ANALYSIS of the

Foothill Employment and Training Consortium

PROGRAM YEAR 2011

BENEFIT-COST ANALYSIS OF WIA PROGRAMS AND
REGIONAL ECONOMIC IMPACT ANALYSIS OF WIB OPERATIONS

MARCH 2013

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ACKNOWLEDGEMENTS

Economic Modeling Specialists Intl. (EMSI) is pleased to present this report to the Foothill Employment and Training Consortium (FETC), serving Los Angeles County in the state of California. Special thanks go to Phillip L. Dunn, Executive Director, who approved the study, and to Steve Chase, Planning Manager, and Flora Karmiryan, Senior Accountant, who collected and organized much of the data and information requested. We would also like to thank our reviewers, Dr. Kevin Hollenbeck, Senior Economist at the W.E. Upjohn Institute for Employment Research; Dr. Chris King, Senior Research Scientist and Director of the Ray Marshall Center for the Study of Human Resources and lecturer at the LBJ School of Public Affairs at The University of Texas at Austin; and Dr. David Stevens, Executive Director of The Jacob France Institute in the Merrick School of Business. Their help greatly improved the quality of our study.

The views expressed in this report are solely those of EMSI. Any errors are entirely the responsibility of EMSI and not of any of the above-mentioned institutions or individuals.

EXECUTIVE SUMMARY

The report examines the Foothill Employment and Training Consortium (FETC) and the benefits and costs generated by its adult, dislocated worker, and youth programs, which are largely supported by Workforce Investment Act (WIA) Title I funds. The report also measures the economic benefits generated by the operations of FETC in its local service region, defined by Los Angeles County in the state of California. The time period reflected in the analysis is Program Year 2011 (July 1, 2011 to June 30, 2012).

Key findings of the study are as follows:

BENEFIT-COST ANALYSIS OF WIA PROGRAMS

- The adult, dislocated worker, and youth programs at FETC served 376 registered participants in PY 2011.[1] Performance measures for PY 2011 show that, of those who were unemployed at the date of participation, 75 adults and 89 dislocated workers entered employment from October 1, 2010 to September 30, 2011. A total of 58 youth were placed in employment or education during that same time period.[2]
- Adult program participants who retained employment for three consecutive quarters after exit (according to PY 2011 performance measures) are projected to generate an aggregate present value of $2 million in added taxable earnings over the next ten-year period. The corresponding earnings effect of the dislocated worker program is $716,800, and the earnings effect of the youth program is $1.1 million.
- By the end of the ten-year time horizon, the adult program at FETC is projected to yield a cumulative added value of $3.30 in added taxable earnings per dollar spent

1 Self-serve participants who are not required to register for WIA services are excluded from the analysis.
2 Due to WIA performance measurement requirements, the entered employment rate reflects participants who exited three quarters prior to the start of the program year. Similarly, there is a time lag of five quarters in the data for the retention rate.

to fund the program. Similarly, the dislocated worker program will yield $1.09 for every dollar spent, and the youth program will generate $2.02.[3]

- Overall, the combined adult, dislocated worker, and youth programs at FETC will generate a cumulative added value of $2.10 in added taxable earnings for every dollar spent.[4] These benefits accrue to all members of society—higher earnings for participants, increased output for businesses, and added tax receipts for government.

REGIONAL ECONOMIC IMPACT ANALYSIS OF WIB OPERATIONS

- FETC employed 20 FTE staff with a combined payroll of $941,800 (excluding benefits) in PY 2011. The WIB spent another $918,700 for supplies and services. FETC's payroll and expenditures directly and indirectly generated $2.1 million in regional income and supported 33 jobs in the regional economy.
- Furthermore, FETC administered $818,800 in funds to participants in the form of special assistance funds and tuition vouchers, as well as to third-party contractors and service providers to run WIB-sponsored programs. These expenditures generated $1 million in added regional income and supported 17 jobs.

3 Variances in results across programs are largely informed by the number of people who retain employment, their associated change in earnings, and the amount spent by the WIB to run the program. Note that, due to a lack of reliable information, there are many economic and social benefits that are not quantified in this report, particularly in the case of the youth program. For example, a primary measure of success for youth is the attainment of a high school diploma or post-secondary certificate or degree; however, there are no earnings data associated with this achievement in the wage records. As such, the model cannot attach a dollar value to the benefits of enrolling in education for youth, even though education has statistically demonstrated a positive impact on the earning potential of individuals.

4 As discussed later in this report, the benefit/cost ratios should not be viewed as standard return on investment (ROI) metrics. This is because the benefits of the investments facilitated by the WIB extend beyond those that accrue to the original investors.

Chapter 1.

STUDY OVERVIEW

The Foothill Employment and Training Consortium (FETC) provides services that can be measured in clear economic terms and generates a wide array of benefits through its WIA programs and its own day-to-day operations. Individuals benefit from workshops, career planning services, and job training programs. Employers benefit from consultation services, customized training programs, and a readily accessible pool of potential job candidates. Furthermore, as more jobseekers find in-demand jobs, the public as a whole benefits from higher regional earnings, increased business productivity, and lower unemployment rates.

PURPOSE OF THE REPORT

This study has two main objectives: (1) to provide a benefit-cost analysis of FETC's WIA programs, and (2) to examine the regional economic impacts of FETC operations. These objectives are described more fully below.

Benefit-cost analysis of WIA programs

As a Workforce Investment Board (WIB), one of the primary roles of FETC is to implement the Workforce Investment Act (WIA) of 1998, one of the main pieces of federal legislation that seeks to promote workforce development in the United States. The largest funding stream under this legislation is WIA Title I, which authorizes state and local WIBs to deliver services to jobseekers and establishes the funding formula for the WIA adult, dislocated worker, and youth programs.

The need for WIBs to demonstrate the benefits and costs of WIA programs is becoming increasingly clear, especially in light of recent questions raised by Congress regarding the effectiveness of many publicly-funded employment and training programs. Currently the common measures required by the U.S. Department of Labor serve as the primary performance metrics for WIA, but they do not address the fundamental question of

whether or not the public investment in WIA makes economic sense to the taxpayer. The first purpose of this study, therefore, is to provide an objective, third-party analysis of FETC's WIA programs, assessing whether or not the benefits that accrue to the public as a whole outweigh the taxpayer costs of supporting the programs. Results are presented from a distinctly national perspective, tracking both public benefits and taxpayer costs on a national accounting basis.

Regional economic impact analysis of FETC operations

The second main purpose of this report shifts from a national to a regional focus, measuring the economic impacts generated by FETC's day-to-day activities in the local region. FETC is an economic driver through the people it employs, through its local purchases for supplies and services, and through the funds it administers to participants and to program operators. These impacts play a role in the local economy that local constituents of WIBs may not realize or acknowledge. Our goal, therefore, is to provide readers with more insight on the positive contribution of FETC operations to the local economy.

NOTES OF IMPORTANCE

There are several notes of importance that readers should bear in mind when reviewing the findings presented in this report. First, benefit-cost analysis is not the same as a return on investment (ROI) analysis. Due to the nature of workforce development programs, far more people stand to benefit from the investment than just the original investors, in this case, the taxpayers. Taxpayers pay the full cost of WIA programs, but the benefits created by the programs are widely dispersed to jobseekers, employers, and the community as a whole. In an investment analysis where investors and beneficiaries are not one and the same, therefore, standard ROI measures such as the rate of return and payback period no longer apply. As such, we encourage readers to interpret the results of this study strictly in benefit-cost (as opposed to ROI) terms.

Second, this report is not intended to be a vehicle for comparing WIA with other government-funded workforce development programs such as the U.S. Employment Service (ES) and others. Other studies about the gains in earnings and employment probabilities in one program relative to another address such questions better and in greater detail. Our intent is simply to provide the WIB management team and stakeholders with pertinent information should questions arise about the extent to which WIA programs increase or decrease social resources, without reference to the marginal gains over other programs.

Finally, this report is useful in establishing a benchmark for future analysis, but it is limited in its ability to put forward recommendations on what the WIB can do next.

The implied assumption is that a WIB can effectively improve its metrics if it increases the number of people who find and retain employment, helps people find higher-paying jobs, or ensures that people retain their jobs for a longer period of time (all else being equal). Establishing a strategic plan for achieving these goals, however, is not the purpose of this report.

REPORT ORGANIZATION

The report has five chapters and five appendices. Chapter 1 provides an overview of the study. Chapter 2 discusses the regional backdrop and WIB profile data required to complete the analysis. Chapter 3 presents the benefit-cost analysis of WIA programs. Chapter 4 presents the regional economic impact analysis of WIB operations. Finally, Chapter 5 concludes the study and provides suggestions for further research.

Chapter 2.

REGIONAL BACKDROP AND WIB PROFILE DATA

Data requirements for the analysis included the following three types of information: (1) the economic profile of the region that FETC serves, (2) employee and finance data, and (3) WIA program data. EMSI's proprietary database and input-output model provided the economic profile data for the region, FETC provided the employee and finance data, and FutureWork Systems' Performance Matters Quarterly (PMQ) web-based data system provided the data on WIA programs. This chapter describes in detail the various data elements that were used to calculate the results of the analysis.

It is important to note that the strength of the results is in large part dependent on the quality of the data provided. Much of the data from the WIB is self-reported by participants at the time of registration, and it is impossible to validate all of their responses. Different reporting methodologies also pose problems for researchers when analyzing WIA programs, particularly when examining WIBs that have different service delivery strategies. Such variations are an important limitation in the data that readers should bear in mind when reviewing the findings in this report.

REGIONAL PROFILE DATA

FETC serves Los Angeles County in the state of California. For the purposes of this analysis, EMSI built a customized input-output (IO) model for the region. The data from EMSI's IO model and corresponding multiplier matrix yielded key information for the analysis, including earnings, non-labor income, jobs, and Gross Regional Product (GRP), as well as a set of industry-specific multipliers for calculating indirect effects. More information on the EMSI IO model appears in Appendix 2.

Table 1 on the next page summarizes the major industrial sectors of the region, with details on jobs, earnings, and non-labor income. Earnings refer to wages, salaries, and

proprietors' income; non-labor income refers to profits, rents, and other income. Together, earnings and non-labor income comprise the region's total income or GRP, equal to $478.8 billion. The region also supports approximately 5.5 million jobs.

TABLE 1. JOBS AND INCOME BY MAJOR INDUSTRIAL SECTOR IN REGION, 2012

Industry Sector	Earnings ('000)	Non-labor Income ('000)	GRP ('000)	Jobs
Agriculture, forestry, fishing and hunting	$300,371	$95,078	$395,449	8,877
Mining	$1,037,248	$1,750,493	$2,787,740	17,376
Utilities	$1,790,310	$5,220,683	$7,010,993	12,900
Construction	$9,095,695	$667,669	$9,763,363	191,192
Manufacturing	$28,098,432	$20,785,504	$48,883,936	382,621
Wholesale trade	$15,291,216	$12,325,466	$27,616,682	236,162
Retail trade	$17,385,449	$10,840,311	$28,225,760	496,836
Transportation and warehousing	$11,760,497	$5,259,760	$17,020,257	211,826
Information	$25,228,694	$25,868,375	$51,097,069	235,331
Finance and insurance	$23,751,235	$15,416,065	$39,167,300	270,758
Real estate and rental and leasing	$11,198,980	$39,581,503	$50,780,483	296,570
Professional and technical services	$33,546,333	$9,917,209	$43,463,542	439,512
Management of companies and enterprises	$6,703,806	$1,255,480	$7,959,286	60,436
Administrative and waste services	$12,740,532	$2,446,246	$15,186,778	364,011
Educational services	$7,319,091	$830,038	$8,149,129	172,368
Health care and social assistance	$30,990,119	$2,861,400	$33,851,518	539,304
Arts, entertainment, and recreation	$11,126,292	$2,986,930	$14,113,222	194,572
Accommodation and food services	$8,743,448	$5,336,360	$14,079,808	375,983
Other services, except public administration	$10,347,070	$1,163,313	$11,510,382	464,262
Federal government	$4,444,619	$1,179,755	$5,624,374	48,739
State and local government	$38,873,335	$3,211,751	$42,085,086	514,689
Total	**$309,772,772**	**$168,999,387**	**$478,772,158**	**5,534,345**

** Data reflect the most recent year for which data are available. EMSI data are updated quarterly.*

† Numbers may not add due to rounding.

Source: EMSI. See www.economicmodeling.com for a full list of data sources used to derive the data in this table.

EMPLOYEE AND FINANCE DATA

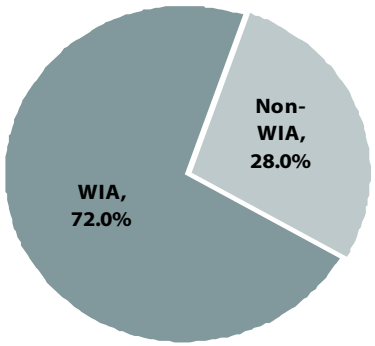
Table 2 and Figure 1 on the following page show FETC's revenues by source—a total of $2.5 million in PY 2011. As indicated, WIA Title I comprised 72% of total revenue, while other sources comprised the remaining 28%, including funds from Wagner-Peyser, National Emergency Grants (NEG), and other sources. The most important figures in this table are those for WIA programs, as these comprise the cost component of our benefit-cost analysis in Chapter 3.

TABLE 2. TOTAL REVENUES, PY 2011 ($ THOUSANDS)

Funding	Total	%
WIA REVENUE		
WIA adult	$591	23.5%
WIA dislocated worker	$657	26.1%
WIA youth	$563	22.4%
NON-WIA REVENUE		
Wagner-Peyser	$200	8.0%
National Emergency Grants (NEG)	$400	15.9%
All other funding	$103	4.1%
Total	**$2,514**	**100.0%**

** Numbers may not add due to rounding.*
Source: Data supplied by FETC.

FIGURE 1. REVENUES BY SOURCE



FETC also employed 20 FTE staff in PY 2011, with a combined payroll of $941,800 (excluding benefits). This information appears in Table 3. Staff wages and salaries at FETC become part of the region's overall earnings, while the spending of employees for groceries, apparel, and other household expenditures help support local businesses. This creates a ripple effect that generates more jobs, earnings, and sales throughout the local economy.

TABLE 3. TOTAL EXPENDITURES, PY 2011 ($ THOUSANDS)

Expense Item	Total	%
EXPENSES TO SUPPORT WIB OPERATIONS		
Wages and salaries	$942	35.2%
Benefits	$614	22.9%
Travel	$3	<.1%
Professional services	$63	2.4%
Office expense and supplies	$106	3.9%
Telephone and communications	$5	0.2%
Facilities expenses	$129	4.8%
MONIES PAID TO SUB-RECIPIENTS		
Monies paid to participants	$447	16.7%
Monies paid to program service providers	$372	13.9%
Total	**$2,679**	**99.9%**

** Numbers may not add due to rounding.*
Source: Data supplied by FETC.

In addition to being an employer, FETC purchases supplies and services from vendors and contractors, many of whom are located in the region. Expenditures for supporting activities made up a total of $918,700, including employee benefits, travel, professional services, office expenses, telephone and communications, facilities, and other expenses.

The WIB also paid $818,800 to participants and to third-party contractors and service providers to operate WIB-sponsored programs (see the bottom section of Table 3).

WIA PROGRAM DATA

Adult/Dislocated Worker

The WIA adult program provides employment and training services to individuals who are 18 years of age or older, with a priority of service given to people who are veterans, recipients of public assistance, low-income, or unemployed. The dislocated worker program targets individuals who have lost their jobs due to permanent closure, downsizing, or other reasons outside of the individuals' control. Both programs offer the following three levels of service to participants:

- **Core services** include outreach, workshops, and access to job search tools and labor market information.
- **Intensive services** include more comprehensive assessments, one-on-one counseling and career planning development, and other staff-assisted help.
- **Training services** include occupational and basic skills training through qualified training providers.

In addition to the three levels of service described above, WIBs may also provide "supportive" services such as transportation, childcare, and other forms of assistance designed to address the specific circumstances of individuals and give them the means to participate in the program.

Table 4 on the next page displays the number of registered participants in the adult and dislocated worker programs at FETC in PY 2011. As shown, FETC served 131 people in the adult program and 138 people in the dislocated worker program. Of these, 56 adults and 95 dislocated workers received training services, while the remaining people received core and intensive services.[5]

Also displayed in Table 4 are the common measures of the adult and dislocated worker programs, including the entered employment rate, the retention rate, and earnings change. Common measures are nationally defined accountability measures used to assess the performance of WIA-funded programs. The US Department of Labor (DOL) defines these measures as follows:

5 Individuals who utilized the WIB's self-directed services but who were not required to register in any WIA program are not included in the participant counts.

TABLE 4. ADULT/DISLOCATED WORKER PARTICIPANTS AND COMMON MEASURES, PY 2011

	Adult	Dislocated Worker
PARTICIPANTS SERVED		
No. of participants, non-training related	75	43
No. of participants, training-related	56	95
Total	131	138
ENTERED EMPLOYMENT RATE		
Entered employment numerator	75	89
Entered employment denominator	97	137
Entered employment rate (%)	77%	65%
RETENTION RATE		
Retention rate numerator	83	109
Retention rate denominator	93	124
Retention rate (%)	89%	88%
EARNINGS CHANGE		
Six-month average pre-program earnings	$4,042	$10,096
Six-month average post-program earnings	$11,746	$18,714
Average earnings change	$7,704	$8,618

** Data reflect the US Department of Labor WIA performance measures, not the state-negotiated performance goals.*

Source: Data supplied by FutureWork Systems' Performance Matters Quarterly (PMQ) web-based data system (see www.futureworksystems.com).

- **Entered employment rate:** Of those who are unemployed at the date of participation, the number of participants who are employed in the first quarter after the exit quarter divided by the number of participants who exit during the quarter.
- **Retention rate:** The number of participants who are employed in both the second and third quarters after the exit quarter divided by the number of participants who are employed in the first quarter after the exit quarter.
- **Earnings change:** Total earnings in the second and third quarters after the exit quarter (*i.e.*, post-program earnings) less total earnings in the second and third quarters prior to participation (*i.e.*, pre-program earnings) divided by the number of participants who are employed in the first, second, and third quarters after the exit quarter.

It is important to keep in mind that, due to WIA performance measurement requirements, the participant cohorts reflected in the performance measures are not always the same. For example, retention rates and the earnings data reflect participants who exited the program from April 1, 2010 to March 30, 2011, five quarters prior to the start of PY 2011. Similarly, there is a three quarter time lag in the data for participants who entered employment. Because of this, there is not necessarily a one-to-one match between dollars spent and participant outcomes for PY 2011. Assuming that the WIB's funding streams and participant outcomes stay relatively consistent over time, however, it is reasonable

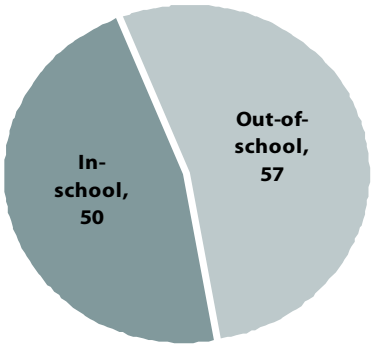
to use the dollars spent in one program year as a proxy for the monies used to serve participants who exited in a previous program year.

Youth

The WIA youth program aims to increase the long-term employability of young people between the ages of 14 and 21 by means of education and training programs. Positive outcomes for the youth program may be one or more of the following:

- Placed in employment or education;
- Attained a high school diploma or GED;
- Attained a post-secondary certificate or degree.

FIGURE 2. YOUTH PARTICIPANTS BY TYPE



WIA authorizes youth services to the following two types of populations: in-school youth and out-of-school youth. As shown in Figure 2, FETC served 50 in-school youth and 57 out-of-school youth in PY 2011. In addition to the age eligibility requirements, youth participants must also be a low-income individual (with limited exceptions) and meet one or more of the following barrier categories:

1. Deficient in basic literary skills;
2. School dropout;
3. Homeless, runaway, or foster child;
4. Pregnant or parenting;
5. Offender;
6. Disabled.

The breakdown of youth participants by barrier appears in Table 5 on the following page. The reader should note that, because youth may have more than one barrier, the sum does not match the total number of youth who participated in the program. Youth outcome data for PY 2011 appear in Table 6 and Figure 3, also on the next page. As indicated, 58 youth were placed in employment or education. Another 22 participants attained their HS diploma or GED, and 26 participants attained a post-secondary certificate or degree. As with Table 5, the figures in Table 6 may be duplicated since youth may achieve more than one positive outcome.

TABLE 5. NUMBER OF YOUTH PARTICIPANTS BY BARRIER, PY 2011

Barrier	Total
Deficient in basic literary skills	73
School dropout	3
Homeless, runaway, or foster child	9
Pregnant or parenting	12
Offender	11
Disabled	28
Total youth participants (unduplicated)*	**107**

** Youth may have more than one barrier, so the sum of the individual categories does not match the unduplicated total of participants.*

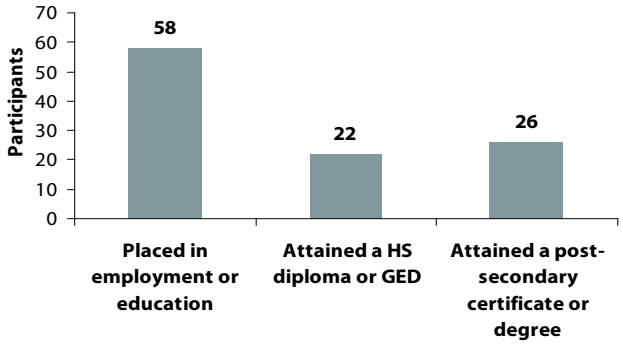
Source: Data supplied by FutureWork Systems.

TABLE 6. YOUTH OUTCOMES AND OTHER MEASURES, PY 2011

	Total
OUTCOMES	
Number placed in employment or education	58
Number who attained a HS diploma or GED	22
Number who attained a post-secondary certificate or degree	26
OTHER MEASURES (OLDER YOUTH ONLY)	
Retention numerator	22
Retention denominator	23
Retention rate (%)	96%
Average six-month earnings change	$5,027

Source: Data supplied by FutureWork Systems.

FIGURE 3. YOUTH OUTCOMES



The bottom half of Table 6 displays the retention rate and associated earnings change for older youth only, as these data are not available for younger youth. Note that, similar to the adult and dislocated worker programs, youth performance measures reflect different participant cohorts due to time lags in the data.

Chapter 3.

BENEFIT-COST ANALYSIS OF WIA PROGRAMS

Benefit-cost analysis is a standard method for determining whether or not a government program is economically viable, in accordance with the recommended guidelines set by the Office of Management and Budget for analyzing Federal programs and projects.[6] This methodology is appropriate where benefits are expected to be distributed over time and where a discount rate must be applied in order to account for the time value of money. The measure most commonly used in benefit-cost analysis is the benefit-cost ratio, *i.e.*, the present monetized value of benefits divided by the present monetized value of costs. If the benefit-cost ratio is greater than 1, then benefits exceed costs and the program is considered feasible.

In this study we use benefit-cost analysis to assess FETC's WIA-funded programs. Results are presented from a national perspective, measuring the economic benefits that accrue to the public as a whole and comparing these to the taxpayer funds used to support WIA programs. We include benefits to the entire public in recognition of the fact that far more people stand to benefit from WIA activities than just the taxpayers. This is in keeping with the primary purpose of WIA, *i.e.*, to provide a public service that increases the employment, retention, and earnings of participants and enhances the productivity of the economy as a whole. Because beneficiaries and funders are not one and the same, however, we encourage readers to distinguish the results from standard return-on-investment (ROI) analysis, where benefits are limited to those that strictly accrue to the original investors.

6 See the Office of Management and Budget, Circular No. A-94 Revised, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (OMB: October 1992).

APPROACH

There are a number of high quality studies that evaluate WIA programs. The most common is the quasi-experimental study where researchers measure the impacts of a particular program on the study's participants (*i.e.*, the "treatment" group) relative to those who do not participate in the program (*i.e.*, the "comparison" group). The study typically takes on a pre-post test design that examines the conditions of both the treatment group and the comparison group before and after the treatment to measure what effect takes place and whether or not it is statistically significant. See Hollenbeck *et al* (2005) and Heinrich *et al* (2008) for examples of a quasi-experimental impact evaluation of WIA programs.

In selecting a comparison group, researchers often apply propensity score matching techniques that are designed to match treated individuals (in this case, those who participate in WIA programs) with individuals who do not participate in WIA programs but who have similar observable characteristics. These characteristics can range from the individuals' employment history to a wide variety of demographic variables such as age, gender, ethnicity, geographic location, and socioeconomic background. Use of matching techniques allows researchers to better control for factors that are unrelated to WIA but that may affect the outcome of the pre-post test results. This is an important advantage when adjusting for potential biases in the analysis.

One of the disadvantages of quasi-experimental approaches to WIA program evaluation is that there is no reliable data pool from which researchers can draw a comparison group of untreated individuals, *i.e.*, people who do not receive services at all. Researchers often rely on observations collected from other workforce development programs such as Employment Services (ES), since the pool of observations is large and the probability that participants would be eligible for WIA treatment is high (*i.e.*, they have a high propensity score). However, ES and other workforce development programs are themselves a form of treatment, so drawing a comparison group from them generates results that are limited to the marginal benefits of one program over another. These results are valuable when analyzing WIA programs relative to alternative treatments, but they do not fully address the question of whether or not WIA is a better alternative to not offering services to jobseekers at all.

Another important disadvantage of quasi-experimental methodology regards its applicability in benefit-cost analysis. Because benefit-cost analyses typically examine benefits that occur over time, researchers need at least five years' worth of data, preferably more, in order to create a viable benefits stream. Using a comparison group based on empirical data would thus require researchers to either use data that is already five years old or older, or to perform a longitudinal analysis that tracks the treatment and comparison groups for

five years or more. The first option generates results that are potentially obsolete because they are based on older data, while the latter option is expensive and time-consuming.

In light of the disadvantages of quasi-experimental studies, our approach is to develop a pre-post test design without a comparison group, thereby allowing us to define the upper bound measure of benefits that were correlated with—but not necessarily caused by—the effect of WIA. These benefits we project ten years into the future using applicable theory and assumptions to simulate the employment patterns of participants over time. Our challenge is to control for potential biases without the supporting evidence of a comparison group and to adjust for correlating factors other than WIA that might affect the outcomes. This is an essential step in our benefit-cost analysis in order to arrive at a measure of the benefits that we can reasonably credit to WIA intervention. A full discussion of the theory, assumptions, and methodology used to control for these biases is presented in Appendix 1.

Readers should note that, as with any study of this nature, it is impossible to identify and account for all factors that may inform the success or failure of WIA programs, leaving the study vulnerable to questions about its internal validity. To head off these concerns, we intentionally apply a conservative methodology and are careful to avoid making assumptions that are unwarranted by the existing empirical data. We also provide a sensitivity analysis to test the uncertainty of the assumptions. In spite of these actions, however, we still encourage readers to interpret the results with caution and to bear in mind the inherent limitations of the approach.

Readers are also encouraged to interpret the results in the appropriate context. Worthwhile public projects often generate benefit-cost ratios that are low relative to those in the private sector. This is because the role of government is to provide services that the public wants but that the business sector may find unprofitable. As such, benefit-cost ratios that range from 0.3 to 3.0 in the public sector are normal and even expected. Considerable funds are spent on public parks, for example, yet they do not generate sufficient monies to recover the costs of supporting them. However, public parks generate many non-quantifiable benefits that are enjoyed by park users. Similarly, the benefits generated by WIA take on many different forms that do not necessarily translate to jobs and earnings. These are benefits that are difficult to quantify but that still have a positive impact on society.

RESULTS

Adult

The vast majority of participants in the adult program are either unemployed or underemployed, coming from low-income households, or otherwise economically disadvantaged. As such, the WIB's primary role in serving adults is to move people from a position of earning either very little or nothing at all to a position where they are gainfully employed and receiving a steady income.

In this study we calculate the benefits of the adult program based on the earnings change of individuals who find employment within a quarter of completion and retain employment for an additional two quarters (*i.e.*, the retention rate numerator).[7] We then project this earnings change ten years out into the future, adjust for a set of correlating factors in order to control for participant characteristics, and discount the results back to the present. The resulting benefits stream comprises the present value of the added taxable earnings that accrues to the public as a result of the earnings change of participants. Note that we do not include the indirect (*i.e.*, multiplier) effects in accordance with the recommended guidelines of the OMB. For more detail on the methodology used in these calculations, please see Appendix 1.

TABLE 8. BENEFITS AND COSTS OF ADULT PROGRAM ($ THOUSANDS)

	Amount
Present value of projected benefits	$1,951
Costs	$591
Benefit-cost ratio	**3.30**

Source: EMSI.

Table 8 presents the results of the analysis. As indicated, the 83 adults who retained employment (from the PY 2011 performance measures) will generate an earnings effect of $2 million over the next ten-year period. To derive a benefit-cost ratio, we divide the $2 million in earnings by the associated costs of the adult program, equal to $590,800, the total amount of WIA funding received by FETC to fund the program in PY 2011. This calculation yields a benefit-cost ratio of 3.30, *i.e.*, by the end of the ten-year time horizon, the adult program at FETC is projected to yield a cumulative added value of

7 Some might argue that we understate the results by not counting the benefits generated by participants who were served in one year but who did not find employment until a later year (either because they enrolled in a training program or were still receiving services from the WIB). However, some of the participants who find employment incurred a portion of their associated costs in previous program years. Our assumption, therefore, is that the benefits and costs that we do not count on the one hand are counter-balanced by the benefits and costs that we count on the other.

$3.30 in added taxable earnings per dollar spent to fund the program. The benefit-cost ratio appears in the bottom row of Table 8.

There are a couple of items to note regarding the $590,800 cost component of the benefit-cost ratio. First, a significant portion of WIA funding for the adult program is spent on participants who receive services without finding a job, so by allocating the full cost of the program to those who find and retain employment during the program year, we are essentially overstating the effective cost per completer. Limiting the costs to just those incurred by participants who find and retain employment would certainly yield higher benefit-cost ratios. However, the purpose of the analysis is to estimate the benefit-cost ratio for the adult program as a whole. This means taking the benefits generated by all participants—not just those with a positive outcome—and dividing by all costs. Because our analysis is based on the earnings change of participants over the course of the analysis year, the benefits generated by participants who do not retain employment is necessarily assumed to be zero.

Second, determining the true cost of the adult program is complicated by a collection of issues arising from the fungible nature of revenues, sunk capital costs, the indivisibility of certain inputs, and other concerns. For example, revenues that are dedicated to the adult program might be used to fund other WIB activities, causing an overstatement of actual WIA costs. However, the reverse occurs as well, where non-WIA funds support WIA activities, causing an understatement of actual WIA costs. For the purpose of this analysis, we assume that overstatement on the one hand is offset by understatement on the other. As such, data provided by the WIB on WIA funding for the adult program is likely a good estimate of the actual operating costs of the program.

Dislocated Worker

The dislocated worker program functions in a manner similar to that of the adult program, although it serves a different group of people. Participants do not necessarily come from low income backgrounds (as is generally the case for adult program participants); in fact, some participants may come from relatively high-paying jobs that they lost because of company closures, downsizing, or other factors outside of their control. In many cases it is difficult for participants in the dislocated worker program to get those wages back, even with training. As a result, it is not uncommon for the participants' post-program earnings to be less than what they were earning before they enrolled, creating a potential bias in the wage record data.

In other cases, dislocated workers may try for an extended period of time to find a job on their own before registering at the WIB for services, causing a decline in earnings in the several quarters prior to entry into the program. This phenomenon is known as

"Ashenfelter's dip" (Ashenfelter, 1978) and is a common pattern for participants in many publicly-funded employment and training programs. Dislocated workers that experience a decline in earnings prior to program entry show an earnings change that is higher than what might otherwise have been the case had they registered for services sooner, thereby generating another potential bias in the wage record data.[8]

Given the inherent biases in the earnings data for dislocated workers, we are unable to derive their gross earnings change simply by subtracting their pre-program earnings from their post-program earnings, as we do for the adult program.[9] Rather, we need to determine the difference between their post-program earnings and what their earnings levels would have been had they not entered the program at all. Here too the approach poses a fundamental challenge, however. Individuals cannot be participants and non-participants at the same time, so there is no way to know for certain what would have happened had they not registered for WIA services.

To address this problem, we use the dispersion of earnings in the local region to estimate the highest level of pay that dislocated workers would have been able to find on their own without WIA treatment. We then claim no more than 30% of the difference between the simulated earnings level and the participants' post-program earnings to estimate what portion of the earnings change is creditable to WIA intervention. From there we follow the same methodology as we do for the adult program, by projecting the earnings change into the future, controlling for participant characteristics, and discounting the results back to current year dollars. More information on the assumptions and methodology appears in Appendix 1.

Benefits and costs of the dislocated worker program appear in Table 9. The present value of the benefits amounts to a net increase in earnings of $716,800. This figure divided by the $656,600 that the WIB spent to fund the program generates a benefit-cost ratio of 1.09. This means that, over the next ten years, there will be a total of $1.09 in added taxable earnings that accrues to the public for every dollar spent to fund the WIA dislocated worker program at FETC.

8 Without knowing whether the participants' drop in earnings is permanent or merely reflects a temporary setback, the extent of the bias in the wage record data cannot be determined. We adopt a middle of the road approach recognizing that the drop in earnings prior to program entry would have been permanent for some participants and temporary for others had they not registered for WIA services.

9 Because adults are generally low-income or otherwise economically-disadvantaged at program entry, the potential biases in the wage record data are less pronounced. As such, we use the difference between their pre-program earnings and post-program earnings to derive their gross earnings change, then control for participant characteristics and other counterfactual outcomes when projecting their earnings change into the future.

TABLE 9. BENEFITS AND COSTS OF DISLOCATED WORKER PROGRAM ($ THOUSANDS)

	Amount
Present value of projected benefits	$717
Costs	$657
Benefit-cost ratio	**1.09**

Source: EMSI.

Youth

In this study we base the benefits of the youth program on the following two variables: (1) the number of youth who were placed in employment or education, and; (2) the earnings change of older youth who retained employment in the second and third quarters after exit. Calculating the net earnings change that accrues to youth follows a methodology similar to that of the adult program described earlier in this chapter and in Appendix 1. Results of the analysis appear in Table 10. The total earnings effect is $1.1 million, equal to the present value of the projected benefits that can reasonably be credited to the WIB over the next ten-year period. Dividing this value by the costs of the program yields a benefit-cost ratio of 2.02.

TABLE 10. BENEFITS AND COSTS OF YOUTH PROGRAM ($ THOUSANDS)

	Amount
Present value of projected benefits	$1,139
Costs	$563
Benefit-cost ratio	**2.02**

Source: EMSI.

It is important to keep in mind that, given the unique nature of the program, there are a number of economic and social benefits that the youth program generates but that are not quantified in Table 10. Participants who attain a high school diploma or a post-secondary degree or certificate can expect monetary and non-monetary benefits that persist throughout their entire lifetime. Attaining higher levels of education is also statistically correlated with improved social behaviors, such as reduced crime, increased volunteerism, reduced tobacco and alcohol abuse, *etc*. Another strong component of the youth program is assisting participants to attain the soft skills they need for long-term employability. These are incidental benefits of the youth program that are difficult to quantify but still worth mentioning.

Overall

Table 11 on the next page presents a summary of the benefit-cost ratios for the combined adult, dislocated worker program, and youth programs. Benefits comprise the earnings effects from Tables 8, 9, and 10, while costs comprise the total funding received by FETC

to run the programs. Dividing total benefits by total costs yields a 2.10 benefit/cost ratio, *i.e.*, every dollar in WIA funding will generate a cumulative added value of $2.10 over the next ten-year period.

TABLE 11. SUMMARY OF BENEFITS AND COSTS OF WIA PROGRAMS ($ THOUSANDS)

	Amount
Present value of projected benefits	$3,807
Costs	$1,810
Benefit-cost ratio	**2.10**

Source: EMSI.

Chapter 4.

REGIONAL ECONOMIC IMPACT ANALYSIS OF WIB OPERATIONS

In the previous chapter we present the results of the benefit-cost analysis of WIA programs. In this chapter we address an entirely different issue, namely, the regional economic impacts of WIB operations. Regional impact analysis is a standard approach for measuring the effect of an organization's activities on the structure of a regional economy. Results are typically measured in terms of changes in regional jobs and income.

Economic impact analysis is distinct from benefit-cost analysis in that it focuses on a single time period and does not project impacts into the future, nor does it factor in costs incurred by stakeholders. The benefit-cost analysis in this report also has an explicitly national backdrop, tracking both benefits and costs on a national accounting basis. In contrast, the economic impact analysis presented in this chapter has a regional focus, highlighting the role of the WIB in the annual formation of regional jobs and incomes. This information is of particular importance to local constituents interested in learning more about the WIB's "good neighbor" effect on the regional economy.

APPROACH

FETC generates economic benefits in the region in a variety of ways. The WIB is an employer and a buyer of goods and services. On top of this, it brings federal and state dollars into the region, directing a large portion of these to third-party service providers and to participants in the form of tuition vouchers and special assistance funds.[10] These

10 At the national level, the impact of WIB operations would be near zero, since every dollar of Federal and state funds that were injected into the U.S. economy originated from the U.S. economy anyway. At the regional level this is no longer the case; however, there is wide variance across regions in the

various expenditure ripple through the regional economy creating additional jobs and income.[11]

In this study we rely on a specialized input-output (IO) model that shows the interconnection of industries, government, and households in a given area. Each category of impacts estimated by the IO model is subdivided into the following two effects: the direct effect and the indirect effect. The direct effect comprises the changes in economic activity due to the first round of spending by the WIB, its employees, and its program operators. The indirect effect refers to the additional jobs and income created in the economy through the action of economic multipliers built into the regional IO model. For more information on the EMSI IO model, please see Appendix 2.

In calculating the impacts, we begin by mapping payroll and the WIB's purchases for supplies, services, and other supporting activities to the 21 top-level industry sectors of the IO model (see Table 1). For example, the WIB's expenditures for telephone and communications affect vendors in the "information" industry, so we allocate those expenditures to that industry. Similarly, we allocate the WIB's expenditures for professional services to the "professional and technical services" industry. All of the WIB's other expenditures are allocated to the different industry sectors in a similar fashion, depending on which industries the WIB's expenditures are most likely to affect.

Not all of the WIB's expenditures occur locally, however, so we must adjust the gross figures to account for monies that leak outside the region. To do this, we assume that the percent of employees who live in the region (80%) is a reasonable proxy for the percent of wages and salaries that are spent in the region. We also request data from FETC on the percent of funds directed to participants and to program operators that occur in the region. To FETC's remaining expenditures we apply industry-specific regional purchase coefficients, or RPCs, to determine what portion of them occurs in the region and what portion leaks outside the region.[12] With these adjustments, we are able to generate the direct sales effect of FETC on the regional economy.

The indirect sales effect we calculate by running direct sales through the IO model's

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degree to which Federal and state funds represent an injection. Until clearer regional cross-hauling effects of public monies can be captured in the data, we chose to assume that all Federal and state dollars received by the WIB during the program year were regional injections.

11 As noted in Chapter 1, income refers to the sum of earnings (*i.e.*, wages and salaries) and non-labor income (*i.e.*, profits, rents, and other). Together earnings and non-labor income comprise a region's total income or Gross Regional Product (GRP).

12 Regional purchase coefficients are a measure of the proportion of the total demand for a good or service that is supplied by vendors in the region. An RPC of 0.6, for example, means that 60% of the demand for that commodity is met by local vendors, while the remaining 40% of the demand is met by imports.

multiplier matrix. This provides an estimate of how the spending of FETC affects the inputs and outputs of other industries in the region. We then convert both the direct and indirect sales effects to regional jobs and income by means of jobs-to-sales and income-to-sales ratios, also provided by the IO model.

Here a brief note on the application of indirect (or multiplier) effects is in order. OMB guidelines explicitly recommend against the inclusion of multiplier effects in national benefit-cost analyses. Following OMB's directive, therefore, our national-level benefit-cost analysis presented in the previous chapter excludes multiplier effects. Here, however, where our focus is not national-level benefits and costs but rather regional economic effects, the inclusion of multiplier effects is most appropriate.

RESULTS

Table 12 presents the direct and indirect income and jobs effects of FETC. The direct income effect—equal to $941,800—comprises the total salaries and wages (excluding benefits) paid to FETC employees during the reporting year. The indirect effect, or $1.1 million, comprises the additional rounds of income created in the region as the WIB and its employees spend money for supplies and services. The associated multiplier is 2.20, *i.e.*, every dollar of payroll at the WIB yields an additional $1.20 in income in the economy.

The corresponding jobs effect of FETC is 20 direct jobs, equal to the number of FTE employees who work at the WIB. The WIB also accounted for 13 indirect jobs. Altogether the WIB directly and indirectly supported 33 jobs in the regional economy, for an overall jobs multiplier of 1.66 (*i.e.*, every FTE employee at the WIB yields an additional 0.66 jobs in the economy).

TABLE 12. OPERATIONS EFFECT, PY 2011 ($ THOUSANDS)

Effect	Income	Jobs
Direct effect	$942	20
Indirect effect	$1,134	13
Total	**$2,076**	**33**
Multiplier	2.20	1.66

** Numbers may not add due to rounding.*

Source: Based on data supplied by FETC and the EMSI IO model.

In addition to the impacts generated by FETC and its employees, the funds that the WIB administers to participants (in the form of special assistance and tuition vouchers) and to third-party service providers to operate programs also have an impact on the economy.

As shown in Table 13, these expenditures generate $1 million in income and support 17 jobs in the regional economy.

TABLE 13. EFFECT OF MONIES PAID TO PARTICIPANTS AND TO PROGRAM SERVICE PROVIDERS, PY 2011 ($ THOUSANDS)

Effect	Income	Jobs
Direct effect	$774	12
Indirect effect	$235	6
Total	**$1,009**	**17**
Multiplier	1.30	1.48

** Numbers may not add due to rounding.*
Source: Based on data supplied by FETC and the EMSI IO model.

Not included in these results but worth mentioning is the regional efficiency effect that is created in the local economy as the WIB works to match jobseekers to employers, saving both stakeholder groups considerable time and effort. Productivity effects also increase regional income through the increased skills and added productivity of participants who undergo training through a WIB-sponsored program. Tracking these effects is a worthy yet costly endeavor that is beyond the scope of the present research. Accordingly, we limit our regional impact analysis to the effect of WIB operations and its program operators, essentially assuming that the efficiency and productivity effects are zero. To the extent that these effects exist, however, our regional impact analysis should thus be considered conservative.

Chapter 5.

CONCLUSION

The results of this study demonstrate the benefits and costs of FETC's WIA-funded programs and the economic impacts generated by WIB operations in the regional economy. Participants of FETC's adult, dislocated worker, and youth programs who found and retained employment (according to the PY 2011 performance measures) are projected to generate a present value of $3.8 million in earnings over the next ten-year period. These benefits will generate a cumulative added value of $2.10 to the public as a whole for every WIA dollar spent. In addition, FETC directly and indirectly generated $2.1 million in income and supported 33 jobs in the region, while the funds that the WIB administered to participants and to program service providers generated an additional $1 million in income and supported 17 jobs.

It is anticipated that the results of this study and subsequent studies can be used as a performance benchmark for FETC, as well as for other WIBs that participate in the same research. Additional benefits of FETC that are not reflected in this study but that are worth mentioning include the following:

- Increase in income, property, and sales tax revenues as a result of employment outcomes;
- Avoided welfare and unemployment costs to government;
- Social benefits related to increased employability (particularly for youth), such as reduced crime and improved quality of life;

Further research and data collection will be required in order to fully capture the impact of these benefits.

Appendix 1.

ASSUMPTIONS & METHODOLOGY FOR BENEFIT-COST ANALYSIS

This appendix describes the background assumptions and methodology used to derive the future earnings stream and corresponding benefit-cost ratios for WIA programs. Our approach involves the following three steps:

- Calculate the average earnings change of WIA participants.
- Project the earnings change ten years out into the future.
- Derive the benefit-cost ratio.

The following sections describe these three steps in greater detail.

CALCULATING THE AVERAGE EARNINGS CHANGE

Data collected from the WIB provide the earnings of participants in the second and third quarters prior to receiving WIA services and in the second and third quarters after participants find employment. This information supplies the raw data needed to derive the pre-post test results for participants before and after WIA intervention.

As shown in Table 4, the average six-month earnings change for adults is $7,704, equal to post-program earnings of $11,746 less pre-program earnings of $4,042. Post-program earnings are reported in current dollars, so we likewise inflate pre-program earnings to current dollars so that we can determine the real (as opposed to nominal) earnings change. After adjusting for inflation, we convert the six-month earnings change to an annual figure by multiplying it by two, which yields a change in earnings of $14,968 for the entire year. This defines the upper limit earnings change that correlates with the

effect of WIA. We calculate the earnings change for dislocated workers and for youth in a similar fashion, with important modifications described later in this section.

Limitations of the approach

An inherent weakness in calculating the average earnings change using only six months' worth of data is Ashenfelter's dip, *i.e.*, the empirically-observed pattern that the earnings of participants generally decline or "dip" in the period just before participation in a government workforce program. This phenomenon was originally recognized by Ashenfelter (1978) and has been a common pattern in many workforce programs to date. For dislocated workers this "dip" is not an issue because we do not factor their recorded pre-program earnings into the analysis for reasons stated later in this section. For adults, the drop in earnings prior to program entry is generally less pronounced than it is for dislocated workers. Given the low-income status of adult participants, we assume that any earnings decline they experience will persist absent WIA intervention; as such, no adjustment in the pre-post earnings change is necessary.

Some might also argue that the analysis is subject to selection bias because we base the results solely on the earnings of individuals who find and retain employment, ignoring those who exit the program without a positive outcome. However, participants who exit the program before finding a job (*i.e.*, dropouts or soft exits) incur costs of WIA services, but we do not credit any subsequent benefits that they generate to WIA because they do not find a job through the program. Essentially we assume that their outcome is zero. In our benefit-cost analysis we weigh all WIA costs—including those used to serve participants without a positive outcome—against a benefits stream that is limited only to individuals who retain employment. This approach underscores the conservative nature of the analysis.

Simulating dislocated worker pre-program earnings

In applying the pre-program and post-program earnings differential, we make the fundamental assumption that the intervention of WIA cannot harm an individual's earning potential. It can only keep the individual's earnings at the same level or increase them from what they were before. This assumption particularly comes into play in the case of dislocated workers where participants are sometimes unable to find jobs that pay as well or better than their previous employment. As such, the difference between their pre-program earnings and their post-program earnings may be zero or even negative, as illustrated in Figure A1. There are a number of economy-wide factors outside the WIB's control that can cause the participants' earnings change to be negative, so clearly we cannot hold the WIB liable for it.

FIGURE A1. ILLUSTRATION OF NEGATIVE EARNINGS CHANGE BASED ON WAGE RECORD DATA

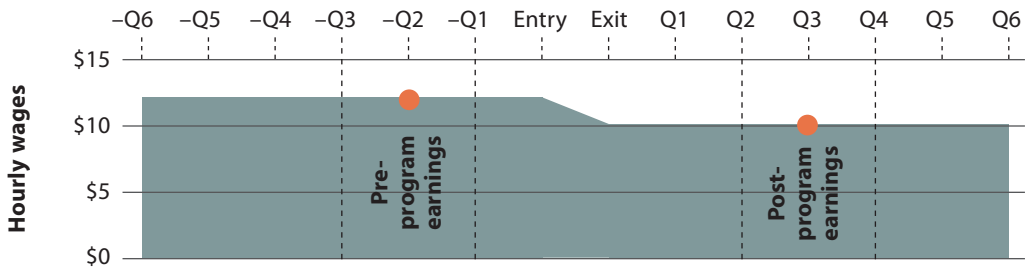
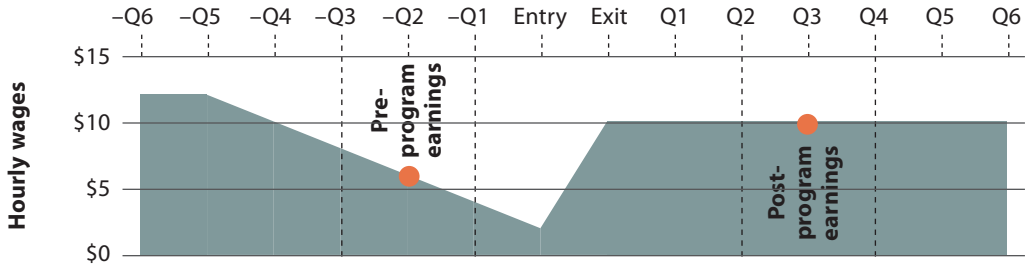


Figure A2 shows an alternate scenario where dislocated workers try for a period of time to find a job on their own before registering for WIA services. This causes a drop in earnings in the several quarters prior to program entry, in accordance with the phenomenon known as Ashenfelter's dip discussed in the previous section. As a result of this decline in earnings, the difference between the participants' post-program earnings and their pre-program earnings is positive. However, there is no way of knowing whether or not this decline would have existed had the participant registered for services sooner, nor do we know if the decline would have persisted had the participant forgone WIA services and continued the job search on their own. These potential biases in the data need to be addressed before crediting any portion of the participants' positive earnings change to WIA treatment.

FIGURE A2. ILLUSTRATION OF POSITIVE EARNINGS CHANGE BASED ON WAGE RECORD DATA



Our solution is to adopt a middle-of-the-road approach that simulates the earnings that dislocated workers would have received in the absence of any WIA services. We then subtract the participants' simulated earnings from their post-program earnings to derive their earnings change. The first step in our simulation is to assess the dispersion of earnings in the region by calculating the standard deviation of earnings at selected percentiles. Our assumption is that the *maximum* earnings change that WIA can claim for dislocated workers is defined by one standard deviation below the individuals' post-program earnings (*i.e.*, the earnings they receive after undergoing WIA treatment). In

other words, if dislocated workers had not received WIA treatment, we assume that they would have been able to find a job that paid at least as much as what they are currently earning less one standard deviation.

Having determined the maximum earnings change for participants, our next task is to calculate what portion of that earnings change is attributable to WIA and what portion of it is attributable to the natural ability of the participants themselves. In the absence of better data, we conservatively claim no more than 30% and no less than 10% of the maximum earnings change, depending on the earnings percentile in which participants fall. Our assumption here is that participants in the lowest earnings percentiles benefit the most from WIA services (*i.e.*, a higher percentage of the maximum earnings change is attributable to WIA) and those in the highest earnings percentile benefit the least from WIA services (a lower percentage of the maximum earnings change is attributable to WIA). With this methodology, we estimate that the average six-month earnings change of dislocated workers is $2,052, equal to the difference between their post-program earnings and what they would have earned had they not participated in the WIA program.

PROJECTING EARNINGS INTO THE FUTURE

In the previous section we describe how we derive the average earnings change of participants as a result of WIA intervention. In this section we discuss how we project this earnings change into the future, adjust for counterfactuals and the decay rate, and apply a discount rate to calculate the present value of the participants' future earnings stream.

Applying the growth function

To project earnings forward we use a standard log-linear earnings growth function as a smooth predictor of earnings over time. See for example Mincer (1974), Willis (2001), and Heckman, Lochner, and Todd (2006). Earnings projections are in constant dollars, so we use a real discount rate when calculating their present value, as discussed later in this appendix.

To increase the plausibility of the assumptions, we limit the time horizon to ten years. This is because a high proportion of WIA participants are likely to have received core services, which are generally short-term and require minimal staff assistance. This type of service often results in benefits that are short-lived, while the benefits of training services tend to be greater and last longer.

Adjusting for counterfactuals

The fundamental problem in analyzing WIA or any other government program is that no

person can be a participant and a non-participant at the same time, making it impossible to observe the outcomes of both situations simultaneously. For this reason, researchers often form a comparison group with a similar economic and employment profile to control for variables outside of WIA that may be causally related to the results. However, the only comparison group pools from which researchers can draw a sufficient number of observations are other government-funded workforce programs, which are simply another form of treatment under a different legislation.

Our solution, therefore, is to forgo the comparison group and simulate a hypothetical situation where WIA participants received no treatment at all. The limitation of this approach, however, is that we are unable to empirically account for causal factors that a standard quasi-experimental analysis with a comparison group would implicitly be able to address. Age, gender, ethnicity, educational level, geographic location, employment history, and socioeconomic background are among a wide range of characteristics that can potentially influence an individual's ability to find and retain employment without the intervention of WIA or other government programs. We cannot credit to WIA any earnings that participants are able to accrue on their own, so adjusting for these factors is a necessary and inherent part of our benefit-cost analysis.

The question we are thus trying to answer is this: If participants do not receive treatment from WIA, how many of them will eventually be able to find and retain employment on their own and achieve the same future earnings stream? We include a time factor in our analysis under the assumption that the probability that participants can find a job that pays equally well as the job they find through WIA is relatively low in the early years of the time horizon.[13] Over time this probability increases as participants seek out and leverage alternative resources to find job openings, apply for positions, and enhance their short- and long-term employability through skills training. By the end of the ten-year period, we assume that nearly all participants are able get a job of equal pay without the help of WIA, so the portion of the future earnings stream that we credit to WIA is very small. A sensitivity analysis to test the plausibility of our assumptions appears in Appendix 3.

Some might argue that many participants exhaust all of their resources to find a job on their own before they register for WIA or other publicly-funded services. Essentially public services are the last opportunity for these participants to find employment. If this is the case, the counterfactual adjustment that presumes that individuals would be able to find a job without help from WIA is highly conservative. Clearly, though, there is a wide variance in the extent to which participants are able to search for a job on their

13 It should be stressed that we apply this adjustment to account for individuals who can find a job that pays *equally* well as the job they find through WIA. We assume that, on average, it takes individuals more time to find a job of equal pay than a job of lesser pay.

own before registering in a government-funded program. Some participants register for services immediately upon becoming unemployed, others explore all of their options to find employment before registering, and the rest fall somewhere in between. As such we feel that our counterfactual adjustment is a reasonable "middle of the road" assumption.

An additional counterfactual argument must be mentioned here. When WIA participants find employment, they prevent other potential candidates from getting the same position, a phenomenon which economists sometimes refer to as the "displacement" factor. Displacement is less of a concern when unemployment is low, since fewer people apply for the same position at the same time. When unemployment is high, on the other hand, more people apply for the same position, thereby increasing the probability that employers will fill positions with non-WIA participants. The extent to which displacement affects the outcome of the results is unknown, and the data required to estimate its effects is limited at best. Because of this, we encourage readers to bear in mind that there may be some displacement effects that inform the outcomes of the study but that are outside the scope of the analysis to quantify.

Applying a decay rate

The previous section addresses the question of counterfactuals and the estimated portion of the future earnings stream that can reasonably be credited to WIA. A second question that our analysis addresses is the decay rate of WIA intervention. In other words, at what point does the effect of WIA on the future earnings stream of participants ultimately wear off?

Data from the WIB supplies us with information on the retention rates of participants in three consecutive quarters after the quarter in which participants exit the WIA program (*i.e.*, the exit quarter).[14] The DOL common measures define the retention rate as a fraction where the numerator is the number of participants who are employed in both the second and third quarters after the exit quarter, and the denominator is the number of participants who are employed in the first quarter after the exit quarter. Both the numerator and the denominator are based on participants who are employed in the first quarter after the exit quarter.

By applying the retention rate we are able to determine the number of participants who drop out of the workforce by the end of the first year in the ten-year time horizon.

14 Retention rates are derived from in-state UI wage record evidence of the employment status of participants in the second and third quarters after the first post-exit quarter. However, an important limitation of this data is that the jobs held by participants in the second and third quarters are not necessarily the same jobs that they acquired under the auspices of the WIB. A sensitivity analysis of the retention rate is provided in Appendix 3.

Participants leave the workforce for any number of reasons, whether because they are in a short-term position, or because they lack the skill set to maintain long-term employment, or because they have personal or family-related concerns that affect their ability to keep their jobs.[15] Once a participant drops out of the workforce, we assume that the effect of WIA has completely worn off and will not be renewed for the duration of the time horizon. This is the case even if participants register for WIA services again and re-enter the workforce at a later date, since at that point their future earnings are no longer related to the services received in the current program year.[16]

Beyond the first year of the time horizon, we simulate the employment retention of participants based on the standard entropy decay equation

$$r(t) = N + (r_0 \times N)e^k, \quad k < 0$$

where N is the normal rate of unemployment, r_0 is the initial retention rate, and k is a negative constant. Given these parameters, the rate of unemployment for participants starts off relatively low at the start of the time horizon (when they find jobs), rises steeply in the next few years as individuals drop out the workforce, and then begins to level off as the rate of unemployment approaches normal levels.

Because the decay rate is likely to vary by service level, the negative constant k is assumed to be 0.5 for participants who receive core or intensive services (*i.e.*, they have a higher decay rate) and 0.2 for participants who receive training services (*i.e.*, they have a lower decay rate). This is because core services are generally short-term and require little to no staff assistance, generating benefits that wear off relatively quickly. The benefits of training services, however, typically last longer because participants receive more staff assistance and because they acquire skills that increase their long-term employability. For a sensitivity analysis of the negative constant k, see Appendix 3.

Discounting to current-year dollars

Discounting is a standard procedure in benefit-cost analysis where researchers account for the time value of money. For example, $1,000 in higher earnings realized ten years in the

15 Retirement is another common reason for leaving the workforce. However, because the time horizon is limited to ten years, and because the majority of participants who find employment are more than ten years away from the average retirement age of 65, there is no need for us to account for retirement in the decay rate.

16 Note that it is possible for WIA participants to find employment, drop out of the workforce, re-register for services, and find employment again within the same program year. However, repeat appearances do not affect the analysis because results are based strictly on participants who receive wages for three consecutive post-program quarters after the exit quarter. Participants who find employment in one quarter and again in another quarter will not have three consecutive quarters' worth of earnings data, automatically disqualifying them from the analysis.

future is worth much less than $1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (*i.e.*, costs) made today. The rate of interest that converts future benefits to current year dollars is called the discount rate.

The selection of an appropriate discount rate can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, *i.e.*, the rate of return one can reasonably expect to obtain from alternative investment schemes. In this study we assume a 1.5% real discount rate, which is already adjusted to eliminate the effect of expected inflation. In today's volatile economy, a 1.5% discount rate is arguably high given that the ten-year real discount rate published by the Office of Management and Budget (OMB) is only around 1%.[17] To the extent that a higher discount rate generates lower present values, our results may be considered conservative.

Note that our calculation of WIA program benefits does not include multiplier effects in accordance with the guidelines set by the OMB for analyzing Federal programs. In general, the OMB recommends that benefit-cost analyses of government programs should assume that all resources are fully employed and should thus exclude the secondary effects of expenditures on jobs and earnings. By not including multiplier effects in the analysis, we are likely to understate the benefits of WIA, particularly from the perspective of the region where the greater proportion of benefits occurs.

DERIVING THE BENEFIT-COST RATIO

In the fourth and final step of the benefit-cost analysis, we take the total benefits generated by each program and divide them by the associated costs of the programs to derive a benefit-cost ratio. Benefits comprise the added taxable earnings created by the participants' earnings change, while costs include the public monies used to fund each WIA program during the analysis year.

With regard to the cost component of the analysis, readers should bear in mind that a significant portion of WIA money is spent on participants who receive services without finding a job. Therefore, we are essentially overstating the effective cost per completer by allocating the full cost of the program to those who find and retain employment during the program year. If we were to limit the costs to just those incurred by participants who find and retain employment, the analysis would certainly yield higher benefit-cost

17 See the Table of Past Years Discount Rates from Appendix C of OMB Circular No. A-94.

ratios. However, the purpose of the analysis is to estimate the benefit-cost ratio for WIA programs as a whole, which means taking all benefits generated by all participants (not just those with a positive outcome) and dividing by all costs. Because our analysis is based on the earnings change of participants over the course of the analysis year, the benefits generated by participants who do not retain employment is necessarily assumed to be zero.

It is also important to note that determining the true cost of WIA programs is complicated by a collection of issues arising from the fungible nature of revenues, sunk capital costs, the indivisibility of certain inputs, and other concerns. As such, revenues that are dedicated to WIA programs might be used to fund other WIB activities, causing an overstatement of actual WIA costs. However, the reverse might occur as well, where non-WIA funds support WIA activities, causing an understatement of the actual costs of WIA programs. For the purpose of this analysis, we assume that overstatement on the one hand is offset by understatement on the other.

Appendix 2.

EMSI'S INPUT-OUTPUT MODEL

EMSI's input-output model represents the economic relationships among a region's industries, with particular reference to how much each industry purchases from each other industry. Using a complex, automated process, EMSI can create regionalized models for geographic areas comprised by counties or ZIP codes in the United States. Primary data sources are the following:

- The Industry Economic Accounts from the Bureau of Economic Analysis (BEA); specifically the "make" and "use" tables from the annual and benchmark input-output accounts.
- Regional and national jobs-by-industry totals, and national sales-to-jobs ratios (from EMSI's industry employment and earnings data process).
- Proprietor earnings from State and Local Personal Income Reports (BEA).

The data and information presented in this appendix are for illustrative purposes only and do not reflect a particular industry or region. Additional detail on the technical aspects of the model is available upon request; however, we are unable to provide information that discloses confidential or proprietary methodology.

Creation of the national Z matrix

The BEA "make" and "use" tables (MUTs) show which industries make or use which commodity types. These two tables are combined to replace the industry-commodity-industry relationships with simple industry-industry relationships in dollar terms. This is called the national "Z" matrix, which shows the total amount in dollars that each industry purchases from other industries. Industry purchases run down the columns, while industry sales run across the rows.

The value 1,532.5 in Table A1 on the following page means that Industry 2 purchases $1,532,500,000 worth of commodities or services from Industry 1. The whole table is

TABLE A1: SAMPLE "Z" MATRIX ($ MILLIONS)

	Industry 1	Industry 2	. . .	Industry N
Industry 1	3.3	1,532.5	. . .	232.1
Industry 2	9.2	23.0	. . .	1,982.7
. . .	. . .	. . .	. . .	. . .
Industry N	819.3	2,395.6	. . .	0

basically an economic double-entry accounting system, configured so that all money inflows have corresponding outflows elsewhere.

We create two separate Z matrices since there are two sets of MUTs—annual and benchmark. The benchmark data are produced every five years with a five-year lag and specify up to 500 industry sectors; annual data have a one-year lag but specify only 80 industrial sectors.

The basic equation is as follows:

$$Z = V\hat{O}^{-1}U$$

where V is the industry "make" table, $\hat{O}^{-1}$ is a vector of total gross commodity output, and U is the industry "use" table.

In reality, this equation is more complex because we also need to "domesticate" the Z matrix by removing all imports. This is needed because we are creating a "closed" type of national model. In addition, there are a number of modifications that need to be made to the BEA data before the calculations can begin. These are almost all related to the conversion of certain data in BEA categories to new categories that are more compatible with other data sets we use in the process. Describing them in detail is beyond the scope of this appendix.

Disaggregation of the national Z matrix

The previous step resulted in two national Z matrices—one based on the benchmark BEA data (five years old, approximately 500 industries) and the other based on the annual BEA data (one year old, but only about 80 industries). These initial national Z matrices are then combined and disaggregated to 1,125 industry sectors. Combining them allows us to capitalize on both the recency of the annual data and the detail of the benchmark data. The disaggregation is performed for each initial Z matrix using probability matrices that allow us to estimate industry transactions for the more detailed sectors based on the known transactions of their parent sectors. The probability matrix is created from detailed EMSI industry earnings data, which are available for all 1,125 sectors and are created using a separate process.

Creation of the national A matrix

The national disaggregated Z matrix is then "normalized" to show purchases as percentages of each industry's output rather than total dollar amounts. This is called the national "A" matrix.

Each cell value in Table A2 represents the percentage of a column industry's output that goes toward purchasing inputs from each row industry. Thus, the cell containing .112 in the table means that Industry 2 spends 11.2% of its total output to obtain inputs from Industry 1.

TABLE A2: SAMPLE "A" MATRIX

	Industry 1	Industry 2	. . .	Industry 1125
Industry 1	.001	.112	. . .	.035
Industry 2	.097	0	. . .	.065
. . .	. . .	. . .	. . .	. . .
Industry 1125	.002	.076	. . .	0

Regionalization of the A matrix

To create a regional input-output model, we regionalize the national A matrix using that region's industry mix. The major step in the process is the calculation of per-industry out-of-region exports. This is performed using a combination of the following standard techniques that are present in the academic literature:

- Stevens regional purchase coefficients (RPCs);
- Simple location quotient of value added sales, and;
- Supply/demand pools derived from the national A matrix.

We try to maximize exports in order to account as fully as possible for "cross-hauling," which is the simultaneous export and import of the same good or service to and from a region. Cross-hauling is quite common in most industries.

The A-matrix regionalization process is automated for any given region for which industry data are available. Although partially derived from national figures, the regional A matrix offers a best possible estimate of regional values without resorting to costly and time-consuming survey techniques, which in most cases are completely infeasible.

Creating multipliers and using the A matrix

Finally, we convert the regional "A" matrix to a "B" matrix using the standard Leontief inverse $B = (I - A)^{-1}$. The "B" matrix consists of inter-industry sales multipliers, which can be converted to jobs or earnings multipliers using per-industry jobs-to-sales or earnings-to-sales ratios.

The resulting tables and vectors from this process are then used in the actual end-user software to calculate regional requirements, calculate the regional economic base, estimate sales multipliers, and run impact scenarios.

Appendix 3.

SENSITIVITY ANALYSIS

Sensitivity analysis is the process by which researchers determine how variations in the background data and assumptions impact the results of the study. When the magnitude of the results is highly sensitive to a particular assumption or variable, it is essential that there be a high degree of confidence in the accepted assumptions. Assumptions that have little impact on the results still need to be reasonable, but the degree of confidence in those variables is less constraining.

ASSUMPTIONS

In this appendix we test the sensitivity of the results to the following four variables: (1) the discount rate; (2) the average number of years that WIA participants would need to find a job of equal pay without receiving services; (3) the decay rate; and (4) the retention rate. These variables all affect the WIA benefit-cost analysis presented in Chapter 3. More detail on the use of these variables is found in Appendix 1.

Discount rate

Table A3 tests the sensitivity of the benefit-cost ratio for each WIA program to variations in the assumed discount rate. As discussed in Appendix 1, we apply a real discount rate of 1.5% because the projected earnings stream of participants is in real (as opposed to nominal) terms. Base case results using the 1.5% discount rate appear in the middle

TABLE A3. SENSITIVITY ANALYSIS OF DISCOUNT RATE

	-50%	-33%	-17%	Base case	17%	33%	50%
Discount rate	0.8%	1.0%	1.3%	1.5%	1.8%	2.0%	2.3%
Adult	3.35	3.34	3.32	3.30	3.29	3.27	3.25
Dislocated worker	1.11	1.10	1.10	1.09	1.09	1.08	1.08
Youth	2.06	2.05	2.04	2.02	2.01	2.00	1.99
Overall	2.14	2.12	2.11	2.10	2.09	2.08	2.07

column of Table A3, with variations of plus or minus 17%, 33%, and 50% on either side. Analyses are then redone introducing one change at a time, holding all other variables constant.

As expected, the discount rate has an inverse relationship with the results, *i.e.*, reductions in the discount rate lead to corresponding increases in the benefit-cost ratios, and vice versa. For example, lowering the discount rate from 1.5% to 0.8% causes the combined benefit-cost ratio to increase from 2.10 to 2.14. Similarly, raising the discount rate from 1.5% to 2.3% reduces the combined benefit-cost ratio from 2.10 to 2.07. In all cases the combined benefit-cost ratio fluctuates by no more than 1.5% relative to the base case, even given fairly large variations in the discount rate.

Time to employment without intervention

Table A4 demonstrates how the results are affected by changes in the assumed length of time it would take participants to find a job of equal pay on their own had they not registered at the WIB for services (measured in terms of years). This variable naturally has a high degree of variance depending on the inherent characteristics of the participants, the level of service they receive, and the type of program in which they enroll. The base case assumption is 2.5 years for participants who receive training-related services and 0.5 years for participants who do not receive training-related services. For the sake of simplicity, we perform the sensitivity analysis on just the 2.5 year assumption for training-related participants. As before, we bracket this assumption by plus or minus 17%, 33%, and 50% variations.

TABLE A4. SENSITIVITY ANALYSIS OF TIME TO EMPLOYMENT WITHOUT INTERVENTION

	-50%	-33%	-17%	Base case	17%	33%	50%
Time to employment (no. of years)	1.3	1.7	2.1	2.5	2.9	3.3	3.8
Adult	2.37	2.66	2.98	3.30	3.64	3.98	4.33
Dislocated worker	0.74	0.86	0.98	1.09	1.20	1.31	1.40
Youth	1.82	1.83	1.90	2.02	2.17	2.33	2.50
Overall	1.61	1.75	1.92	2.10	2.30	2.50	2.70

Clearly results are sensitive to this variable. This is understandable since, the less time it takes participants to find a job that pays as well as the one they find with WIA's help, the fewer benefits the model is able to credit to WIA intervention. Nonetheless, the results are still reasonable even given the most conservative of assumptions.

Decay rate

Table A5 varies the negative constant, k, from the entropy equation provided in Appendix

1. This variable determines the rate at which the effect of WIA treatment on participants wears off once they enter the workforce. In the model the negative constant *k* is assumed to be 0.2 for participants who receive training-related services and 0.5 for participants who do not receive training-related services. We test the sensitivity of the 0.2 assumption for training-related participants in Table A5. Note that increasing the constant lowers the benefit-cost ratio while decreasing the constant raises the benefit-cost ratio. Although this variable has implications for the specific programs, it does not affect the combined benefit-cost ratio to the same extent.

TABLE A5. SENSITIVITY ANALYSIS OF DECAY RATE

			Base case		
Decay rate	0.15	0.18	0.20	0.23	0.25
Adult	3.32	3.31	3.30	3.29	3.29
Dislocated worker	1.14	1.11	1.09	1.07	1.05
Youth	2.13	2.07	2.02	1.98	1.94
Overall	2.16	2.13	2.10	2.08	2.06

Retention rate

Lastly we measure the sensitivity of the results to the retention rate. As described in Chapter 2 and in Appendix 1, the retention rate is expressed as a percentage where the numerator is the number of people who are in employment in the second and third quarters after the exit quarter. Because each program has a unique retention rate, the sensitivity analysis must be done separately for each of the respective program retention rates. The range around the base case is plus or minus 10% unless that exceeds rational bounds (*i.e.*, where retention rates are in excess of 100% or less than 0%).

TABLE A6. SENSITIVITY ANALYSIS OF RETENTION RATE

	Adult		Dislocated Worker		Youth	
	Rate	B/C ratio	Rate	B/C ratio	Rate	B/C ratio
10%	98.2%	3.63	96.7%	1.20	100.0%	2.12
5%	93.7%	3.47	92.3%	1.15	100.0%	2.12
Base case	89.2%	3.30	87.9%	1.09	95.7%	2.02
-5%	84.8%	3.14	83.5%	1.04	90.9%	1.92
-10%	80.3%	2.97	79.1%	0.98	86.1%	1.82

As seen in the table, increasing the retention rate has positive effects on the benefit-cost ratio for all programs. This emphasizes the importance of ensuring that participants find a job that is well-suited to their skill set and has long-term sustainability.

CONCLUSION

This sensitivity analysis demonstrates the reasonableness of the accepted assumptions and the range of outcomes that would result were those assumptions increased or decreased. Although some assumptions have a greater impact on the resulting benefit-cost ratios than others, all accepted base case scenarios appear reasonable, if not conservative, even when conditions are changed to the highest or lowest extremes.

Appendix 4.

GLOSSARY OF TERMS

Adult/Dislocated Worker programs: Programs offered under the Workforce Investment Act (WIA) designed to increase the employment, retention, earnings, and occupational skill attainment of unemployed adults or dislocated workers who have lost their jobs due to plant closure, layoff, or other reasons outside of the individuals' control.

Average earnings: Of those who are employed in the first, second, and third quarters after the exit quarter, total earnings in the second and third quarters after the exit quarter divided by the number of participants who exit during the quarter; a common measure.

Common measures: Performance measures used to assess program effectiveness; includes the entered employment rate (EER), retention, and average earnings.

Direct effect: Changes in economic activity due to the first round of spending by the WIB and its employees.

Entered employment rate (EER): Of those who are unemployed at the date of participation, the number of participants who are employed in the first quarter after the exit quarter divided by the number of participants who exit during the quarter; a common measure.

Gross Regional Product (GRP): Sum of earnings (*i.e.*, wages and salaries) and non-labor income (*i.e.*, profits, rents, and other) in the region.

Indirect effect: Additional jobs and income created in the economy as the businesses patronized by the WIB spend money in the region to purchase even more supplies and services.

Multiplier: Factor of change that occurs in a region's industries as a result of economic activity in another industry.

NAICS: North American Industry Classification System.

Retention rate: Of those who are employed in the first quarter after the exit quarter, the number of participants who are employed in both the second and third quarters after

the exit quarter divided by the number of participants who exit during the quarter; a common measure.

SOC: Standard Occupational Classification.

Youth program: Program offered under the Workforce Investment Act serving eligible low income youth, ages 14 to 21 (14 to 24 under ARRA), who face barriers to employment.

Appendix 5.

RESOURCES & REFERENCES

Ashenfelter, Orley C. "Estimating the Effect of Training Programs on Earnings." *Review of Economics and Statistics* 60 (1978): 47-57.

Heckman, J.J., L.J. Lochner, and P.E. Todd. "Earnings Equations and Rates of Return: The Mincer Equation and Beyond." In *Handbook of the Economics of Education*, edited by Eric. A. Hanushek and Finis Welch, 307-458. Amsterdam: North Holland, 2006.

Heinrich, Carolyn J., Peter R. Mueser, and Kenneth R. Troske. "Workforce Investment Act Non-Experimental Net Impact Evaluation: Final Report." Employment and Training Administration, Department of Labor, ETAOP 2009-10, December 2008.

Hollenbeck, Kevin, Daniel Schroeder, Christopher T. King, and Wei-Jan Huang. "Net Impact Estimates for Services Provided through the Workforce Investment Act." ETA Occasional Paper 2005-06. Washington, DC: U.S. Department of Labor, Employment and Training Administration, 2005.

Mincer, Jacob. *Schooling, Experience, and Earnings*. National Bureau of Economic Research. New York: Columbia University, 1974.

Office of Management and Budget. "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." Circular No. A-94 Revised, October 1992.

Willis, Robert J. "Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions." In *Handbook of Labor Economics*, Vol. 1, edited by Kenneth J. Arrow and Michael D. Intriligator. Amsterdam: Elsevier Science Publishers, 1986: 525-602.