

**RETURN ON INVESTMENT ANALYSES OF
A SELECTED SET OF WORKFORCE SYSTEM PROGRAMS
IN INDIANA**

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EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

As part of its involvement in the efforts to upgrade and align the state's workforce and economic development systems, the Indiana Chamber of Commerce Foundation has contracted with the Upjohn Institute to use Indiana Workforce Intelligence System (IWIS) data to conduct a formal return on investment (ROI) study of its workforce programs similar to projects that the Institute conducted in the states of Washington and Virginia. The specific programs that were examined in this study included the following:

- Workforce Investment Act (WIA)-Adults
- WIA-Dislocated Workers
- WIA-Youth
- Trade Adjustment Assistance (TAA)
- Sub-baccalaureate Postsecondary Education (Up to and including Associate's Degree)
- WorkOne (Source of comparison samples)

These were the only workforce programs for which data were made accessible. The analysis year for which the estimates in this study were produced is state fiscal year 2006 (July 1, 2005 to June 30, 2006). In order to produce the estimates, the analysis uses a database that links the program administrative data with IWIS data on employment and earnings for the 19 calendar quarters from 2003 Q3 to 2008 Q1.

DESCRIPTION OF PROGRAMS

The workforce programs that were analyzed serve a large number of individuals in the state. The WIA programs provide core labor market exchange services to all individuals and will provide education and training services to individuals who are not employable. The Act authorizes services to three populations – adults over the age of 21 who typically have employment barriers, dislocated workers who have lost their jobs and are unlikely to become re-employed in the occupation and industry of their former employment, and youth between 14 and 21. Trade adjustment assistance provides services to individuals who have lost their job due to international competition. Postsecondary education represents sub-baccalaureate programs overseen by the Commission on Higher Education that lead up to and include an Associate's degree credential. Such programs are offered primarily by Ivy Tech, but also at Vincennes University and the regional campuses of Indiana University.

Table ES-1 presents some statistics about these programs, and about WorkOne, for FY 2006. The workforce system served over 21,000 individuals, whereas WorkOne registered over 290,000 job seekers. The workforce system programs predominantly served females (TAA is an exception); however, a majority of WorkOne customers were male. A quarter or less of the

participants in all of the programs, except for WIA-Youth and TAA, were minorities. Finally, WIA-Dislocated Workers and TAA participants had much higher earnings levels than the other programs.

Table ES-1. Workforce Program Characteristics in FY 2006

Characteristic	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary (Assoc. or less)	WorkOne
Number of participants	2,697	1,891	1,782	2,855	12,452	292,616
Female (%)	72.7	61.1	63.7	28.3	59.6	43.8
Minority (%)	26.4	12.1	43.4	56.5	14.0	22.2
Median Quarterly Earnings (\$)	1,698	4,411	0	4,748	2,590	2,253

NET IMPACTS

How effective are these workforce programs in Indiana?

The first step in conducting an ROI analysis is to estimate the net impacts of these programs on employment and earnings. A net impact evaluation evaluates the outcomes of a program for participants relative to what would have occurred if the program did not exist. In other words, it answers the question of how the program has changed the lives of individuals who participated in it relative to their next best alternative. Net impacts may be considered the value added of a program.

An analytical comparison group for the workforce programs was derived by using individuals who encountered the WorkOne system, but who did not participate in a training program. The assumption here is that the next best alternative to the public workforce development system is WorkOne. Of course, the individuals who use WorkOne may be quite different from the individuals who went through a program, so we conducted a statistical match between the data sets in order to identify individuals in WorkOne who had characteristics like the clients of the public training system.

The following net impact results, displayed in table ES-2, suggest that, in general, the workforce development programs that were studied had positive impacts on participants. The table displays employment impacts in percentage point terms. The first entry of 14.8 means that the employment rate in the third full quarter after exit for individuals served by the WIA-Adult program is almost 15 points higher than the employment rate for the appropriate comparison group. The quarterly earnings and UI benefit impacts are in dollars. The table entry for WIA-Adults of \$549 means that in the third full quarter after program exit, individuals served by the WIA-Adult program had average earnings for the quarter that were almost \$550 higher than the average for the comparison group. Following is a summary of the data in the table:

- The WIA-Adult, the WIA-Dislocated Worker program, and postsecondary education all have substantial positive impacts on individuals' likelihood of being employed and average quarterly earnings.
- The WIA-Dislocated Worker program, Trade Adjustment Assistance, and postsecondary education reduce Unemployment Insurance benefits in the short-term (third quarter after exit), but those positive impacts seem to disappear by the 7th quarter.
- The WIA-Youth program net impacts are positive, but they are not statistically significant.
- TAA has a small employment impact, but negative (insignificant) earnings impacts.

Table ES-2. Net impact Estimates, by Program

	WIA-Adults	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary (Assoc. or less)
Employment, 3rd quarter (%)	14.8**	17.0**	3.4	3.2	17.9**
Employment, 7th quarter (%)	13.7**	16.5**	2.3	5.1**	19.9**
Earnings, 3rd quarter (\$)	549**	410**	24	-122	1,490**
Earnings, 7th quarter (\$)	463**	310**	47	-139	1,547**
UI benefits, 3rd quarter (\$)	-15	-53**	5	-95**	-22**
UI benefits, 7th quarter (\$)	10	3	-0	-15	-15**

NOTE: **Indicates statistical significance at the 0.05 level. All dollar impacts are in 2008 \$.

RETURN ON INVESTMENT

The ROIs that have been computed for Indiana residents build on the net impact estimates. The concept of ROI is fairly straightforward. An investment is made in the current time period that is likely to yield benefits in the future. The ROI is the interest rate that equalizes the investment with the (discounted) flow of future benefits. For workforce development programs, individual participants make investments and get future benefits, and the public sector, on behalf of taxpayers, makes investments that yield future benefits. Most programs provide services to eligible individuals without charge, so for participants, the investment costs are their time costs, which comprise opportunity costs of foregone earnings while they are participating in the program. Some programs, postsecondary education in particular, have tuition and fees that must be added to time costs. The benefits that participants receive are greater likelihoods of employment and higher wage rates from skills that are learned. From the public's perspective, the investment is the cost of providing services, and the returns are increased tax revenues from participants' higher levels of employment and earnings and decreased expenditures because participants have decreased take-up rates of unemployment insurance and income support programs.

The ROI results are shown in table ES-3. In this table, all of the results are percentages. The first entry indicates that the average individual served by the WIA-Adult program receives a (quarterly) ROI of 16.32% from their investment of time in the program when their lifetime earnings and other benefits are considered. In general, the table's results suggest that participants in programs, with the exception of TAA, have extremely handsome payoffs, and the government sector (federal government and State of Indiana are combined) reaps positive ROIs for the WIA-Dislocated Worker, Trade Adjustment Assistance, and postsecondary programs. If we add together the benefits for participants and for the government, and compare them to the sum of the costs to the participants and the government, then we can calculate a social rate of return. The results show that this societal ROI is positive for all of the programs, save TAA.

Table ES-3 ROI Estimates (Quarterly ROIs)

	WIA-Adults	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary (Assoc. or less)
Individual program participant (%)	16.32	2.64	13.27	-0.93	29.87
Government (%)	-0.04	1.50	-1.73	5.01	1.82
Society (takes into consideration individual and government) (%)	7.60	2.13	0.22	-0.40	9.66

The results can be analyzed on a program by program basis.

WIA-Adults. For WIA-Adults, the program increases earnings and employment modestly in the short- and long-run. The “costs” to the individuals in these programs are minor. There is no tuition or fees, so the only cost to participants is foregone earnings; that is, earnings that they could have made while they were participating. Because WIA-Adult program participants are generally low wage workers, they give up modest earnings while they are being trained, so the individual’s return is high. For the government, however, the cost of serving these individuals—i.e., administrative and services costs—are about \$4,000 (2008\$) per individual. The additional earnings of individuals generate tax revenues and the individuals receive less transfer income, but these additional revenues and expense reductions are not substantial enough for the government to recoup its costs. Thus the public sector’s ROI for the WIA-Adult program is (slightly) negative.

WIA-Dislocated Workers. The story is almost the opposite for WIA-Dislocated Workers. Their employment and earnings gains are comparable to, although a bit higher than WIA-Adults. But because they are higher wage workers, their foregone earnings during training are quite high, so the average individual’s ROI is lower than for the Adult program (still positive, though). However, Dislocated Workers’ lifetime earnings increases and reductions in unemployment compensation more than offset the government’s cost, which is over \$6,000 (2008\$) per participant. Thus, the government’s ROI for this program is positive.

WIA-Youth. The ROIs for WIA-Youth are similar to those for WIA-Adults. The foregone cost of training is very low and, while the employment and earnings net impacts are modestly positive, they last for a long period of time and generate a positive ROI. However, the

earnings impacts do not generate much in the way of taxes, so the government's ROI is negative since the program costs are substantial.

TAA. Not surprisingly, the results for TAA are similar to the results for WIA-Dislocated Workers. However, the foregone earnings cost of training (more than \$2000 per quarter) is larger, which causes the individual's return to be negative, and the earnings and employment impacts are slightly smaller, which limits the extra tax revenues and causes the government's ROI to be slightly negative.

Postsecondary education. The story is all positive for postsecondary education. The investment cost for individuals comprises tuition and fees and foregone earnings. In this case, foregone earnings are actually negative (this means that postsecondary students' earnings while they were in school exceeded their matched counterparts' earnings during those quarters). However, the tuition and fees, on average, exceed in magnitude the negative foregone earnings, so individuals still have a net investment cost of over \$4,000. The net earnings and employment impacts of postsecondary education are large, however, so individuals generate more than enough additional earnings over their lifetimes to make a substantial return on their tuition investments. Furthermore, the additional taxes received from those earnings along with reductions in transfer payments more than offset the government subsidies so that the government gets a return of about 2 percent per quarter.

BOTTOM LINE: WHO BENEFITS?

As administered in FY2006, the individual programs comprising the workforce system had disparate ROIs for individual participants and for the government. From an individual's perspective, the WIA-Adult, WIA-Youth, and Postsecondary education programs provide extraordinarily high returns. The programs that serve more mature, higher-wage workers—WIA-Dislocated Workers and TAA—have more modest returns (actually negative for TAA).

The ROI estimates suggest that governments (state and federal are combined) receive a payoff from only three of the programs, and it should be recognized that these payoffs are accounted for over a working lifetime. That is, it takes a long time for the government to recoup its investment.

IMPACT OF TRAINING

It should be recognized that not all of the workforce system programs provide training to all clients. In particular, about half of the Workforce Investment Act adult program participants receive training. At the national level, between program years 2002 to 2005, the annual average number of participants in WIA-Adults was about 250,000, of whom about 46.0 percent received training. The annual average number of WIA-Dislocated Workers was about 200,000, of whom about 48.5 percent received training. Between program years 1999 and 2003, the Trade

Adjustment Assistance program had about 40,000 participants, of whom just under 80.0 percent received training.

The IWIS data identified individuals in the WIA-Adult and WIA-Dislocated Worker programs who entered training (the data do not indicate whether the training was completed). For these two programs, we disaggregated the net impact results to the populations who entered training and those who did not. These disaggregated results suggest that training significantly increases the employment rate and earnings outcomes for WIA-Adults. However, the training outcomes are not significantly different from the outcomes for individuals who didn't receive training for WIA-Dislocated Workers.

POLICY EXPERIMENTS

A useful byproduct of the ROI analyses done in this study is a spreadsheet tool that can be used to conduct policy experiments. To demonstrate its usefulness, two policy experiments were run as follows:

Experiment 1: Reduce the per participant cost of the workforce program, except for postsecondary education 25 percent, and, concomitantly, reduce the earnings gains from the programs by 25 percent.

Experiment 2: Reduce the state subsidy for postsecondary education by 25 percent, and added that amount to tuition and fees. (Note that this might be a very unpopular reduction, but presumably could be accompanied by increases in supports for access.)

The results for experiment 1 (fully documented in the full report) suggest that scaling up the WIA programs, which would likely reduce per participant costs and also per participant employment and earnings gains, would still yield sizeable returns for the individuals and would enhance the payoff for the government. However the experiment does just the opposite for TAA. For this program, the experimental return to the taxpayer is quite large, and the return to the program participant is negative. This combination suggests that the program might be able to strike a better balance by investing more into the services provided to individuals (assuming that these individuals would then obtain more positive labor market outcomes).

Reducing state subsidies to sub-baccalaureate education and increasing tuition and fees (Experiment 2) turns out to be reasonable from the ROI point of view. The return to individuals declines by about 12 percentage points, but is still well over 50 percent on an annualized basis. The public sector's return increases from about seven percent on an annual basis to about 10 percent.

RECOMMENDATIONS

In many ways, this study should be considered a prototype, or proof of concept. It shows a potential use of administrative data for the State of Indiana. All in all, it seems that with IWIS and with support of studies such as this, Indiana has shown the potential for systematically using data to inform policymakers and to improve its workforce development system. The following specific recommendations may be considered by state policymakers to institutionalize its data analytic capability:

Recommendation 1: *Legislate or use an executive order to mandate ROI studies to be used in the budgeting process.* The purpose of estimating ROIs for the various programs comprising the workforce development system is to determine whether there might be relative underinvestment in one or a few programs as indicated by relatively high returns on investment. If there were high returns, then it would be sensible to re-allocate funding toward those programs to the extent practicable.

Recommendation 2: *Invest adequately in data systems.* The IWIS system is a great start, but the initiative needs to continue and be funded at an adequate level. Resources need to be adequate, and also staffing expertise needs to be available. In general, a data warehouse effort such as IWIS needs a considerable investment in time and effort for its design, but also needs a thorough plan for retaining complete and accurate data in order to provide the best information possible for performance monitoring and policy analysis.

Recommendation 3: *Institute a cross-program coordinating board.* As it moves forward, we hope that the state will develop an oversight or coordinating entity that will have cross-program accountability. We believe that such a construct will facilitate meaningful use of net impact/ROI studies, but also would be a way to overcome the “siloeing” that occurs from having different programs administered by different agencies.

INTRODUCTION

The Lilly Endowment and the Joyce Foundation are investing in efforts to make substantial improvements in the workforce and economic development systems of Indiana. The Joyce “Shifting Gears” grant is targeted on setting priorities and strategies to engage, educate, and elevate Indiana’s workforce. The grant is being led by a policy team that is setting goals and bringing together resources and expertise to work on accomplishing the goals. Two broad strategies that have been identified include increasing the high school graduation rate of Indiana’s students and improving the basic skills of incumbent workers. Concurrent with the work of the Joyce grant policy team and the Lilly grants has been a major administrative data base development effort led by the Department of Workforce Development (DWD) called IWIS (Indiana Workforce Intelligence System). One rationale for developing IWIS will be its ability to provide data that can be used for program monitoring and quality improvement.

As part of its involvement in the efforts to upgrade and align the workforce and economic development systems, the Indiana Chamber of Commerce Foundation has contracted with the Upjohn Institute to use IWIS data to conduct a formal return on investment (ROI) study of the state’s workforce programs similar to projects that the Institute conducted in the states of Washington and Virginia. The specific programs that were examined in this study included the following:

- WIA-Adult
- WIA-Dislocated Workers
- WIA-Youth
- Trade Adjustment Assistance (TAA)
- Postsecondary Education (Credential < Bachelors Degree)

The analysis year for which the estimates in this study were produced is state fiscal year 2006 (July 1, 2005 to June 30, 2006). In order to produce the estimates, administrative data on employment and earnings for the 19 calendar quarters from 2003 Q3 to 2008 Q1 were analyzed.

Net Impact Evaluation

Conducting an ROI analysis requires estimation of the net impacts of these programs on employment and earnings. A net impact evaluation evaluates the outcomes of a program for participants relative to what would have occurred if the program did not exist. In other words, it answers the question of how the program has changed the lives of individuals who participated in it relative to their next best alternative. Net impacts may be considered the value added of a program.

Individuals who participate in training or educational programs generally experience successful outcomes. However, it is not always clear that individuals' positive outcomes are the direct result of their participation in public training programs. There could have been some other factor(s) such as an improving economy that caused positive results. In social science evaluation, determining the extent to which an outcome is caused by program participation is called the attribution question. Can participants' successes be truly *attributed* to participation in the program or might some other factor coincidental to the program have played a role?

A net impact analysis addresses directly the attribution question. It attempts to answer the question of what would have happened to participants *if there were no program* and individuals were left to their next best alternatives. To find the answer, a comparison group of individuals who are very similar to the participants in each of the programs but who did not receive training or enroll in education is constructed. Both the participants and comparison

group members over time are observed, and any differences in outcomes that are observed between program participants and comparison group members are attributed to the program.

In order to derive a comparison group for the public education and training programs, individuals who encountered the WorkOne system, but who did not participate in a training program are used. The assumption here is that the next best alternative to the public workforce development system is WorkOne. Of course, the individuals who use WorkOne may be systematically different from the individuals who went through a program, so we conduct a statistical match between the data sets in order to identify individuals in WorkOne who are most closely like the clients of the public training system. The technical term is that we are using the WorkOne services as the *counterfactual*.

Return on Investment

Public workforce development programs in Indiana may be considered an investment in the human capital of state residents. In general, these programs are aimed at reducing barriers that individuals may face in attempting to establish economically sustainable careers. Often times, the programs attempt to enhance individuals' skills. Considering these programs as investments leads naturally to an interest in the returns to those investments. Traditionally returns are measured formally as Returns on Investments (ROIs). At the legislative and executive levels of government, programs that have the highest ROIs should attract resources and emphases to the extent that re-allocation can be undertaken. For individual participants, higher ROIs are more attractive investments, i.e., programs in which to participate. But besides signaling investments of time and resources, funding and publicizing the results from net impact evaluations and ROI studies are ways to hold program administrators accountable to taxpayers.

The concept of return on investment is fairly straightforward. An investment is made in the current time period that is likely to yield benefits in the future. The ROI is the interest rate that equalizes the investment with the (discounted) flow of future benefits. For workforce development programs, individual participants make investments and get future benefits, and the public sector, on behalf of taxpayers, makes investments that yield future benefits. Most programs provide services to eligible individuals without charge, so for participants, the investment costs are their time costs, which comprise opportunity costs of foregone earnings while they are participating in the program. The benefits that participants receive are greater likelihoods of employment and higher wage rates from skills that are learned. From the public's perspective, the investment is the cost of providing services, and the returns are increased tax revenues from participants' higher levels of employment and earnings and decreased expenditures because participants have decreased take-up rates of unemployment insurance and income support programs. In actually calculating ROIs, the benefits to the participants are estimated from the results of the net impact evaluation.

Summary of Results

The net impact results suggest that, in general, the workforce development programs that were studied had positive impacts on participants. The WIA-Adult program, the WIA-Dislocated Worker program, and postsecondary education all have substantial positive impacts on individuals' likelihood of being employed and quarterly earnings (precise estimates are presented below). The WIA-Dislocated Worker program, Trade Adjustment Assistance, and postsecondary education reduce Unemployment Insurance benefits in the short-term (third quarter after exit), but those positive impacts seem to disappear by the 7th quarter. The WIA-

Youth program net impacts are virtually all very small positive impacts that are not significant. TAA has a small employment impact, but negative (insignificant) earnings impacts.

The ROI results suggest that participants in programs have extremely handsome payoffs; the government reaps positive ROIs for Dislocated Worker and Postsecondary programs; and when these results are combined, society obtains a positive ROI for all of the programs, save TAA (numeric results presented later). For WIA-Adults, the WIA program increases their earnings and employment modestly in the short- and long-run. The “costs” to the individuals in these programs are minor. There is no tuition or fees, so the only cost to participants is foregone earnings; that is, earnings that they could have made while they were participating. Because WIA-Adult program participants are generally low wage workers, they give up modest earnings while they are being trained, so the individual’s return is high. The cost of serving these individuals—i.e., administrative and services costs—are about \$4,000 (2008\$) per individual. The additional earnings generate tax revenues and the individuals receive less transfer income, but these additional revenues and expense reductions are not substantial enough to all the government to recoup its costs.

The story is almost the opposite for Dislocated Workers. Their employment and earnings gains are comparable to, although a bit higher than WIA-Adults. But because they are higher wage workers, their foregone earnings during training are quite high, so the average individual’s ROI is lower than for the Adult program. However, Dislocated Workers’ lifetime earnings increases and reductions in unemployment compensation more than offset the government’s cost, which is over \$6,000 (2008\$).

The ROIs for WIA-Youth are similar to those for WIA-Adults. The foregone cost of training is very low and, while the employment and earnings net impacts are modestly positive,

they last for a long period of time and generate a positive ROI. However, the earnings impacts do not generate much in the way of taxes, so the government's ROI is negative since the program costs are substantial. Not surprisingly, the results for TAA are similar to the results for WIA-Dislocated Workers. However, the foregone earnings cost of training (more than \$2000 per quarter) is larger, which causes the individual's return to be negative, and the earnings and employment impacts are slightly smaller, which limits the extra tax revenues and causes the government's ROI to be slightly negative.

The story is all positive for postsecondary education. The investment cost for individuals comprises tuition and fees and foregone earnings. In this case, foregone earnings are actually negative (this means that postsecondary students' earnings while they were in school exceeded their matched counterparts' earnings during those quarters). However, the tuition and fees for 2.5 FTEs, on average, exceeded in magnitude the negative foregone earnings, so individuals still had a net investment of over \$4,000. The net earnings and employment impacts of postsecondary education are large, however, so individuals generate more than enough additional earnings over their lifetimes to make a substantial return on their tuition investments. Furthermore, the additional taxes received from those earnings along with reductions in transfer payments more than offset the government subsidies so that the government gets a return of about 2 percent per quarter.

In the next section of this report, the data processing steps that were followed are documented. This section may be skipped by readers not interested in technical details. That section is followed detailed presentations of the net impact and ROI results. The final section of the report provides summary conclusions and recommendations for policy makers to consider. An Appendix to the report contains some detailed technical results.

DATA PROCESSING¹

IWIS data were requested for individuals who exited from one of the five programs being studied in state fiscal year 2006 and for individuals who were served by WorkOne in that same year. In addition to the program data, wage record data from the Unemployment Insurance program were requested to be merged for the 19 calendar quarters from 2003 Q3 to 2008 Q1. This yielded between 7 to 10 full quarters of earnings information after individuals exited from their programs, and considerable earnings and employment data for most individuals before they participated in a program. The IT staff from IDWD supplied these data in a very timely fashion.

Data Editing

The data were in a person-quarter format so that there were at least 19 records associated with every unique individual (as described below, some individuals had more than one record in a quarter.) Over 6.7 million records were supplied; with data from about 320,000 individuals. Table 1 shows the number of records and individuals for each of the programs supplied in the original data.

Table 1 Records Supplied by IDWD

Program	Number of records	Number of unique individuals
WIA-Adult	51,406	2,697
WIA-Dislocated Workers	35,989	1,891
WIA-Youth	33,944	1,782
TAA	54,386*	2,854
Postsecondary Education	242,826	12,452
Wagner-Peyser (WorkOne)	6,346,162	292,616

NOTE: *133 records in the data set that was received had null IDs. These were deleted.

¹ Readers not interested in the technical documentation of the data processing undertaken for this project may skip this section of the report and proceed to the section starting on page 13 describing the net impacts results.

The first processing that was undertaken was to reduce the redundancy in number of records for each person-quarter. That is, we wanted to create a database with 19 records per individual ID number, which is the same as one record per quarter for each individual ID number. The following reasons for having more than 19 records per individual ID were noted: (1) complete replicates,² (2) NAICS code for industry had different values in the repeated records,³ or (3) individuals had more than one spell of participation that ended in fiscal 2006.⁴

Table 2 shows the number of records that were eliminated for each of these reasons.

Table 2 Record Deletions, by Reason for Elimination

Program	Records in original file	Complete replicates	Eliminated by NAICS algorithm	Multiple spells eliminated	Remaining records
WIA-Adult	51,406	16	128	19	51,243
WIA-Dislocated Workers	35,989	11	49	0	35,929
WIA-Youth	33,944	11	75	0	33,858
TAA	54,386	23	137	0	54,226
Postsecondary Education	242,826	34	390	5,814	236,588
Wagner-Peyser*	6,346,162	2,962	8,932	774,564	5,559,704

NOTE: *To save on processing time, multiple spells were eliminated for Wagner-Peyser before the NAICS algorithm was run.

The next series of steps involved examining the data for out of range or outlier values. When problems were found, the individuals' records were deleted from the database. First, distributions of quarterly earnings were examined exhaustively to determine whether some levels of earnings might be considered too high to be believable. A maximum cut-off was set. All of the records for an individual that had earnings above the cut-off *in any quarter* were deleted.

² Presumably these records differed in values for some variable(s) that were not extracted to this database.

³ We used the following algorithm to eliminate duplicative (except for NAICS) records: (1) when there are two or more duplicates, eliminate the record(s) with NAICS = 0 or NAICS = 99; if there are still duplicates, proceed to the next step; (2) examine NAICS codes for all other quarters for this ID and keep record that matches NAICS code in adjacent quarters; if there are still duplicates, proceed to the next step; (3) if there is no match in adjacent quarters, then use the NAICS code that appears the most times in the 19 quarters; if there are still duplicates, then choose one of the records randomly.

⁴ We chose the spell that was completed at the latest point in the year.

The cut-offs were \$50,000 in quarterly earnings for TAA and postsecondary; \$30,000 for WIA-Adults, WIA-Dislocated Workers, and Wagner-Peyser; and \$15,000 for WIA-Youth. These cut-offs eliminated 0.5 percent of the sample size for WIA-Adults; 2.7 percent for WIA-Dislocated workers; 0.4 percent for WIA-Youth; 4.1 percent for TAA; 0.3 percent for postsecondary education; and 1.7 percent for Wagner-Peyser. A second screen was applied—just for postsecondary education. In this case, if an individual had a “spell” of participation with an enrollment date in 2006/07 or had a graduation date before or after fiscal 2006, they were deleted from the data set. This eliminated all of the records for 210, or about 1.8 percent, of the unique individuals in the sample for postsecondary education.

The final editing screen was for demographic or geographic variables that were missing or out of range. Again, all records associated with an individual that had problematic data were deleted. This hardly affected the WIA program data. One individual in WIA-Dislocated Workers was eliminated because he/she was over 80 years old, and one individual in WIA-Youth had sex missing. For TAA, 360 individuals (about 13 percent of the sample) were deleted because of missing values for “Employed at the time of registration” or because “County of Residence” was out-of-state. For postsecondary education, 766 individuals (about 6.5 percent of the sample) were deleted because sex was missing, age was out of range, or residence was out of state. For Wagner-Peyser, 14,917 individuals (about 0.4 percent of the sample) were eliminated because age was missing or out of range (<14 or >64), sex was missing, county of residence was out-of-state, or individuals were co-enrolled in a workforce program. Table 3 summarizes these edits.

Table 3 Record Exclusions for Editing Purposes

Program	Unique IDs in original data	Excluded by earnings cut-off	Excluded for participation data error	Excluded for missing demographics	Unique IDs in remaining data set
WIA-Adult	2,697	13	0	0	2,684
WIA-Dislocated Worker	1,891	51	0	1	1,839
WIA-Youth	1,782	7	0	1	1,774
TAA	2,854	118	0	360	2,376
Postsecondary Education	12,452	35	210	766	11,441
Wagner-Peyser	292,616	4,919	0	14,917	272,780

The final type of editing that was done involved recoding some values of the data in order to estimate propensity scores as described below. In examining the quarterly earnings distributions, some values were found that were extraordinarily low. In these instances, the data were bottom-coded, i.e., values were changed to an earnings floor. Unlike the high-end earnings where a cut-off was set, the records with earnings below the floor values were not deleted. We just changed the values. The floors that were used were \$100 for all of the programs except WIA-Youth, and for it, we used \$50. This recoding affected approximately 10 percent of the program participants, but less than one percent of the quarterly earnings values. The rest of the recoding had to do with the treatment of missing values in the logistic regressions described below. In all cases, missing was set to the reference value. If race was missing, it was set to non-white, which is the reference value for the variable “ethnicity = white.” If disability was missing, it was set to non-disabled, and if county of residence was missing, it was set to Marion County.

Propensity Score Matching

To construct the comparison groups for the five programs being analyzed, a technique called propensity score matching was used. This technique uses regression techniques to estimate

an equation that predicts the likelihood of being a participant in one of the programs. The sample over which the regression was estimated was a concatenation of the WorkOne data set with a workforce program data set.⁵ The dependent variable was an indicator variable that took on the value of 1 if the observation was from a workforce program and 0 if it was from the WorkOne data. The explanatory variables included individual characteristics such as age, race, sex, education at the time of enrollment, disability status, employment status at the time of enrollment, county of residence, and labor market characteristics derived from the wage record data prior to program participation. Because the dependent variable is an indicator (i.e., 0 – 1) variable, logit regression was used. Appendix table A-1 provides the results from the five regressions.

On a program by program basis, the regression equations were used to impute a propensity score for each observation in program data file and the WorkOne data file. The propensity score is essentially the predicted probability of being in the program data. So for example, the regression estimates for WIA-Adults indicate that females, disabled individuals, and individuals with relatively low previous earnings tend to participate in the program.⁶ The propensity scores for observations that are disabled females with low previous earnings levels would be relatively high in *both* the WIA-Adults file and the WorkOne file. The propensity scores for non-disabled male observations with relatively high previous earnings would be low in both files.

The comparison sample from the universe of WorkOne applicants was constructed by conducting a statistical match on the propensity scores. That is, for every observation in the

⁵ For WIA-Youth, the WorkOne data set was limited to jobseekers between 14 and 21. For most of the other programs, the data set was limited to individuals between the ages of 21 to 64. For postsecondary, the data set was limited to ages 18 to 64.

⁶ These are not the only characteristics that are related to participation at a statistically significant level.

program file, we searched through the WorkOne file to find the observation that had the closest propensity score value. That observation was then entered into the comparison sample.

There are many variants to how propensity score matching can be done. For this study, one-to-one matching with replacement and a caliper was used. A constraint that was imposed involved doing an exact match on some characteristics. One-to-one matching simply means that the comparison group was formed by using just one observation from the WorkOne file for each observation in a program file. (The alternative would be to use a one-to-many technique.) Matching with replacement means that an observation in the WorkOne file may be used multiple times as long as it is the closest observation. The advantage of this method as compared to matching without replacement is that better matches are made. The disadvantage is that re-using observations biases the standard errors of the net impact estimates slightly. Matching with a caliper means that if no observation can be found within a certain “distance” of the program file’s observation, then the observation is deleted from consideration. In other words, the individual’s characteristics are so unique that a good matching observation could not be found. The WIA-Adult and WIA-Dislocated Worker files used exact matching on sex and region within the State (North, Central, South.) For the other three programs, we used exact matching for males and females only.

There are several methods of testing the quality of the match. Perhaps most important is a t-test on the differences in means of the observable characteristics at the time of program participation. Table A-2 exhibits these tests. For the most part, one expects statistical significance between the means for the program data set and the full WorkOne dataset, which implies that the populations are quite different. After the statistical matching, the expectation is

that the participants and the comparison group are similar; i.e., the t-tests will find no differences that are significant. Indeed, the results in the table confirm this for the most part.

NET IMPACTS OF PROGRAMS ON EMPLOYMENT, EARNINGS, AND BENEFITS

In theory, the net impacts of the workforce programs being analyzed are the differences in outcomes between the individuals who received workforce services (the treatment group) and the comparison group, i.e. (treatment – comparison.) In practice, estimation of the net impacts is complicated by the fact that there are four different, defensible methods for calculating them. Two of the methods are called levels estimates, and two of them are called difference-in-difference estimates. Levels estimates use the observed outcomes at a particular point in time after participants exit from the program. For example, the net impact of a program on earnings six quarters after exiting a program would be the average earnings in that quarter for individuals who were in the program minus the average earnings of members of the comparison group. The second type of levels estimates would be estimated by regression-adjusting the differences in means. Regression adjustment controls for differences between participants and comparison group members in things such as the local unemployment rate, industry of employment, and personal characteristics.

Difference-in-difference estimates use a baseline period, which in this study, is the year composed of the 4th through the 7th quarter prior to entering the program, and they use an outcome period that is the year composed of the 4th through the 7th quarter after exiting the program. The net impact is now the difference in the growth rates between the program participants and matched comparison group. As with the levels estimates, the difference-in-

difference estimates can be regression-adjusted to control for factors that may not be equally distributed across the participant and comparison group populations.

Many evaluators/econometricians would suggest that the regression-adjusted difference-in-differences are the best estimates to use because they partially control for unobservables. However, an assumption that is made with the difference-in-difference estimators is that the labor market experiences of individuals are roughly the same in the baseline and outcome periods. This is a strong assumption for dislocated workers or TAA participants because to be eligible for services, their jobs were about to end in the baseline period. Furthermore, the assumption seems unrealistic for WIA-Youth or postsecondary programs because prior to program involvement, these individuals were likely to have been students. The assumption may be reasonable for WIA-Adults, but those estimates turned out to be empirically similar to the regression-adjusted levels. For consistency, the regression-adjusted levels were used as the study's preferred estimates.

Table 4 displays the results of the net impact estimation. Note that the table displays the impacts on three outcomes—employment, earnings, and UI benefits. Employment is specifically defined as having at least \$100 in quarterly earnings.⁷ Earnings come directly from the wage record data and are not edited in any way.⁸ UI benefits are benefits paid to a recipient in a calendar quarter. Two time periods are displayed in this table—3rd and 7th full quarters after exiting from the program.

The table shows quite positive and statistically significant results for WIA-Adults, WIA-Dislocated Workers, and Postsecondary Education. The first entry of 14.8 percent means that in

⁷ \$50 for WIA-Youth.

⁸ That is, there was no minimum level set as there was for employment. So, for example, if a record showed \$75 in earnings in a quarter, they would be considered not employed. But the \$75 would enter into the earnings impact.

the 3rd quarter after leaving the WIA-Adult program, individuals from that program had an employment rate that was 14.8 percentage points higher than the individuals in the matched comparison group. Roughly, 74 percent of the program participants were employed (had earnings >\$100 in the quarter) and only 59 percent of the matched comparison group individuals were employed. The impact persisted through the 7th quarter after exit; decreasing by only about one percentage point. Slightly stronger employment impacts were estimated for WIA-Dislocated Workers and Postsecondary programs. The impacts here were on the order of 16 to 20 percentage points. The WIA-Dislocated Worker impacts declined slightly between the 3rd and 7th quarters after exit, but the impacts for postsecondary programs actually increased. The other two programs—WIA Youth and TAA—showed positive employment impacts, but these estimates were not statistically significant.

Table 4 Regression-Adjusted Mean Differences in Post-Exit Outcomes

	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary
Employment, 3rd quarter (%)	14.8**	17.0**	3.4	3.2	17.9**
Employment, 7th quarter (%)	13.7**	16.5**	2.3	5.1**	19.9**
Earnings, 3rd quarter (\$)	549**	410**	24	-122	1,490**
Earnings, 7th quarter (\$)	463**	310**	47	-139	1,547**
UI benefits, 3rd quarter (\$)	-15	-53**	5	-95**	-22**
UI benefits, 7th quarter (\$)	10	3	-0	-15	-15**

NOTE: **Indicates statistical significance at the 0.05 level. All dollar impacts are in 2008 \$.

The middle panel of the table shows earnings impacts. Not surprisingly, the programs that had strong employment impacts also had positive and statistically significant earnings impacts. The WIA-Adult impact on earnings was about \$550 per quarter in the 3rd quarter after exit and about \$450 per quarter in the 7th quarter. The Dislocated Worker impacts were

somewhat smaller—about \$400 and \$300 in the 3rd and 7th quarters after exit. On the other hand, the earnings impacts for postsecondary programs were quite large; on the order of \$1,500 per quarter. In terms of percents, these postsecondary earnings impacts are about 25 percent. As is the case with employment impacts, the WIA-Youth and TAA programs essentially have no impact on earnings in either the 3rd or 7th quarter after exiting from training. (Interestingly, the earnings impacts have negative signs for TAA, meaning that the individuals from the matched comparison group actually receive higher earnings.)

The bottom panel of the table shows impacts on the receipt of UI benefits. The expectation is that programs that increase employment rates of participants should reduce UI benefits in the short run.⁹ In general, the results conform to this expectation, especially in the 3rd quarter after program exit. Here, WIA-Dislocated Workers, TAA, and Postsecondary programs all have a statistically significant reduction in quarterly UI benefits. These reductions are all attenuated by the 7th quarter, however.

Comparison of results to other states. One way to test the validity of the results is to compare them to the results in similar studies in other states. Studies that are closest in comparability to this study examined workforce programs in Washington and Virginia.¹⁰ The Washington study examined data from program exiters in 2003/2004, whereas the Virginia study used 2004/2005 for its period of analysis. Table 5 compares the employment and earnings net

⁹ Longer-run impacts on UI benefits are less clear. An increase in employment rates for a group increases the risk of becoming unemployed eventually. Thus one “cost” to a workforce development program that is successful at placing individuals is that in the long run, the individuals may actually receive more UI benefits than otherwise expected.

¹⁰ Hollenbeck, Kevin M., and Wei-Jang Huang. 2006. *Net Impact and Benefit-Cost Estimates of the Workforce Development System in Washington, State*. Technical Report No. TR06-020. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Hollenbeck, Kevin M., and Wei-Jang Huang. 2008. *Workforce Program Performance Indicators for The Commonwealth of Virginia*. Technical Report No. 08-024. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

impact estimates from these two studies to the estimates for the 3rd quarter after exit in table 4. (Note that the earnings estimates for Indiana have been deflated to 2005/2006\$ to be consistent with the other studies.) Qualitatively, the estimates are quite similar. In all the studies, the WIA-Adult, WIA-Dislocated Worker, and Postsecondary Education programs have positive and significant employment and earnings net impacts. In the studies, the WIA-Youth and TAA impacts are generally not significantly different from zero.

Table 5 A Comparison of Findings Across States

Outcome	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary Education
Employment in 3rd quarter (%)					
Indiana	14.8***	17.0***	3.4	3.2	17.9***
Washington	9.7***	8.7***	4.2**	na	10.3***
Virginia ^{a, c}		3.4***	-3.9**	-5.9***	2.8***
Quarterly earnings in 3rd quarter ^b (\$)					
Indiana	549**	410**	24	-122	1,490***
Washington	711***	784***	66	na	1,275***
Virginia ^{a, c}		146***	62	-154***	1,539***

NOTES: *, **, *** impact estimate is significant at 0.10, 0.05, and 0.01 level.

^aWIA-Adults and WIA-Dislocated Workers were combined in the Virginia study.

^bIndiana results in 2008\$; Washington and Virginia in 2005/2006\$.

^cVirginia results are for the 4th quarter after exit.

Inexplicably, the Indiana employment impacts are much larger than the comparable impacts in both of the other two states, but the quarterly earnings impacts tend to be smaller. This pattern suggests that for the time period under examination, program administrators were very good at getting clients placed, but the wage rates or hours were not as lucrative as in the other two states.

It should be noted that both the Washington and Virginia studies examined several other workforce programs such as adult education, vocational rehabilitation, apprenticeships, and secondary career and technical education. These programs were not analyzed for Indiana since those data are not in the IWIS system.

Results of training. It should be recognized that not all workforce system programs provide training to all clients. In particular, about half of the Workforce Investment Act adult program participants receive training. At the national level, between program years 2002 to 2005, the annual average number of participants in WIA-Adults was about 250,000, of whom about 46.0 percent received training. The annual average number of WIA-Dislocated Workers was about 200,000, of whom about 48.5 percent received training. Between program years 1999 and 2003, the Trade Adjustment Assistance program had about 40,000 participants, of whom just under 80.0 percent received training.

The IWIS data identified individuals in the WIA-Adult and WIA-Dislocated Worker programs who had entered training while on the program rolls (the data do not indicate whether the training was completed). For the FY 2006 data, 58.1 percent of the WIA-Adult participants were recorded as having had entered training, whereas 49.1 percent of WIA-Dislocated Workers were trained. For these two programs, we disaggregated the net impact results to the populations who entered training and those who did not. The estimates are displayed in table 6. These disaggregated results suggest that training significantly increases the employment rate and

Table 6 Net Impacts, Disaggregated by Training Status

Outcome	WIA-Adults			WIA-Dislocated Workers		
	All	Training	No Training	All	Training	No Training
Employment, 3rd Qtr (%)	14.8***	19.2***	9.5***	17.0***	15.4***	18.3***
Employment, 7th Qtr (%)	13.7***	18.2***	8.2***	16.5***	15.9***	17.0***
Earnings, 3rd Qtr (\$)	549***	751***	339***	410***	482***	354***
Earnings, 7th Qtr (\$)	463***	692***	221***	310**	394***	245***
UI benefits, 3rd Qtr (\$)	-15	-17	-12	-53**	-70**	-39**
UI benefits, 7th Qtr (\$)	10	1	21	3	-20	21

NOTES: *, **, *** impact estimate is significant at 0.10, 0.05, and 0.01 level.

earnings outcomes for WIA-Adults. However, the employment and earnings impacts are not significantly different from the impacts for individuals who did not enter training for WIA-Dislocated Workers.

RETURN ON INVESTMENT

The ROIs are the interest rates that equalize the flow of discounted future benefits to (investment) costs. For this study, ROIs have been calculated for two time periods—lifetime (to age 65) and short-term, meaning 10 quarters. Furthermore, the ROIs have been calculated for three groups: (1) the program participants, (2) the public sector (state and federal government), and (3) all of society. Note that the benefits and costs differ depending on the decision making groups whose interests are affected by the action. For example, increased taxes are a cost to individuals, but a benefit to the government.

For this project, the benefits that were calculated included the following:

- Increased earnings
- Fringe benefits associated with those earnings
- Federal, state, and local taxes on earnings (negative benefit to participants; benefit to government)
- Reductions in UI benefits (negative benefit to participants; benefit to government)
- Reductions in TANF benefits (negative benefit to participants; benefit to government)
- Reductions in Food Stamp benefits (negative benefit to participants; benefit to government)
- Reductions in Medicaid benefits (negative benefit to participants; benefit to government)

The costs included the following:

- Foregone earnings (reduced earnings during the period of training)
- Tuition payments
- Program costs, including tuition subsidies

The ROIs presented here are all *quarterly interest rates*. To estimate the annual rates, they can be multiplied by 4.0.

Table 7 provides the ROI estimates for the five workforce development programs analyzed using the lifetime earnings time period. From a societal point of view, the WIA Adult and Postsecondary programs have substantial ROIs of about 25 percent and 40 percent on an annual basis. From the individual’s point of view, those two programs plus WIA-Youth have very high returns, and WIA-Dislocated Workers has an adequate return. TAA has a negative return—the costs to the participant exceed the discounted flow of returns. From the government’s point of view, WIA-Dislocated Workers, TAA, and Postsecondary programs generate enough tax revenue or transfer program reductions to cover the program costs.

Table 7 Quarterly ROIs Using Lifetime Earnings Flow Estimates

	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary
Individual program participant (%)	16.32	2.64	13.27	-0.93	29.87
Government (%)	-0.04	1.50	-1.73	5.01	1.82
Society (takes into consideration individual and government) (%)	7.60	2.13	0.22	-0.40	9.66

Note that the data in table 7 can be presented as benefit-cost ratios. This translation is made in the results shown in table 8. The way that these estimates are interpreted is that they are returns for every \$1.00 invested. So, looking at the Postsecondary column, for the average student, a dollar invested in this education returns over their lifetime \$27.58. Every dollar invested by Indiana in supporting this education returns \$2.37; and for every dollar that society invests (either students or taxpayers), the return is \$9.32.

Table 8 Benefit-Cost Ratios Using Lifetime Earnings Flow Estimates

	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary
Individual program participant (%)	11.72	2.39	14.25	0.63	27.58
Government (%)	0.99	1.60	0.18	1.91	2.37
Society (takes into consideration individual and government) (%)	3.63	2.00	1.17	0.86	9.32

The results are largely driven by the employment and earnings net impacts displayed in table 4. The stories that these results tell are the following. For WIA-Adults, the program increases their earnings and employment modestly. Earnings go up about \$300–\$500 per quarter in the short-run and about \$150 per quarter in the long-run. The “costs” to the individuals are minor. There is no tuition or fees, so the only cost to participants is foregone earnings; that is, earnings that they could have made while they were participating. Because WIA-Adult program participants are generally low wage workers, they give up modest earnings while they are being trained, only about \$500 per quarter for the 2.7 quarters that they are being served, on average. So the individual’s return is high. Program data on costs—administrative and services costs—are just over \$4,000 (2008\$) per individual.¹¹ The additional earnings generate tax revenues and the individuals receive less transfer income, but these additional revenues and expense reductions are not substantial enough to allow the government to recoup its costs.

The story is almost the opposite for WIA-Dislocated Workers. Their employment and earnings gains are comparable to, although a bit higher than WIA-Adults. But because they are higher wage workers, their foregone earnings during training are quite high (more than \$1,500 per quarter), so the average individual’s ROI is lower than for the Adult program. However,

¹¹ Debbie Gibson and Garmell Hudson of IDWD were very helpful in supplying program cost data for the WIA and TAA programs. Specifically, the costs were derived from data in tables M and N in the document, “Workforce Investment Act Annual Report, Program Year 2005, July 2005 to June 2006,” Indiana Department of Workforce Development, n.d.

dislocated workers' lifetime earnings increases and reductions in unemployment compensation more than offset the government's cost, which is over \$6,000 (2008\$) per participant.

The ROIs for WIA-Youth are similar to those for WIA-Adults. The foregone cost of training is very low—only about \$200 per quarter for just short of 3 quarters, on average—and while the employment and earnings net impacts are modestly positive, they last for a long period of time and generate a positive ROI. However, the earnings impacts do not generate much in the way of taxes, so the government's ROI is negative since the program costs are substantial. Not surprisingly, the results for TAA are similar to the results for WIA-Dislocated Workers. However, the foregone earnings cost of training (more than \$2,000 per quarter) is larger, which causes the individual's return to be negative, and the earnings and employment impacts are slightly smaller, which limits the extra tax revenues and causes the government's ROI to be slightly negative.

The story is all positive for postsecondary education. The investment cost for individuals comprises tuition and fees and foregone earnings. In this case, foregone earnings are actually negative (this means that postsecondary students' earnings while they were in school exceeded their matched counterparts' earnings during those quarters). However, the tuition and fees for 2.5 FTEs on average exceeded in magnitude the negative foregone earnings, so individuals still had a net investment of over \$4,000.¹² The net earnings and employment impacts of postsecondary education are large, so individuals generate more than enough additional earnings over their lifetimes to make a substantial return on their tuition investments. Furthermore, the additional taxes received from those earnings along with reductions in transfer payments more

¹² I am grateful to Bob Holmes, of IVTC, for providing the average tuition and state support data for postsecondary programs.

than offset the government subsidies so that the government gets a return of about 2 percent per quarter.

Short-Term ROIs. Table 9 shows the ROIs for the first 10 quarters after program services. In this case, some of the individuals' ROIs are positive, but none of the government's ROIs are positive. In other words, none of the government's investments in these programs pay off by the end of the 10th quarter after program exit. However, for the individual, positive returns are achieved within 10 quarters for WIA-Adults, WIA-Youth, and Postsecondary education.

Table 9 Quarterly ROIs for First 10 Quarters after Program

	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary
Individual program participant (%)	10.54	-15.76	6.03	**	27.35
Government (%)	-10.29	-21.31	**	-4.00	-20.80
Society (takes into consideration individual and government) (%)	-0.85	-17.83	-27.96	**	0.11

**Implausibly large negative estimates.

Assumptions. The ROI estimates require a number of assumptions. The following assumptions hold for all five programs:

- State/local income tax rate of 4.5 percent (Indiana data)
- FICA tax rate of 7.65 percent
- (Real) discount rate of 3.00 percent
- Fringe benefits = 20 percent of earnings (national data)
- Medicaid has 2.15 persons/case; and average benefits of \$435.33 (2000\$) per quarter (Washington State data)¹³
- TANF has a multiplier of 2.3128 for child care and supportive services (Washington State data)

The assumptions listed in table 10 were program specific.

¹³ We were unable to access participant or cost data from the Indiana Department of Human Services, so we used data from the State of Washington for some parameters needed in the ROI calculation.

Table 10 Assumptions Used to Estimate ROIs (Note: Indiana data unless otherwise noted.)

	WIA-Adult	WIA-Dislocated Workers	WIA-Youth	TAA	Postsecondary
Age at program registration; quarters until age 65	34.1; 124	43.2; 88	18.4; 187	44.4; 83	28.6;146
Earnings extrapolation (\$)	Max [616-22t, 150]	Max [485-25t, 250]	68	200	1,500
Unemployment compensation quarters; benefit (\$)	20; actual data	20; actual data	0; 0	20; actual data	40; actual data
Federal income tax rate	0.05	0.10	0.05	0.10	0.10
TANF/Food Stamps/Medicaid quarters; benefit (\$)	20; WA data	0;0	0;0	20; WA data	20; WA data
Duration of participation (in quarters)	2.72	3.73	2.8	5.25	8.00
Foregone earnings during training (\$)	1,350	6,440	495	14,203	-\$6,308
Public Costs, or Tuition/State support (for postsecondary) (\$)	4,132	6,426	6,550	3,114	3,522 FTE (2005\$)/3,968 FTE (2005\$)

Sensitivity analyses/policy experiments. Projecting earnings, employment, and income maintenance benefits far into the future in order to calculate lifetime ROIs requires strong assumptions. To examine the robustness of the results, we computed ROIs using different assumptions than those listed in the table. Most of the sensitivity tests that were undertaken had very little impact on the estimated ROIs. By far, the assumption that has the most significant influence on the results is the earnings extrapolation (second row of table 10). Using actual data, we can observe the additional earnings and employment that result from receiving program services only through the 8th full quarter after exit. To estimate ROIs, earnings need to be extrapolated for every quarter until the average participant turns 65, which is between 83 and 187 quarters after exiting from the program (see the first row of table 10). The functions or constants in the 2nd row of the table, used for these extrapolations, were derived from actual data for the first 8 quarters. Table 11 shows the ROI estimates for the five programs of interest when extrapolated earnings are reduced *by one-half*. In short, the magnitudes of the returns are smaller, but the signs of the results and the general stories are the same as those presented above.

Table 11 Quarterly ROIs Using Lifetime Earnings Flow Estimates Reduced by 50 Percent

	WIA-Dislocated			TAA	Postsecondary
	WIA-Adult	Workers	WIA-Youth		
Individual program participant (%)	5.45	0.21	6.27	-2.47	14.85
Government (%)	-1.47	0.82	**	3.29	0.28
Society (takes into consideration individual and government) (%)	2.00	0.49	-0.65	-1.94	4.46

** Implausibly large negative estimate.

In addition to the sensitivity analyses, two policy experiments were undertaken. First, tables 7 and 9 display negative (or small) returns to the government for the public workforce programs (WIA and TAA), but sizable returns to the individual program participants. The first policy experiment that was done was to reduce the per participant cost of the programs by 25 percent, and to concomitantly reduce the earnings gains from the programs by 25 percent. In a similar vein, because of the exceptionally high returns to individuals relative to the state's taxpayers for postsecondary programs, we reduced the state subsidy for postsecondary career and technical education by 25 percent, and added that amount to tuition and fees. The results of these policy analyses are shown in table 12.

Table 12 Quarterly ROIs From Policy Experiments that Reduce Public Sector Costs

	WIA-Dislocated			TAA	Postsecondary
	WIA-Adult	Workers	WIA-Youth		
Individual program participant (%)	10.49	1.49	9.77	-1.58	17.91
Government (%)	0.40	2.24	-1.72	8.68	2.72
Society (takes into consideration individual and government) (%)	6.65	1.78	0.22	-0.97	9.66

The results in table 12 should be compared and contrasted with those in table 7. The results for the WIA-Adult and WIA-Dislocated Worker programs suggest that scaling up either of these programs, which would likely reduce per participant costs and also per participant

employment and earnings gains, would still yield sizeable returns for the individuals and would enhance the payoff for the state government. A similar result holds for WIA-Youth, although the return to taxpayers is still negative.

The ROIs for TAA suggest just the opposite. For this program, the return to the taxpayer is quite large, and the return to the program participant is negative. This combination suggests that the program might be able to strike a better balance by investing more into the services provided to individuals (assuming that these individuals would then obtain more positive labor market outcomes.)

Finally, reducing state subsidies to sub-baccalaureate education and increasing tuition and fees turns out to be reasonable from the ROI point of view. The return to individuals declines by about 12 percentage points, but is still well over 50 percent on annualized basis. The state's return increases from about 7 percent on an annual basis to about 10 percent. (Note that the social rate of return stays the same—this policy simply transfers some of the return from individuals to the state.)

CONCLUSIONS AND RECOMMENDATIONS

In many ways, this study should be considered a prototype, or proof of concept. It shows a potential use of administrative data. All in all, it seems that with IWIS and with support of studies such as this, Indiana has shown the potential for systematically using data to inform policymakers and to improve its workforce development system. However, this study was limited to analyses of only five programs and did not gain access to programs such as adult or secondary education nor did it gain access to income maintenance program data from IDHS.

Nevertheless, the study did make considerable analytical headway. The findings of note in this report are summarized in the following paragraphs.

- The net impact results suggested that the WIA-Adult, WIA-Dislocated Worker, and Postsecondary Education programs result in quite positive and statistically significant labor market results for participants. The earnings impacts for postsecondary programs were quite large; on the order of \$1,500 per quarter, which in terms of percents, are about 25 percent. The other two programs examined in this study—WIA Youth and TAA—showed positive employment impacts, but these estimates were not statistically significant. Furthermore, these programs did not increase quarterly earnings.
- The ROI results indicated that sub-baccalaureate postsecondary education has a substantial payoff for students and for the government.
- The ROIs also suggest that the WIA program as delivered in 2005/2006 “worked.” Participants in all of the components—Adults, Dislocated Workers, and Youth—end up with substantial ROIs. For Adults and Youth, the “costs” in terms of foregone employment and earnings are not very large, and therefore the modest earnings gains over a lifetime yield a handsome individual return. Dislocated workers have higher “costs” and a shorter lifetime of earnings to recoup those costs, but their net earnings impacts are substantial enough to earn a positive ROI. From the government’s perspective, a reduction in program costs per participant would bring in a positive return to taxpayers.
- For TAA, individual costs are not recouped by earnings and employment gains. From the state’s perspective, however, there is a positive ROI.

In addition to these findings, we would offer the following recommendation for the Joyce Policy Group and other policy makers to consider.

Recommendation 1: *Legislate or use an executive order to mandate ROI studies to be used in the budgeting process.* The purpose of estimating ROIs for the various programs comprising the workforce development system is to determine whether there might be relative underinvestment in one or a few programs as indicated by relatively high returns on investment. If there were high returns, then it would be sensible to re-allocate funding toward those programs to the extent practicable.

It should be noted that the ROI estimates are but one data point that policy makers should rely on among many others. We are not advocating a “Tayloristic” scientific management system wherein major changes might be made based on a single measurement. Rather, rigorous net impact and ROI estimates should be produced and analyzed. Where returns seem relatively low, questions should be asked about how outcomes can be improved. Where returns are high, questions should be asked about how programs can be expanded, and approaches can be exported to others.

Recommendation 2: *Invest adequately in data systems.* The IWIS system is a great start, but the initiative needs to continue and be funded at an adequate level. Resources need to be adequate, and also staffing expertise needs to be available. In general, a data warehouse effort such as IWIS needs a considerable investment in time and effort for its design, but also needs a thorough plan for retaining complete and accurate data. Data need to be appropriately “cleaned” in order to support rigorous analyses. It might make sense for the state to develop common intake forms so that individuals are providing the same information no matter where they enter the system.¹⁴ With common forms, then the state can develop common data error checking procedures. Furthermore, the state can design and produce performance monitoring reports that are systematic across agencies.

Recommendation 3: *Institute a cross-program coordinating board.* As it moves forward, we hope that the state will develop an oversight or coordinating entity that will have cross-program accountability. We believe that such a construct will facilitate meaningful use of net impact/ROI studies, but also would be a way to overcome the “siloing” that occurs from having different programs administered by different agencies.

¹⁴ Note that the postsecondary data used in this study were missing a number of key demographic variables. A common intake form and/or consistency in the data warehouse would overcome this type of problem.

APPENDIX A – Technical Tables

Table A-1 Participation Logit Regressions Used to Estimate Propensity Scores, by Program

Variable	Program				
	WIA-Adult	WIA-Dislocated Worker	WIA-Youth	TAA	Postsecondary
Age at entry	-0.006***	0.040***	-0.373***	0.040***	-0.061***
Female	1.070***	0.800***	0.854***	-0.174***	0.875***
White	0.039	0.549***	-0.612***	0.193**	0.914***
Education					
HS grad	0.421***	0.744***	-0.828***	0.158**	–
Some college	0.648***	0.938***	-1.262**	-0.841***	–
BA+	0.010	0.254*	–	-1.813***	–
Disabled	0.573***	0.379***	1.684**	2.261***	–
Veteran	-0.170*	-0.202**	–	0.761***	–
Employed at entry	0.297***	-1.152***	0.415***	-2.685***	–
Prior employment					
Percent employed (%)	-0.020	0.098	-0.223**	2.539***	-0.564***
Mean earnings (x10 ³) (\$)	-0.155***	0.089***	-0.141***	0.182***	0.758
Var. earnings (x10 ⁶) (\$)	-1.030	-0.074***	-3.390	-2.670	-1.290***
Earnings trend (x10 ³) (\$)	-0.417***	-0.358***	-0.750***	-0.188***	-0.666***
Dip	0.476***	0.154	0.115	0.279**	0.437***
Time since dip (qtr.)	-0.099***	-0.224***	-0.037	-0.299***	-0.188***
Percent dip (%)	0.126	0.373**	-0.030	-0.159	-1.114***
Region dummies	Yes	Yes	Yes	Yes	Yes
Log likelihood	-13,118	-8,837	-5,082	-8,172	-31,169
Pseudo R ²	0.070	0.101	0.217	0.297	0.100
Dep. mean	0.0100	0.0065	0.0502	0.0079	0.0271
Sample size	252,726	251,837	32,602	252,201	277,928

NOTES: Table entries are logit parameter estimates. *, **, *** parameter estimate is significant at 0.10, 0.05, and 0.01 level. – denotes variable not available in data set.

Table A-2 Variable Means in Full WorkOne Population, Program Participants, and Matched Comparison Sample, by program

Variable	Program								
	WIA-Adult			WIA-Dislocated Worker			WIA-Youth		
	Full WorkOne	Program	Comparison sample	Full WorkOne	Program	Comparison sample	Full WorkOne	Program	Comparison sample
Age at entry (yrs.)	36.0	34.1	34.5	36.0	43.2	42.9	19.4	18.4	18.3
Female ^a (%)	43.8	72.9	–	43.8	61.7	–	42.1	63.6	–
White (%)	75.9	73.0	71.7	75.9	87.2	88.8	74.5	58.2	57.5
Education									
HS dropout (%)	15.8	12.5	11.3	15.8	6.9	6.6	34.4	63.7	62.2
HS grad (%)	53.3 ⁺	54.5 ⁺	55.0	53.3 ⁺	54.9 ⁺	54.9	53.5	32.3	33.6
Some college (%)	22.2	28.4	28.9	22.2	30.6	31.6	11.5	4.0	3.6
BA+ (%)	8.7	4.7	4.8	8.7	7.6	6.9	0.6	0.0***	0.6***
Disabled (%)	3.7	6.5	6.0	3.7	5.3	5.1	2.8	11.4	12.9
Veteran (%)	10.7	5.5	6.1	10.7 ⁺	9.5 ^{+,*}	7.8*	2.2	0.0***	1.0***
Employed at entry (%)	19.9	24.1**	21.5**	19.9	7.6	6.8	18.3	17.5	10.4
Prior employment									
Percent employed (%)	78.1	65.2	63.7	78.1	74.9	74.7	68.8	50.7	49.7
Mean earnings (\$)	4,799	2,807	2,721	4,799	6,051	5,898	1,814	902	938
Var. earnings (x10 ⁶) (\$)	4.57	2.63	2.41	4.57	4.96	4.85	1.67	0.57	0.65
Earnings trend (\$)	60	-36	-23	60	-54	-26	145	29	36
Dip (%)	46.0	53.2	51.9	46.0	42.4	42.6	43.5 ⁺	42.0 ^{+,**}	38.1**
Time since dip (qtrs)	1.07 ⁺	1.09 ⁺	1.06	1.07	0.73	0.74	0.89	0.76	0.69
Percent dip (%)	32.0	39.6	38.6	32.0 ⁺	31.2 ⁺	30.6	32.4 ⁺	32.9 ^{+,**}	29.8**
Sample size	250,209	2,682	2,682	250,209	1,836	1,836	30,966	1,460	1,460

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Table A-2 (Continued)

Variable	Program					
	TAA			Postsecondary		
	Full WorkOne	Program	Comparison sample	Full WorkOne	Program	Comparison sample
Age at entry (yrs.)	36.0	44.4	44.8	35.9	28.6**	28.8**
Female ^a (%)	43.8	29.5	–	44.5	60.9	–
White (%)	75.9	88.0	86.4	75.9	86.5	86.2
Education						
HS dropout (%)	15.8	10.3	10.3	–	–	–
HS grad (%)	53.3	68.0	68.8	–	–	–
Some college (%)	22.2	17.8	16.9	–	–	–
BA+ (%)	8.7	3.9	3.9	–	–	–
Disabled (%)	3.7	24.2***	18.7***	–	–	–
Veteran (%)	10.7	30.0***	26.3***	–	–	–
Employed at entry (%)	19.9	2.9*	3.9*	–	–	–
Prior employment						
Percent employed (%)	78.1 ⁺	78.3 ⁺	83.6	78.1	46.6**	45.3**
Mean earnings (\$)	4,799	7,687**	8,044**	4,801	2,437***	2,253***
Var. earnings (x10 ⁶) (\$)	4.57	6.13	6.67	4.56	1.75	1.65
Earnings trend (\$)	60	-19	-17	60	4***	23***
Dip (%)	46.0	31.3	33.8	45.9	22.0***	20.0***
Time since dip (qtrs)	1.07	0.53**	0.61**	1.07	0.44***	0.39***
Percent dip (%)	32.0	20.4	22.2	31.9	14.5***	13.0***
Sample size	250,209	2,207	2,207	270,393	11,320	11,320

NOTES: – denotes variable not available in program administrative data. ⁺ difference between WorkOne and program mean is not significant at the 0.01 level. *, **, *** difference between program mean and comparison sample mean is significant at the 0.10, 0.05, and 0.01 level. WorkOne age restrictions: 14–21 for WIA-Youth; 21–64 for WIA-Adult, WIA-Dislocated Workers, TAA; 18–64 for Postsecondary.

^at-test between program and comparison sample is not meaningful because of exact matching by this variable.