.013)	0.119 (0.013)	0.101 (0.013)
<b>Fourth Quintile</b>								
Exits	0.427 (0.009)	0.414 (0.009)	0.484 (0.009)	0.673 (0.009)	0.655 (0.009)	0.057 (0.008)	0.246 (0.008)	0.228 (0.008)
OAO	0.395 (0.014)	0.387 (0.014)	0.471 (0.014)	0.565 (0.014)	0.562 (0.014)	0.077 (0.012)	0.170 (0.012)	0.168 (0.012)
<b>Diff-in-Diff</b>	-	-	-	-	-	-0.019 (.014)	0.076 (0.014)	0.060 (0.014)
<b>Fifth Quintile</b>								
Exits	0.559 (0.008)	0.555 (0.008)	0.569 (0.008)	0.715 (0.008)	0.678 (0.008)	0.009 (0.007)	0.156 (0.007)	0.119 (0.007)
OAO	0.493 (0.017)	0.539 (0.017)	0.566 (0.017)	0.601 (0.017)	0.583 (0.017)	0.073 (0.015)	0.108 (0.015)	0.090 (0.015)
<b>Diff-in-Diff</b>	-	-	-	-	-	-0.064 (.017)	0.048 (0.017)	0.029 (0.017)