Career Pathways Intermediate Outcomes Study: Plan for Cost-Benefit Analyses

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Overview

This document lays out a plan for the cost-benefit analyses (CBAs) that we will conduct for up to six of the nine Pathways for Advancing Careers and Education (PACE) programs. The PACE programs are being evaluated as part of the Career Pathways Intermediate Outcomes (CPIO) study. The CBAs covers the three-year period after study enrollment, which started in 2011 and ended in 2014. The study is measuring the effectiveness of promising programs that use "career pathways" as their main intervention framework for increasing employment and self-sufficiency among low-income individuals and families. The CPIO study continues work begun in the PACE Implementation and Early Impact Report studies (see **www.career-pathways.org** or **www.acf.hhs.gov/opre/research/project/pathways-for-advancing-careers-and-education**).

The CBAs planned in this document will accompany and extend the related "what works" impact analyses of the CPIO study. This document will guide our estimation of the costs of providing the PACE programs and our comparison of these costs with gains in employment and self-sufficiency measured in the impact analyses.

Findings from the CBAs—how program costs compare with observed benefits—will help policymakers assess whether to encourage continuation or potentially expansion of each program's approach as part of national policy.

Research Questions

The research questions answered in this design document are as follows.

- How will we determine and monetize the costs and benefits of six selected PACE programs?
- How will we use the monetized costs and benefits to determine the *net present value* (NPV) of each PACE program—a metric that can inform policymakers' decisions about program approaches?

Purpose

This document will serve as a reference resource and guide for the CBAs of PACE programs that we are conducting as part of the CPIO study.

Key Findings and Highlights

- We will conduct the CBAs from a societal perspective, where as many benefits and costs as possible are included regardless of the party experiencing the benefit or incurring the cost. So, for example, in addition to including the benefits due to increased incomes for treatment group members, we also will include resulting changes in government tax

revenues and spending on public benefits. In addition to determining NPVs from this societal perspective, we will also calculate NPVs that only include the benefits and costs that accrue to key stakeholders such as program participants and the government.

- Costs and benefits cannot be identified without context. The PACE programs were implemented with a randomly assigned treatment group (able to enroll in PACE program) and control group (not able to enroll in PACE program). In the CBAs, the outcomes and costs of the control group will provide the necessary context for the outcomes and costs of the treatment group. That is, the benefits of the PACE programs are the value of outcomes for treatment group members *less* the value of the corresponding "business as usual" outcomes for the control group. Similarly, costs of the PACE programs are calculated as the value of all resources used to provide the program *less* estimated costs of any use of non-PACE education and training programs that control group participants may have accessed.
- The CBAs will use observed study participant and program data wherever possible to measure impacts and outcomes, but complete data on all benefits and costs are not always available. This plan details how we will impute and assume values for costs or benefits when data are not available. This includes taking benchmarks from external research and developing projections about future earnings based on observed data.

Methods

The CBAs will consist of four steps:

(1) Measure and monetize each PACE program's costs and benefits,

(2) Calculate the net present value of each PACE program,

(3) Consider benefits that are not monetized, and

(4) Conduct sensitivity analyses.

This plan describes the methodology and data sources for implementing each of these steps in the CBAs.

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1. Background and Overview

Initiated in 2007, Pathways for Advancing Careers and Education (PACE) is a nine-site implementation and impact evaluation of promising programs that are using "career pathways" as their main intervention framework for increasing employment and self-sufficiency among low-income individuals and families. That framework comprises four categories of service strategies: (1) assessments of skills and needs; (2) promising and innovative approaches to basic skills instruction and occupational training; (3) academic and non-academic supports to promote success; and (4) strategies to connect program participants with career-track employment opportunities.[1]

The impact study portion of the evaluation uses an experimental design to explore the effectiveness of each site's career pathways program. Eligible applicants at each site ("study participants") are assigned at random either to a treatment group that is offered access to that career pathways program ("PACE program") or to a control group that is not offered access; either group can use other similar services available in the community. The PACE study is comparing the treatment and control group's education and training attainment, earnings, and other outcomes at approximately 18 months after random assignment using survey and administrative data to measure the impact of each PACE program. In anticipation of future cost-benefit analyses, the PACE study also collected cost data at each of the nine sites, which was completed in 2015.

1.1 About the CPIO study

The Career Pathways Intermediate Outcomes (CPIO) study builds on this work by extending the data collection and analysis period at the nine sites to approximately 36 months after random assignment. This extended analysis period allows at least 18 more months over which PACE study participants' educational and career progress can be observed and measured.[2]

In addition to intermediate-term impact studies at all nine PACE sites, the CPIO study will conduct cost-benefit analyses (CBAs) for up to six of the sites.[3] These CBAs build on the experimental design of the PACE study and complement the results of the 18-month and

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1 PACE website: **http://www.career-pathways.org/acf-sponsored-studies/pace/**

2 Three of the PACE programs are funded by the Health Profession Opportunity Grants (HPOG) program. The CPIO study also includes 36-month impact analyses of other HPOG programs not included in the PACE study. Because the prior HPOG Impact Study did not collect cost data for those other HPOG programs, the CPIO study will not include CBAs for them. For more information on the HPOG-Impact evaluation, see **http://www.career-pathways.org/acf-sponsored-studies/hpog/hpog-impact/**.

3 The call for six CBAs is based on the CPIO study design specified in the contract procuring this research. Chapter 4 reviews our approach to select the six programs for CBAs from the nine PACE programs.

36-month impact studies. This document is an analysis plan for those six CBAs, and it builds on the *PACE Evaluation Design Report* (Abt Associates, 2014).[4]

Exhibit 1-1 provides timelines of the overlapping PACE and CPIO studies and some relevant evaluation activities and deliverables. In particular, it shows how the CBAs will benefit from using data from both the 18-month and 36-month follow-up surveys and impact analysis findings for this same extended time period.

Exhibit 1-1: Highlights of PACE study and CPIO study timelines

PACE	
• Program evaluation launched	2007
• Random assignment of study participants into treatment and control groups	Nov 2011–Dec 2014 (Completed)
• 18-month follow-up survey period	Nov 2013–May 2016 (Completed)
• PACE program cost data collection	2015 (Completed)
• All nine 18-month PACE reports completed	Apr 2017 – Dec 2017
CPIO (extends PACE and HPOG-Impact program evaluations)[a]	
• Study launched	2014
• 36-month follow-up survey period	Feb 2015–May 2018
• Draft impact reports to ACF	Dec 2017–Jan 2019
• Final CBA reports	May 2018–Mar 2019

[a] The HPOG-Impact program evaluation does not include cost-benefit analysis.

1.2 About the cost-benefit analyses

Cost-benefit analysis provides a comprehensive accounting of costs and benefits, expressed in monetary terms wherever possible.

For the PACE program, the main benefit to be monetized is increased earnings due to improved employment outcomes. Some benefits, such as improved self-esteem due to more stable employment and the existence value to society of better educational outcomes for low-income participants, are intangible and cannot be monetized. But we will measure and report impacts in the primary outcomes that may result in the intangible benefits so that policymakers, program providers, and other stakeholders can take these nonmonetary benefits into account alongside the monetary ones.

The CBAs for this project will place the CPIO studies' impact findings in context by expressing them in terms of the costs incurred to produce the benefits. A program with

[4] See that report for more detail on the hypotheses, outcomes, eligibility criteria, and other design elements of the PACE impact study: **http://www.acf.hhs.gov/sites/default/files/opre/pace_eval_design_report_final_jan_2015_508_0.pdf**.

benefits greater than costs is a net gain for society; a program with benefits less than costs is a net loss, at least in terms of the benefits that can be measured (such as increased educational attainment and earnings).

Costs of PACE programs are incurred within the first few years of program participants' enrollment, whereas potential benefits accrue through increased earnings for program participants over their lifetimes. For this reason, we must consider the value of *future* benefits and costs, in some instances projected beyond the observed data, and always discounted to current dollars to reflect the lesser value of deferred effects.

CBAs provide valuable insights only when benefits are detected. If favorable impacts are to occur in PACE programs, it will most likely occur through impact on treatment group members' educational attainment and earnings, although other benefits are possible. Should we detect no impacts, no analysis is needed as there are no benefits to outweigh the costs.

To maximize the value of the CBAs for this study, we will select the six focal programs based on promising impact findings at 18 months in the PACE evaluation and an expectation of favorable 36-month findings. We will also plan to select programs to represent a diversity of career pathways program approaches and to respond to ACF's interests (see Chapter 4).

1.3 About this analysis plan

The elements of this analysis plan are as follows.

- Chapter 2 describes the purpose and approach of the CBAs.
- Chapter 3 provides our detailed plan for conducting CBAs of PACE programs.
- Chapter 4 describes how we will select the six PACE programs for CBAs.
- Chapter 5 provides an inventory of data sources we will use for the CBAs.
- The appendix shows our cost data collection template that was used to collect program data as part of the earlier PACE study.

2. Overview of Cost-Benefit Analyses Plan for PACE Programs

This chapter describes the purpose of cost-benefit analyses of PACE programs, then briefly describes our approach, how we will measure costs, and the various perspectives that we will analyze the costs and benefits from. Subsequent chapters provide more detail on how we will operationalize the plan.

2.1 Purpose of cost-benefit analyses of PACE programs

The CPIO impact analysis conducted at 36 months after randomization for each PACE program will address a specific question: "Did the program improve outcomes for treatment group members?" The cost-benefit analysis will build on those impact findings by adding information on the monetary value of the improved outcomes and comparing that value with the costs of resources used to produce the improvements. This will allow policymakers to make decisions about each program based on both the resulting benefits and the underlying costs. Thus, each CBA will answer the question: "How do benefits resulting from this PACE program compare with its costs?"

In the plan detailed in Chapter 3, we address this question from a societal perspective, including as many benefits and costs as possible regardless of the party experiencing the benefit or incurring the cost. This means that in addition to any benefits from increased incomes for treatment group members, we will include resulting changes in government tax revenues and spending on public benefits. Similarly, in addition to any costs to government and other members of society of funding the programs, we will include the value of the time that treatment group members spend participating in the program (as valued by their lost earnings).

In addition to considering this combined societal cost perspective, each CBA will ask whether a program's benefits outweigh its costs from the perspectives of various stakeholders: treatment group members, government, and the rest of society (i.e., perspective of society other than government and treatment group members).

Findings from the CBAs will help policymakers assess whether to continue (or potentially advocate for expanding) each program's approach as part of national, state and local policy.

2.2 Overview of approach to cost-benefit analysis

Cost-benefit analysis requires all costs and benefits to be enumerated and monetized. A full list of these elements appears in Chapter 3. Various costs and benefits accrue to treatment group members, government, and the rest of society.

As detailed in Chapter 3, the key **inputs** in this study are costs associated with each PACE program itself (e.g., staffing, materials, tuition assistance, administration, overhead) and the

added costs of subsequent education and training (e.g., tuition, public subsidy of higher education) that result from s participation in the PACE program. Both will be calculated as *additional* costs relative to training and education costs observed within the control group. The hypothesized **impact** of each PACE program is increased education and training for its program participants, which is expected to result in improvements in employment and income for program completers.

The monetized inputs and impacts can be used to calculate the **net benefit** of each PACE program. Impacts of increased employment and income for program participants will change the public benefits received and taxes paid by them over their lifetimes. Such public benefits' changes are transfers that net out to zero (except for a small savings in administrative costs) from a societal perspective. A decrease in public benefits is a cost to participants that is offset by the benefit to the government of decreased spending of that amount. However, we will include such changes in calculating net benefits from the relevant treatment group member and government perspectives to allow the net benefit of the program from either perspective to be considered. (A change in such transfer payments has an added effect on overall economic efficiency that we also consider in our analysis as described in Section 2.3.)

Because benefits and costs accrue over a long period of time and at varying intervals, monetized costs and benefits will be discounted to the year treatment group members enrolled in the program and then compared in order to determine the **net present value** (NPV) of each PACE program:

$$NPV = PV(B) - PV(C)$$

Here, $PV(B)$ indicates the present value of all benefits resulting from the program (such as greater lifetime earnings) in current and future years, and $PV(C)$ indicates the present value of all costs associated with or induced by the program over time. The present value approach allows an "apples to apples" comparison of costs and benefits that occur at different times.

NPV will be positive if the total monetized improvement in key outcomes over treatment group members' lifetimes exceeds total program costs. **NPV will be negative** if the monetized benefits are less than program costs.

2.3 Measuring costs and benefits

In practice, there are a number of challenges and considerations to defining and measuring inputs and outcomes and expressing them in monetary terms (as costs and benefits):

- Outcomes cannot be identified without context. Thus, following the PACE impact study design, the CPIO cost-benefit analysis will compare the outcomes and costs of the treatment group with the outcomes and costs of the control group.
- The CBAs will use observed study participant and program data wherever possible to measure impacts and outcomes, but complete data on all benefits and costs are not always available. When they are not, we will impute and assume values for costs or benefits, sometimes taking benchmarks from external research.
- Projections and the net present value calculations require making assumptions about the future earnings profiles of study participants based on outcomes observed during the timeframe of the study. We will look to published literature on the returns to education for low-income workers to make the necessary projections.

All three issues are presented here and discussed in more detail in Chapter 3.

The benefits and costs used to calculate NPV are relative measures. That is, benefits are the value of outcomes for treatment group members, who have access to PACE programs, *less* the value of corresponding "business-as-usual" outcomes for control group members. Similarly, costs include the opportunity costs of each resource used to provide each PACE program *less* the estimated costs of any use of non-PACE education and training programs that control group participants may have accessed. Also included is the cost of any additional (relative to the control group) non-PACE education or training obtained by treatment group members as a result of PACE program participation. Greater detail on how these benefits and costs will be calculated is in Chapter 3.

Inputs and outcomes will be monetized using the best data available. Where costs and benefits cannot be directly observed, we will use estimates from the literature. Likewise, where projections are needed, we will create these projections using assumptions based on the literature. For example:

- PACE program costs are directly observed, whereas we will estimate costs of education using financial data reported to the U.S. Department of Education by colleges attended by program participants.
- We will use increases in educational attainment and earnings observed in the 18- and 36-month impact findings to project lifetime earnings impacts. To make those projections, we will use assumptions based on the existing published literature on lifetime earnings profiles and on returns to education.
- PACE programs receive public funding, and program participation is expected to alter treatment group members' receipt of public benefits and payment of taxes. These government expenditures and revenues are associated with economic inefficiency, referred to by economists as *deadweight loss*. Accounting in CBAs for changes in

deadweight loss requires we apply an estimate of marginal excess tax burden—the amount this economic inefficiency changes with each dollar of spending or taxes—to changes in public spending or revenues (Vining and Weimer, 2010).

Some parameters needed for NPV calculation must be assumed. For example, over what period should benefits be projected? At what point are impacts expected to begin to decay, and at what rate? What rate should be used to discount costs and benefits, given that the discount rate should accurately reflect the opportunity cost of the resources used as inputs? These questions are addressed in Chapter 3.

The results of cost-benefit analysis can hinge on assumptions and projections such as these. To assess how important the assumptions we make are to the conclusions we draw, we will follow the standard practice of conducting a sensitivity analysis for each assumption. In the sensitivity analysis, detailed in Section 3.4, we recalculate NPV using alternative values for the various assumptions made.

2.4 Variation in the costs and benefits of a PACE program across stakeholders and participant subgroups

Our CBA approach includes two types of variation in how costs and benefits are considered when calculating NPV. The first is that particular benefits and costs of the PACE programs accrue to various stakeholders unequally, resulting in NPVs that differ when calculated using only the benefits and costs that affect a given stakeholder. The second is that benefits and costs may vary within the stakeholder group of PACE program participants. In this section we present our approach to both types of variation. First, we will consider the NPV of PACE programs calculated from various stakeholder perspectives. Second, we will calculate NPVs for any subgroups identified as experiencing disproportionate impacts in the companion impact studies.

2.4.1 Perspective

Whether or not the outcomes of the PACE programs justify their costs depends very much on one's perspective. The cost-benefit analysis will consider costs and benefits accrued by various specific groups. For example:

- **PACE program participants:** Costs to treatment group members include reduced earnings and leisure time during training. Benefits include the potential increases in post-training earnings that are the intended result of the programs.
- **Government:** Federal and state/local governments incur costs and benefits related to a PACE program. The analysis will include both perspectives.
- **Society at large:** Public policies should seek to produce a societal net gain. A broad societal perspective is also important in order to get a more balanced perspective than

that of any particular segment of society. For example, some impacts such as potential decreases in transfer payments are costs to one sector of society (treatment group members who would otherwise receive Temporary Assistance for Needy Families (TANF) or Medicaid benefits) and are benefits to another sector (government). The societal perspective nets out these transfers. On the other hand, their inclusion in the treatment group members' perspective is important for demonstrating how PACE program impacts may result in the redistribution of societal resources.

2.4.2 Subgroup analysis

As outlined in the *PACE Evaluation Design Report*, the PACE impact studies include secondary hypotheses about effects on subgroups of study participants who are of high programmatic interest. The particular subgroups of interest may vary from one program to the next, depending on a program's logic model, service approach, or target population. If these exploratory analyses in the PACE study find substantive and statistically significant impacts for one or more subgroups, we will consider examining those subgroups separately in the CBAs.

Subgroup analyses will recalculate NPV, limiting costs and benefits to those associated with the subgroups of interest. In those examinations, should they be warranted, we will not be able to make subgroup-specific calculations of elements for which costs or benefits are not measured at the individual level. These include:

- per-student costs of PACE programs (they are measured at the program level);
- the per-unit cost of education obtained (because although the amount of education obtained is available for individuals and thus subgroups, the associated cost is determined at the institution level); and
- imputed elements such as lifetime earnings projections (adding subgroup variation within the projection model would add an additional layer of complexity and uncertainty to the forecasting exercise; to maintain a tractable model, we will not make separate projections for different subgroups).

Rather, when individual variations cannot be computed, such as with the per-student costs of PACE programs, we instead will use the same per-unit costs and monetization parameters for the subgroup CBAs that we used for the larger CBAs. Subgroup findings will thus be driven by the elements of the CBA calculations that vary at the individual level (which include the amount of education and training a subgroup obtains, and the subgroup-level impacts).

The resulting estimated NPVs will demonstrate whether any positive impact findings from these exploratory impact analyses are sufficiently large to result in a positive NPV for any subgroup. Such a finding would suggest a policy of targeting programs to that subgroup.

3. Detailed Plan for Conducting the Cost-Benefit Analyses

This chapter provides details of the plan for conducting the cost-benefit analyses of six PACE programs. To do so, we work from a standard approach to CBAs of workforce training and education provided by Boardman et al. (2011), adapting as necessary to specifics of the PACE programs. Data availability, program characteristics, and sampling design in the PACE evaluation guide decisions in our CBA plan. In most cases, we will be able to estimate benefits and costs from PACE program data and administrative data gathered for the impact analysis; for other cases, we will have to rely on published estimates to monetize observed outcomes. Still other parameters must be assumed, and for those we will adhere closely to best practices, which include conducting sensitivity analyses.[5]

The steps outlined below provide a general framework for the six CBAs. Program-specific considerations may require individual adaptation. Our planned approach to selecting up to six of the nine PACE programs for the CBAs is presented in Chapter 4.

The CBAs will consist of four steps:

1. **Measure and monetize PACE intervention costs and benefits**
   - Identify the scope of the PACE intervention and define the business-as-usual counterfactual by cataloguing inputs and anticipated outcomes
   - Detail an approach to measuring or imputing each input and outcome
   - Monetize incremental inputs—such as direct and induced differences in training and education due to PACE participation—as *costs*
   - Monetize incremental outcomes—impact estimates of PACE participation—as *benefits*
2. **Calculate net present value (NPV) of PACE intervention**
   - Discount all benefits and costs to the base period, and sum benefits and costs
   - Assume standard parameter values as necessary
3. **Consider benefits that are not monetized**
   - Compare the NPV with measured nonmonetary benefits to convey the net cost to society—and to its various segments—of obtaining those benefits

[5] Boardman et al. (2011) is our starting point for determining best practices for conducting CBAs. Barnow and Smith (2016) reference and discuss a number of recent CBAs that are examples of the published research we will look to in identifying and modeling best practices.

4. **Conduct sensitivity analyses**

   - Perform sensitivity analysis to determine how uncertainty from statistical measurement and CBA parameter assumptions (from Steps 1 and 2) affect the NPV and conclusions

Sections 3.1 through 3.4 detail each of the four steps in turn. Section 3.5 presents a timeline for conducting the CBAs.

3.1 Step 1: Measure and monetize PACE intervention costs and benefits

For each CBA, we will list and categorize all inputs and outcomes of that PACE program. This allows us to monetize inputs as costs and outcomes as benefits. This process will include an accounting of costs and benefits from key perspectives—of the treatment group members, federal and state/local governments, the rest of society, and society at large (the sum across all perspectives).

Exhibit 3-1 presents the list of expected benefits and costs of a PACE intervention that will serve as a starting point in each CBA. The exhibit presents how we expect each benefit or cost to be affected by a PACE intervention from each relevant perspective. We will review and update this inventory for each CBA conducted, although we expect nearly all benefit categories and most cost categories to be relevant for all programs.

We will bring a variety of data sources to bear to determine inputs and outputs and monetize them into costs and benefits. Sources are listed in Exhibit 3-2 for each category.

Exhibit 3-1: Expected costs and benefits of a PACE intervention, by perspective

Category	Component	Expected Net Effect of a PACE Intervention, by Perspective				
		Treatment Group (relative to control)	Government, Federal	Government, State/Local	Rest of Society	Society at Large (sum)
Inputs/Costs						
PACE program unique elements	Pre-college or program-specific, non-mainstream coursework	Cost: opportunity cost of time (foregone earnings)	Cost: funding	Cost: funding	Cost: funding	Net cost
	Direct assistance (cash and education materials) to treatment group members	Benefit: direct assistance	Cost: funding	Cost: funding	No change	Transfer: no net change
	PACE program administration	No change	Cost: funding	Cost: funding and support	No change	Net cost
Mainstream education or training	Education or training not unique to PACE curriculum (either integrated into a PACE program or subsequent as a result of program participation)	Cost: opportunity cost of time (foregone earnings) and cost of tuition	Cost: funding for higher education	Cost: funding for higher education	No change	Net cost
Outcomes/Benefits						
Employment (no crowd out assumption[a])	Lifetime earnings	Benefit: increased earnings	No change	No change	No change	Net benefit
	Health insurance—employer and other fringe benefits	Benefit: increased fringe benefits of employment	No change	No change	No change	Net benefit
	Child care, transportation, and lost leisure time costs of increased employment	Cost: increased costs due to increased hours worked	Cost: increased use of subsidized services: child care, transportation, and other	Cost: increased use of subsidized services: child care, transportation, and other	No change	Net cost

Category	Component	Expected Net Effect of a PACE Intervention, by Perspective				
		Treatment Group (relative to control)	Government, Federal	Government, State/Local	Rest of Society	Society at Large (sum)
Public benefits and taxes	TANF payments, Medicaid benefits, UI benefits, housing assistance	Cost: decreased assistance (due to higher earnings)	Benefit: decreased spending	Benefit: decreased spending	No change	Transfer: no net change
	TANF, Medicaid, UI, housing assistance administrative costs	No change	Benefit: decreased admin spending	Benefit: decreased admin spending	No change	Net benefit
	Net income tax (after EITC)	Uncertain: increased taxes or EITC	Uncertain: increased or decreased revenue	Uncertain: increased or decreased revenue	No change	Transfer: no net change
Second-order benefits (not measured, and thus not included in NPVs)	Intrinsic value of increased education or training	Benefit: self-esteem	No change	No change	Benefit: existence value[b]	Net benefit
	Radiating benefits from increased education or training such as higher second-generation income and education, decreased crime, greater economic growth, greater social stability	Benefit: higher quality of life	Benefit: lower spending for same outcomes and services	Benefit: lower spending for same outcomes and services	Benefit: higher societal quality of life	Net benefit

[a] *No crowd out assumption* is that increased employment due to the PACE program represents an increase in overall economic activity rather than resulting in displacement into unemployment of individuals who would otherwise have filled the jobs now taken by treatment group members.

[b] The e*xistence value* of increased education or training for program participants to the rest of society reflects the idea that, without themselves receiving a tangible monetary benefit, other members of society may altruistically prefer that low-income individuals have increased opportunities for education and training. See Chapter 9 of Boardman et al. (2011) for a discussion of existence value and the difficulties it presents for cost-benefit analyses.

NOTES: EITC is Earned Income Tax Credit. TANF is Temporary Assistance for Needy Families benefits. UI is Unemployment Insurance benefits.

Exhibit 3-2: Data sources for determining costs and benefits

Category	Cost/Benefit Estimation Element	CBA Resource(s)
Inputs/Costs		
PACE program unique elements, plus counterfactual business-as-usual resources	Program costs	• PACE program profiles • PACE study site visit qualitative data from implementation study • PACE study cost data collection
	Control group use of non-PACE training or education programs	• PACE program profiles • Implementation study • Impact studies • 18-month follow-up survey
Mainstream education or training	Participant, government, and society costs	• Impact studies • 18- and 36-month follow-up surveys • National Student Clearinghouse (NSC) data • College records • Delta Cost Project Database (DCPD) • College net price calculators
Participants (in addition to direct costs such as tuition, fees, and materials)	**Opportunity cost of time (of both PACE programs and increased training or education generally)**	• Impact studies • 18- and 36-month follow-up surveys • National Directory of New Hires (NDNH) wage data
Outcomes/Benefits		
Employment	Total returns to additional educational attainment	• Impact studies (18- and 36-month follow-up surveys, NSC data, etc.) • NDNH wage data • Estimates from literature on returns to education
Public benefits and taxes	Effective marginal tax rates (inclusive of changes in public benefits receipt) for low- and moderate-income workers	• Congressional Budget Office analyses • NDNH wage data

NOTE: Data sources are described in Chapter 5.

Next we will measure or impute each input and outcome. For each input, we will identify the amount of input used and the associated cost. For both inputs/costs and outputs/benefits, we are interested in the *incremental amount* that is caused by the PACE intervention. Just as the impact studies ask, "How much higher are participants' incomes due to PACE?" the CBAs ask, "How much higher are education and training costs for participants due to PACE?" Because of this, for any input or outcome, we can equivalently follow either of two paths:

- We can measure and monetize the total amount for the treatment group and the control group and then calculate the incremental amount as the difference in total monetized amounts.
- We can measure the differential amount directly, prior to monetizing.

We selectively use both approaches for various inputs and outputs depending on data availability, the form of findings taken from the CPIO impact studies, and the form of estimates taken from the relevant literature to make necessary model and parameter assumptions.

In **Subsection 3.1.1**, we detail our approach to measuring and monetizing the costs of the PACE intervention. To measure the incremental cost of the PACE intervention, we must also estimate costs associated with control group members accessing non-PACE program education and training outside of the study. In **Subsection 3.1.2** we describe our approach to measuring intervention benefits.

3.1.1 PACE intervention inputs and resulting costs

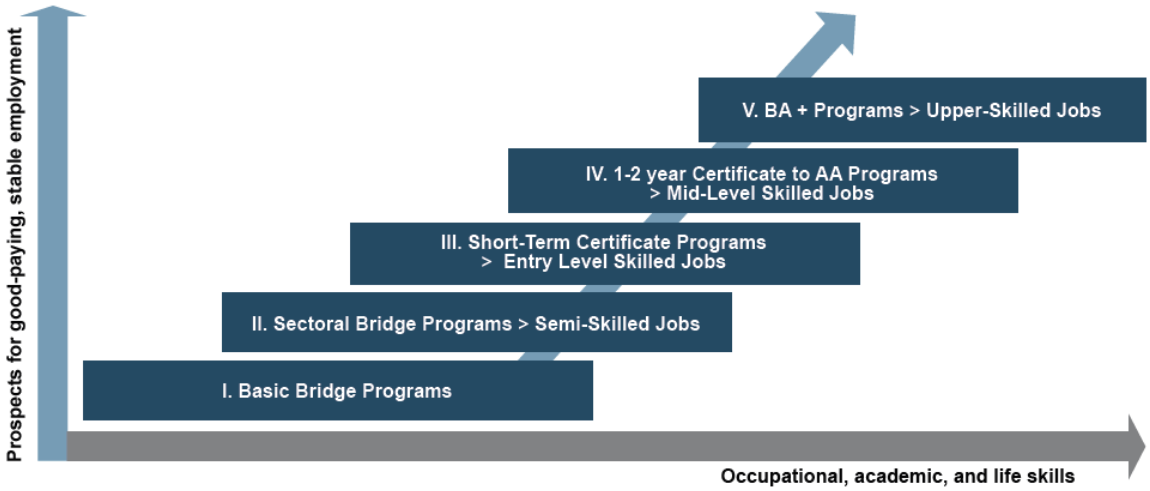
We organize costs of the intervention into the two categories: "PACE Program Unique Elements" and "Mainstream Education or Training." These are the first two items in the left-most, Category column of Exhibit 3-1. The first category includes the elements of PACE programs themselves, such as pre-college or program-specific coursework provided to treatment group members only; direct cash or near-cash assistance (e.g., personal classroom materials and public transit passes) to them; and program administration costs, including assessment and related activities.

The second category covers all mainstream education and training. This includes standard college or training courses that might be integrated into a PACE program. These costs plus the costs of the PACE program's unique elements make up the cost of a PACE program. However, the cost of the PACE intervention should also include costs of subsequent mainstream education and training obtained by treatment group members (beyond that obtained by the control group).

We include costs of subsequent education and training, beyond the PACE program itself, because the PACE programs represent a segment within the career pathways framework depicted in Exhibit 3-3. This career pathways framework implies that PACE program participants may obtain additional education and training because of the PACE program. That is, the PACE programs themselves do not include all of the career pathways steps. Rather, the programs provide key elements of the early steps (I, II, and III) on the pathway of gaining occupational, academic, and life skills to improve employment prospects. Sometimes participants completing a PACE program at an earlier step in the pathway results in their continuing on to a later step when they would not otherwise have done so. Thus, the second category of mainstream education and training also captures the costs

associated with additional education that may be a follow-on result of PACE program participation.

Exhibit 3-3: The career pathways steps



SOURCE: PACE program profiles

PACE program unique elements

In anticipation of the CPIO study CBAs, the PACE study collected and documented PACE program inputs/costs for all nine PACE programs. To estimate costs of all the program components listed under "PACE Program Unique Elements" in Exhibit 3-1 for each program, we identified all inputs used to provide the components (e. g., staffing, materials, tuition assistance, administration, and overhead) and determined an appropriate valuation to monetize each input into a cost. To do so, we relied on three primary sources of information: the PACE study's program profiles published in 2014,[6] qualitative data it collected during site visits in 2012 and 2013, and our own 2015 cost data collection interviews with PACE program staff.

Capturing all program inputs

As a starting point for identifying inputs to each PACE program, we reviewed the PACE program profiles produced as part of the PACE study. PACE programs incorporate some combination of signature career pathway services: assessment, basic skills instruction and occupational training, academic and non-academic supports, and strategies to connect participants to employers.

However, the nine PACE programs vary in the mix of these services, the institutional setting, and other dimensions, such as the number and level of career pathway steps supported.

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[6] The profiles give a high-level overview of each program and detail the program's goals, target population, structure, and career pathways components. Profiles are available at **http://www.career-pathways.org/acf-sponsored-studies/pace/**.

Our review of the program profiles produced an initial list of program inputs and activities for each unique program. In forming this initial list, we also reviewed details about each program using qualitative data collected during site visits for the PACE implementation study in 2012 and 2013 and discussed the programs with the research staff who conducted the site visits.

Based on this background research, we prepopulated a **PACE Program Cost Worksheet** template, reproduced in Appendix A, with our list of inputs. The template was flexible in allowing for any inputs needed for all program components, including pre-college or program-specific training, direct assistance, and administrative costs (the components of the "PACE Program Unique Elements" cost category). We classified inputs as administrative/management/overhead, program activities, and program assistance. To help insure that all inputs were captured during data collection interviews, the template included prompts for typical individual inputs including staffing, facilities costs, materials, transportation/cash/tuition assistance, and a general/other category.

We conducted the cost data collection interviews with program directors and finance staff at each PACE program to complete the program cost data collection. The template provided the guide for our interviews. Their purpose was to capture and value all inputs to the program and identify a dollar cost amount to the program for the input. We conducted the interviews during the latter half of 2015. Program enrollment and programming were largely completed at this time, but program staff still had access to program records (e.g. staffing lists, budgets, and expense reports) and were able to recall relevant details while reviewing the records with the cost data collection team to determine all program inputs and associated costs. We collected costs for the academic year that had the highest number of PACE program participant enrollments to provide the most relevant cost estimate to compare with impact estimates.

To capture all inputs, we had program staff verify or update staffing lists, enumerate the inputs required for program activities, detail the facilities used by the program, and provide overhead rates—typically calculated as part of ongoing financial reporting. To create a comprehensive list of inputs, we had to clearly define a program's scope to determine whether each input should be included in the program's cost. We used the following rule to define program scope***: a given activity or service was included as part of a PACE program if treatment group members' access to the activity or service was explicitly <u>because</u> they were enrolled in the program.*** That is, the activity or service was not available to the general public or to all students or training recipients at a partner institution (e.g., a community college that housed the PACE program).

After identifying all program inputs, we determined a cost for each input.

- For most inputs, we used **actual incurred costs** from financial statements (e.g., total salary plus benefits for program staff, rent paid for facilities).

- For some inputs, such as volunteer or in-kind resources, we developed **valuations of the cost that would have been incurred** were similar inputs purchased by the program directly, based on the interviews with program directors. Sometimes a program could not identify an expense representing a dollar amount cost of an input—for example, for owned facilities where use costs were not a realized program expense. For these inputs, we determined appropriate costs based on available **market price estimates**, such as what it would cost to hire staff to perform the functions performed by the volunteers and prevailing rental costs per square foot for similar facilities.
- We also determined the **number of program participants served**, which is needed to calculate an average cost per student for each program.[7]

For each PACE program we summed the cost of each input to determine a total program cost, and divided that cost by the number of program participants. This average cost is the measure of program costs that we will use in each CBA. It separately provides costs from the government and societal perspectives, as interview data collection included information on funding sources.

(Additional costs of mainstream coursework that was integrated with other aspects of the PACE program will be captured as described in **Mainstream education and training incidence and cost** later in this section.)

Estimating costs of education and training accessed outside of PACE programs

The overall PACE study's experimental evaluation design includes an embargo that prevents control group members from receiving services from PACE programs. However, these students may continue to seek education and training opportunities outside of the study. Treatment group members may also seek additional opportunities outside of the study. Such opportunities may include education and training similar to that of the PACE programs. Just as program impacts are the effects of PACE programs relative to business-as-usual opportunities, we must estimate program costs relative to the cost of business-as-usual services accessed by the control group. Ignoring control group training and education costs would overstate the relative cost of the PACE programs.

Our analysis of the amount of such training or education obtained by both control and treatment group members will build on the implementation study analyses as described in Section 2.1.4 of the *PACE Evaluation Design Report* (Abt Associates, 2014). Those analyses are documenting treatment/control group differences in service receipt using the 18-month follow-up survey data. A series of the survey's questions detailed any education or training experiences since random assignment. The questions were broad in asking about courses "of any kind anywhere, even for a short time?" The prompt asked respondents to consider

[7] We measure inputs at the program level. We do not measure participant-level variation in the intensity of services received; as such, costs of PACE program activities do not vary at the individual level.

courses "on basic skills, ESL, college classes, occupational training, or other skills such as how to succeed in school or career readiness." The survey allowed for the possibility that respondents participated in multiple programs. Finally, the survey asked for the title of and detailed information about each instance of such education or training.

The PACE implementation study and the 18-month and 36-month impact studies include measures of the differences in the frequency and nature of education or training programs used by the treatment and control groups. We will use the amount of education and training reported in these studies together with associated cost estimates that we develop to calculate the value of the difference in education and training used. To the extent that differences are not reported in these reports, we will return to the survey data to document quantity measures for use in the CBAs.

A caveat prevails there, however. Unlike enrollment in a credit-bearing course at an institution that contributes data to the National Student Clearinghouse (NSC; discussed in Section 5.6),[8] enrollment in education and training other than to earn a credential or postsecondary academic credit hours is not necessarily captured comparably. For example, PACE program participation itself is not uniformly observable in NSC or other administrative data. As such, if study members participate in basic skills, English as a Second Language, or non-credit-bearing training courses but don't report the participation the 18-month follow up survey (whether by incomplete survey responses or survey non-response), we will not be able to include it in our calculation of the differences in treatment and control group level of non-credit-bearing training and education.

We will return to the PACE program profiles to provide a basis for estimating the cost of services accessed by control group members (or similarly by treatment group members) outside of PACE programs. The program profiles contain information on services generally available to the control group. Exhibit 3-4 reproduces a figure from the program profile for Year Up, one of the PACE sites. We will review the program profile for each site to determine whether significant training or education opportunities at the site exist outside of the PACE program.

Unfortunately, we do not have detailed costs for the alternative programs. We will explore two approaches to imputing these other programs' costs:

- We will review available published cost estimates for programs elsewhere with education or training content similar to the alternatives and apply these estimates as the monetized cost of the alternative program use. The advantage of this approach is that estimates will be based on actual cost measures as is done in other studies in similar situations. Potential weaknesses of this approach are that valid cost estimates

[8] As detailed in Chapter 5, the NSC is a data system with national coverage that reports basic enrollment and degree attainment for all students in a high percentage of higher education institutions.

may not be available for similar programs in the locations we are studying, and we may have limited information on the content of programs for which cost estimates are available. Any available published cost estimates may also not include comprehensive documentation on the methodology used to calculate costs that will allow comparison with the approach we use for calculating the cost of PACE programs.

- A second approach takes advantage of the fact that the PACE programs and the alternative programs are in the same geography and may share some programmatic elements. For this approach, we will compare their business-as-usual program descriptions with the PACE programs. Where program offerings overlap, we will estimate the cost of the alternative program by summing costs of inputs used by PACE programs to provide similar elements. We will impute the cost of the similar elements using information from the PACE program cost profiles or the underlying data collected to develop them. In other instances, we will assign a relative cost to the alternative program based on a comparison of the described level of programming to the PACE program.

The importance of these assumptions and the selected approach will be tested in our sensitivity analysis. These estimated per-participant costs will be applied to the observed frequency of use from the 18-month survey to determine average per-student costs actually incurred providing services to control group members.

Exhibit 3-4: Example program profile comparison of PACE program (Year Up) versus standard offerings in the community

Career Pathway Components	Year Up	Standard Community Offerings
Assessment	• Assessment of academic skills (site-specific) • Assessments of strengths and barriers to participation • Placement assessments for college partner (e.g., Compass®)	• For WIA-funded programs, Tests of Adult Basic Education or other National Reporting System approved basic skills assessment • College placement assessments for individuals attending community or technical colleges
Curriculum	• 21 weeks of technical skills training in the fields of Information technology, Quality Assurance, Financial Operations, Customer Service or Project Management, full-time participation required (32 hours a week) • Business Communications classes • Students earn up to 30+ college credits, depending on the program's articulation agreements with the specific local college partner.	• Occupational training opportunities at community colleges or other institutions (varying by community)

Career Pathway Components	Year Up	Standard Community Offerings
Supports	• Educational stipend of up to $260 per week while in the program • Paid tuition for college credits earned as part of the program (after Pell or other grants applied) • Professional skills classes • Staff advisors and volunteer mentors support students in their performance in the program • Learning community providers opportunity for student support network • Emphasis on feedback aims to encourage students and to help them acclimate to professional norms • Social work and mental health professionals identify social service needs and make referrals to service providers in the community	• Financial aid assistance available at community colleges, training providers or through college access programs • Standard academic advising services provided by community colleges or other training providers • Typical supports available in the community through American Job Center network partners, community-based organizations, and government programs
Employment Connections	• Six-month, corporate internship in the student's field of study upon successful completion of the Learning and Development phase at a leading employer • Employment search and job placement assistance from Career and Alumni Services team • Alumni networking opportunities (vary by site)	• Job search and development, job readiness training, and on-the-job training provided through American Job Center network partners and other community-based organizations

SOURCE: Year Up program profile (Engstrom, Fein, and Gardiner, 2014)

To summarize, we will impute an average cost per participant of business-as-usual education or training resources accessed by the control group using two resources. First, we will review the PACE implementation study analysis of treatment/control group differences based on responses to the 18-month survey and other implementation study data collection. Then we will consider approaches to estimating costs of control group use of education or training programs. For example, we can use program profile descriptions of services available in the community and survey responses about the program type to develop a judgment assessment of the relative cost of such programs using data collected on the cost of PACE programs.

Mainstream education and training incidence and costs

The second general category of inputs/costs of the PACE intervention is mainstream education or training—that is, coursework and degree programs found in Steps III through V of the career pathways framework (Exhibit 3-3). Such training and education is integrated into the PACE programs, as well as may follow after as a result of a treatment group member's participation in a PACE program. For the CBAs, we will measure the amount of such education or training using estimates from the PACE and CPIO impact studies where possible, supplemented with data from the NSC for treatment and control group members. We plan to develop and refine cost estimates for attainment observed in the NSC data using available PACE program records observed for treatment group members.

The CPIO study will measure the differential participation in education or training activities of the treatment group compared with the control group, as discussed in the *PACE Evaluation Design Report* (Section 3.3.2). Because the CBAs are intended to complement and build on the impact analysis, we will follow the approach used in the impact study to determine the incremental amount of education or training activities of the treatment group relative to the control group. Discrete measures for each site will be defined based on:

- measures of hours;
- persistence (allowing for breaks in enrollment, consistent with the flexible entry/exit notion of the career pathways framework); and
- credentials most relevant to each program and target population.

We will select from among these measures those that comprehensively capture a quantity for which we have an available cost. For some types of training or education, an average cost per credit hour or similar unit may be most straightforward to estimate costs. For other types, an average cost per completed semester may be the most precise cost estimate available.

We may need to modify or build on a measure of educational attainment from the PACE impact study in order to determine a valid quantity to which we can assign a cost. To do so, we will review available quantity measures from the 18-month survey and in program records data collected for treatment and control group members in the PACE study. As outlined in the *PACE Evaluation Design Report* (Section 4.3.2), these include three types of records: program and college record systems, state agency student record databases, and the NSC. NSC data have the greatest coverage among the three, and they will be the primary source of treatment/control contrasts in educational attainment for the CPIO impact study and CBAs.

We note that in the NSC, coverage of enrollments at private for-profit institutions is substantially lower (53 percent) than for public (93 percent) and private nonprofit (87

percent) postsecondary institutions nationwide. For the former institutions we will rely on self-reported enrollment from the 18- and 36-month surveys to augment and fill in our quantity measure of educational attainment for the CBAs. If enrollment in for-profit institutions is missing in the 18- and 36-month surveys and in NSC data we will not be able to include it in our estimate of mainstream education and training costs.

However, outcomes observed in NSC data (enrollment and degree completion) have limited information from which to develop dollar cost estimates for the differential attainment. To estimate these costs more precisely, we will use program and college records. These records contain detail on service receipt, coursework, and education and training completion for treatment group members but are not available for control group members. We will use these records to associate a profile of education or training activity to outcomes observed in the matched NSC data. We will use this detail, together with Delta Cost Project Database[9] (DCPD) information on dollar values for the activities, to develop cost estimates for a particular outcome (see below and Chapter 5 for more details about DCPD). We can then apply this cost estimate as necessary to control group outcomes for which only more sparse NSC data are available.

After measuring the differential amount of education and training activity and educational attainment of treatment group members relative to control group members, we must monetize this input. Our primary source for cost data will be the DCPD. The dataset includes detail both on revenue sources that will allow costs to be allocated across our perspectives of interest and on spending categories that will allow some refinement of cost estimates based on the type of courses and programs in which PACE treatment and control group members participate. Data are currently available through the 2012-13 academic year. The database is designed to examine cost trends. We will use projected cost trends based on the database to determine costs for coursework observed in later years (Desrochers and Hurlburt, 2016).

We will develop institution-specific per-student total costs (per credit or completed degree or other relevant unit of education or training attainment, depending on data constraints) for institutions with attendance by either treatment or control group members. We will use the extensive variables available in the DCPD to make cost estimates as specific to study participants' observed coursework and attainment as possible. For example, costs are sometimes broken out by particular program types that may allow, for example, the costs of nursing program coursework at a particular institution to differ from costs of a business program at that institution.

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[9] Delta Cost Project Database is a longitudinal database of revenues, spending, and total operating expenditures for more than 6,000 postsecondary institutions. See Chapter 5 for more detail about the DCPD.

We will also calculate local average costs for observed institution types in each metro area that includes a PACE program. Institution types will include two-year and four-year public, private nonprofit, and private for-profit. These average costs will be applied as cost estimates for education or training completed by study participants at institutions that may not be represented in the DCPD data.

Note that we expect that PACE program participants are likely to qualify for more financial aid than the average student. We assume that the average amount of financial aid reported in the DCPD would understate aid received by PACE analysis. So, to estimate the amount of financial aid received by PACE program participant, we propose to use available net price calculators (e.g., **https://www.dmacc.edu/fin_aid/npcalc/npcalc.htm**) to determine expected out-of-pocket costs for PACE treatment and control study participants where possible.[10] At a minimum, we will estimate net prices using average PACE program participants' baseline characteristics at institutions that served the greatest number of them. These net prices will be compared with average student out-of-pocket costs in the DCPD to determine a financial aid multiplier that reflects PACE student characteristics. We will apply this multiplier to the perspective analysis of who bears the cost of the education or training, but note that total costs to society will not be affected.

Economic efficiency costs of government spending

Best practices require that an estimate of the marginal excess tax burden be included in social policy CBAs when the policy intervention requires net public expenditures (Vining and Weimer, 2010). This is because taxation and government spending result in losses of economic efficiency, a concept referred to as *deadweight loss*. The marginal excess tax burden is the amount that deadweight loss changes with a marginal change in government spending (or in taxes).

Government spending on PACE programs and mainstream education and training combined with the anticipated decreased government spending on public benefits plus the increased taxes paid by PACE program completers as noted in Exhibit 3-1 will result in changes in deadweight loss. Following Boardman et al. (2011), we will adjust our estimates of costs and benefits that affect the government perspective by 23 cents per dollar to account for

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[10] Institutes of higher education are required by federal law to maintain a net price calculator on their institution websites (**https://ifap.ed.gov/dpcletters/GEN1307.html**). As explained by the Department of Education (**https://collegecost.ed.gov/netpricecenter.aspx**) "Net Price is the amount that a student pays to attend an institution in a single academic year AFTER subtracting scholarships and grants the student receives. … Net price calculators are available on a college's or university's website and allow prospective students to enter information about themselves to find out what students like them paid to attend the institution in the previous year, after taking grants and scholarship aid into account."

changes in economic efficiency. Lower and higher estimates will be explored in the sensitivity analysis.

We note that the PACE evaluation itself, a potentially important cost to the government and foundation partners, is not a component of the PACE programs. As such, costs of evaluation, including costs incurred for program recruitment for the purpose of increasing sample size, are not included among government expenditures in the CBAs.

Opportunity costs to students of PACE participation

The largest cost of program participation from the treatment group member perspective is the opportunity cost of foregone employment (and thus earnings) during that participation. We will calculate the extent of foregone employment at each site by direct contrast with the control group at the site. Specifically, we will adopt, and as necessary adapt, the methodology of the CPIO impact study to estimate differential earnings for the treatment group relative to the control group during the first 36 months after random assignment. We will use this difference (anticipated to be negative) as the foregone employment cost of the PACE intervention.[11] For this estimation, we will rely on earnings reported in the 18- and 36-month surveys as well as through the National Directory of New Hire's (NDNH) Unemployment Insurance wage records, following the methods used in the two impact analyses.

3.1.2 PACE intervention outcomes and resulting benefits

For the CBAs, we have organized the PACE intervention outcomes into three high-level categories. The primary target of PACE programs is improvement in students' employment-related outcomes. Recalling Exhibit 3-1, these are benefits that show up from the program participant perspective only.[12]

A secondary category of benefits are changes in public benefits and taxes. Mostly, public benefits and taxes represent changes in transfers that net out to zero (except for a small savings in administrative costs) from a societal perspective, with participants receiving less

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[11] Valuing treatment group members' opportunity cost of time based on control group employment and earnings requires the assumption that only employment time is forgone. For further discussion of this issue, see, for example, Bell and Orr (1994) and Greenberg and Robins (2008). An alternative assumption would be that students forgo some leisure time in order to participate in education and training. As discussed in Section 3.4, we will include alternative assumptions in our sensitivity analysis. We also note that this may be a conservative estimate in the career pathways framework if the intervention increases education and training along the career pathways steps that last beyond 36 months. See the *PACE Evaluation Design Report* (Section 3.2) for further discussion of the timing of effects of PACE programs.

[12] As is standard in the literature, we assume that increases in lifetime earnings for PACE program participants represent overall economic growth rather than displacement of earnings of other workers who would have otherwise held the positions now held by PACE program completers. See Barnow and Smith (2016) for a recent discussion.

public assistance and paying more in taxes and government paying less in public assistance and receiving more in taxes. However, even though it is close to neutral from the societal perspective, changes in benefits and taxes can make a big difference from the participant perspective and the government perspective, thus are important to the cost-benefit analysis. In addition, the decreased administrative costs associated with such transfers do represent a net positive gain from a societal perspective.

A final set of "second-order" benefits improve quality of life for program participants and members of society at large. Education is often thought of as providing nonmarket personal benefits of greater life satisfaction. Higher levels of education in society at large may have radiating benefits. Examples often given include decreased crime, greater economic growth, and greater general social stability. We will not measure this final set of benefits in the CBAs, but we will discuss the potential importance of them when reporting our findings.

Employment

We will follow the 36-month CPIO impact study estimates as closely as possible in measuring employment benefits for the CBAs. As necessary, we will develop additional measures for the CBAs. For example, total earnings differences between treatment and control groups in the first 36 months after random assignment will provide our measure for the opportunity cost of treatment group members' time spent in PACE programs, as discussed in Section 2.3. We will review the length of time after random assignment that treatment and control group members spend in training and education before transitioning to employment. From this, we will determine whether a window shorter than 36 months is appropriate for assessing the opportunity cost of program participation.

The 36-month study impact estimates will use the 18-month and 36-month follow-up surveys, together with NSC data, PACE program data, and NDNH data, to construct measures of educational attainment and employment and earnings outcomes as the confirmatory hypotheses.

In the career pathways framework, participation in a PACE program may result in educational attainment for multiple years after random assignment, as students complete a program, become employed, return to complete a higher level credential, etc. It is possible, depending on the local theory of change, that although gains in educational attainment will be observed within the 36-month follow-up period, earnings gains will not yet be realized. For this reason, we will consider both observed earnings over the first 12 quarters after random assignment and increased educational attainment in that period as inputs for developing estimates for the lifetime earnings gains expected from PACE program participation.

For developing lifetime earnings profiles based on observed earnings over the first 12 quarters after random assignment, we will consider approaches used in previous rigorous studies, for example, Bell and Orr (1994). For additional insight into projecting these lifetime

earnings profiles, we will also scan the recent literature on the benefits of education and training for populations similar to PACE program participants.

In our context, the analysis will develop quarter-by-quarter earnings impact estimates over the observed 12 quarters after random assignment. From the literature, we will select a projection approach (a functional form of the future earnings profile that models, for example, decay of earnings gains) that best fits our data and the context of the PACE programs to extrapolate the estimates through students' working lifetimes. For estimates of how additional educational attainment translates to lifetime earnings differences, we will consider estimates used in Avery and Turner (2012), Trostel (2010), and other analyses from the literature. Note that our projections will include fringe benefits, including health insurance.

We will compare results from projecting earnings and imputing earnings gains based on educational attainment and consider modifying our selected approach to estimating differences in lifetime earnings based on the comparison. Alternative parameters for the approach we select and alternative approaches will be considered in the sensitivity analysis to assess how the choice of projection approach affects the CBA conclusions.

As noted in Exhibit 3-1, increases in lifetime earnings are also expected to increase costs of employment such as child care, transportation, and the value of lost leisure time. Note that we consider here direct costs to the individual. We address changes in eligibility for a range of public benefits and other assistance in **Public benefits and taxes** later in this section.

There are two ways in which PACE programs can increase lifetime earnings. First, education and training can result in employment at a higher wage. Second, education and training can improve employment prospects generally, increasing the hours worked through both a decreased incidence of unemployment and an increase in hours worked when employed.[13] We assume that costs of employment do not increase over the baseline quantity of employment that individuals would have experienced without PACE program education or training. For example, the same amount of child care does not become more expensive because of wage gains due to PACE participations (except through changes in eligibility for income-based assistance, addressed as a public benefit later in this section). However, when the number of hours worked increases, or the incidence of unemployment decreases, individuals will use more child care, transportation, and other resources to facilitate the additional employment. CBAs should net out these costs of employment from gains in earnings (Boardman et al., 2011, p. 297).

[13] A higher wage could theoretically lead individuals to choose to work fewer hours. We assume this is not the case for PACE program participants, who have relatively low income and face employment challenges at the time of program enrollment.

We plan to follow the approach outlined in Greenberg and Robins (2008) to adjust for costs of increased employment. A key insight in this approach is that these costs of employment are embedded in an individual's willingness to accept employment. Formally, the costs are components of the individual's labor supply curve—the relationship between an individual's willingness to work a given number of hours at a given wage. So, rather than attempting to itemize, measure, and model every possible employment cost individually, we will rely on literature estimates on the shape of labor supply curves for relatively low-income workers to determine an adjustment to estimated earnings to account for employment costs.

Greenberg and Robins (2008) use standard assumptions about the shape of labor supply curves for individuals in a training program (e.g., an assumption based on literature estimates of a compensated wage elasticity at 0 hours of 0.1) to develop an adjustment factor to apply to earnings increases due to increased employment when conducting a CBA. They find that a factor of 0.5 is appropriate and robust to sensitivity analysis. That is, approximately half of earnings gained through increased employment due to a job training program are offset by increases in costs to the individual of the increased employment, such as increased use of child care and transportation and decreased leisure time. We will use 0.5 as a cost of employment adjustment factor in the CPIO CBAs and will consider 0.4 and 0.6 as alternative values in sensitivity analyses.

We note that survey data collection includes information on family structure, with the 36-month follow-up survey asking about outcomes for a focal child. We will further explore the possibility of using different adjustment factors for individuals with and without young children to account for differential costs of employment due to child care needs.

This approach requires our estimate of the increase in lifetime earnings to be decomposed into a wage component (changes in the amount individuals are paid for a given level of employment) and an hours component (changes in the level of employment). To arrive at an estimate of this split, we will again first look to estimates from the impact studies and then to estimates in the literature. For example, Greenberg and Robins (2008) find that, on average, approximately half of earnings gains in the population and program they examine are due to wage increases and half are due to increases in employment (at the potentially higher wage).

Public benefits and taxes

Changes in earnings affect the receipt of public benefits and payment of taxes. From a societal perspective, these payments represent transfers from one part of society to another, and so directly net each other out. However, distributional effects of such transfers are often of interest to policymakers. Also changes in public spending and taxes require an adjustment for changes in deadweight loss. As discussed in Section 3.1.1, we include a 23 cents per dollar adjustment for marginal excess tax burden for all changes in government spending or in taxes.

The net effect of increased income on the receipt of benefits and taxes paid is referred to as the *effective marginal tax rate*. The Congressional Budget Office (CBO) conducts in-depth analysis on the effective marginal tax rate for low- and moderate-income workers. We will apply these CBO estimates (Congressional Budget Office, 2015) to the estimated lifetime earnings profiles.[14] This approach estimates the total reduction in public benefits plus the increase in taxes paid that accompany earnings gains. It is an efficient analysis approach in that it does not repeat the exercise already completed by the CBO of estimating changes in benefits for TANF, Medicaid, Unemployment Insurance (UI), Supplemental Nutrition Assistance Program (SNAP), housing assistance, and other benefits individually.

State and local tax payments and revenues are also affected when incomes change. Though the CBO analysis includes some state tax and transfer payments, we will consult an additional resource to verify that the approach and assumptions used in the CBO analysis are applicable to each PACE site. The Center for State Tax Policy at the Tax Foundation publishes information on state and local tax rates that we will use to supplement the CBO analysis as necessary in estimating changes in state and local tax revenue that will result from estimated changes in lifetime earnings.[15]

Reductions in benefits receipt due to increases in earnings will result in decreased administrative costs associated with the benefits programs. These reductions are a benefit from the government perspective and a benefit to society as a whole. A common approach to monetizing this benefit is to assume an average level of administrative costs across all public benefits programs and to apply this multiplier to the estimated change in public benefits receipt (Karoly, 2008). This suits our plan for measuring overall changes in public assistance receipt as a component of the effective marginal tax rate (as opposed to tracking each element of public assistance separately).

Studies typically assume around 10 percent, which is in line with most estimates of administrative costs found when examining budget details for the relevant federal and state agencies (Karoly, 2008; Isaacs, 2008). We will adopt this approach by assuming that administrative costs of public benefits programs average 10 percent. We will add a sensitivity analysis by calculating the CBA net present value with more conservative (5 percent) and more liberal (20 percent) estimates.

Second-order benefits to society from improved treatment group member outcomes

Many additional benefits may radiate from improvements (increased training and education, higher lifetime earnings) targeted by the PACE intervention. We would expect children of PACE treatment group members with higher educational attainment and lifetime earnings to also have improved education and economic outcomes and other

[14] Note that this requires an assumption that current benefits and tax policy remains in place.

[15] **http://taxfoundation.org/tax-topics/state-taxes**

radiating benefits. Treatment group members themselves may have better health outcomes and experience greater life satisfaction due to an intrinsic value of education. Benefits to society more broadly could include decreased crime, greater economic growth, greater social mobility, and greater social stability.

With the exception of effects on child well-being, the PACE study was not designed to measure such second-order benefits, many of which we would not anticipate to be observed at 36 months. Some child well-being outcomes are included for a focal child in the 36-month survey. However, we will not incorporate monetary value estimates of child well-being impacts or other second-order benefits in the CPIO CBAs.[16] Rather than monetize these benefits for the CBAs, we plan to calculate net present value based on direct costs and benefits only and then discuss how such second-order impacts affect our interpretation of NPV. We discuss this aspect of our analysis further in Section 3.3.

3.2 Step 2: Calculate net present value of PACE intervention

After measuring and monetizing individual PACE intervention costs and benefits where possible, we will take the next step in the CBA of combining the individual monetized amounts into the summary **net present value** measure. The NPV compares the sum of all benefits, each discounted to a common time point of 36 months after random assignment, versus the sum of all costs, likewise discounted.

We chose 36 months as the base period for normalizing costs and benefits so that the CBA findings will align in interpretation with 36-month impact findings. For example, the *PACE Evaluation Design Report* (Abt Associates, 2014) specifies earnings in the 12th quarter after randomization as the confirmatory outcome in the employment domain.

As introduced in Section 2.2, the basic formula for NPV is the difference between benefits and costs,

$$NPV = PV(B) - PV(C)$$

where $PV(B)$ indicates the present value of the combined benefits resulting from the program, and $PV(C)$ indicates the present value of all costs associated with or induced by the program over time. To calculate $PV(B)$ and $PV(C)$, we will populate the cells of Exhibit 3-1 with measured dollar amounts (except for the "Second-Order Benefits" category) and then sum totals for each category to determine a total $PV(B)$ and a total $PV(C)$ for each segment of society (five right columns).

[16] Reasons for this design decision include that the impact studies do not measure or impute effects for most such outcomes, there are not currently consistent outcome measures or standard monetization values for most of these benefits in the cost-benefit analysis literature, and including such benefits would compound the difficulties of parameter uncertainty. See Karoly (2012) for a discussion of these issues.

This requires us to adjust all monetized costs and benefits to the same year by applying a discount rate. As a base case, we will follow the OMB (2003) guidance in *Circular A-4* and use a discount rate of 3 percent. This rate is recommended for a program that "primarily and directly affects private consumption," where a "social rate of time preference" is the appropriate adjustment. Some of our monetized benefits are based on literature estimates, notably our estimate of the lifetime earnings effects of additional education or training. We will adjust these estimates to reflect a 3-percent discount rate if a different rate was used in the original calculations. As is standard practice (see Boardman et al., 2011), we will recalculate NPV with discount rates of 2 and 6 percent in sensitivity analyses, discussed in Section 3.4.

- **NPV will be positive** if the total monetized improvement in outcomes over treatment group members' lifetimes exceeds net program costs (treatment versus control).
- **NPV will be negative** if the benefits do not offset costs.

However, NPV from a particular perspective can be different than the total NPV from a society perspective. Thus, we will also calculate NPV from the perspective of PACE treatment group members, federal and state/local government, and the rest of society (i.e., perspective of society other than government and treatment group members). .

- The total NPV to **society at large** (right-most column in Exhibit 3-1) indicates whether a PACE program produces overall measurable societal benefits that outweigh the program's costs.
- From a **treatment group member's perspective**, the NPV indicates whether enrolling in the program makes sense as a personal investment.
- From the **government perspective**, the NPV indicates the net government resources (adjusting expenditures today to account for lower expenditures and higher tax revenue in the future) needed to generate benefits experienced by other segments of society, such as treatment group members.

3.3 Step 3: Consider benefits that are not monetized

The theory of change for PACE programs predicts a wide range of potential improvements in child and adult well-being (see Exhibit 1.2 in the *PACE Evaluation Design Report*). One core effect of a successful PACE program—increases in lifetime earnings—is expected to lead to a variety of improved outcomes for treatment group members and society that we will not directly include in the CBAs. As noted in Exhibit 3-1, these may include the intrinsic value of more education and training (i.e., improved self-esteem, existence value to society of better educational outcomes for lower income members), higher income and more education and training in the next generation (i.e., among children of treatment group members), greater economic growth, and greater social stability. We consider such benefits

to be second-order effects of the increased educational attainment and earnings that are the primary target effects of PACE programs.

Measuring and monetizing these longer-term, second-order outcomes is beyond the scope of the CPIO evaluation (except that some child welfare outcomes are included for a focal child in the 36-month survey).[17] Additionally, we are not aware of reliable methodologies for estimating the total monetized value of all such second-order effects from estimated lifetime earnings gains based on 36-month earnings and education impacts. Should such methods become available in the literature in the near term, we will consider using them for such a purpose.

This exclusion of second-order effects from our NPV calculations is not intended to diminish the potential importance of such effects. Indeed, taken together, these benefits may be substantial. Our approach to recognizing these benefits in each CBA report will depend somewhat on the findings of the CBA.

If a CBA finds a negative NPV for a PACE site, where costs are greater than directly calculated benefits, then we will calculate how large the monetary value of second-order benefits would need to be in order to tip the scales to a positive NPV, and discuss the plausibility of long-term benefits of that magnitude. That is, "What multiple of the primary benefits would second-order benefits need to be in order to result in a positive NPV?" For the alternative finding of a positive NPV, with calculated benefits alone outweighing the costs, we will discuss how second-order benefits that totaled to 10, 25, and 50 percent of the primary earnings–based benefits would increase the size of the measured NPV.

3.4 Step 4: Conduct sensitivity analyses

Estimated NPVs of PACE programs based on all measured costs and benefits are subject to three types of uncertainty, discussed in this section: sampling variability, measurement error, and a multiplicity of options for elements that cannot be estimated from observed data but must instead be assumed from estimates available in the CBA literature. After describing each type of uncertainty, we explain how sensitivity analysis will be used to explore how uncertainty affects the NPV calculation.

3.4.1 Sources of uncertainty in NPV parameters

Three types of uncertainty arise in these CBAs. First, **sampling variability**—chance inclusion of just some cases from the universe of interest in the analysis sample rather than the entire universe—causes virtually all impact estimates and other parameters calculated using statistical analysis to be subject to some uncertainty, even for parameters found to be statistically significant. Statistical standard errors associated with each estimate provide a measure of the extent of this sampling uncertainty. Larger standard errors indicate greater

[17] See Karoly (2012) for a discussion of these issues for child welfare outcomes.

parameter uncertainty. Elements of the NPV calculation that we will base on point estimates with standard errors include estimated impacts on mainstream education attainment and impact estimates for lifetime earnings and associated changes in public benefits and taxes.

Measurement error due to inaccurate observed values is also present for point estimates of PACE program costs for the single program or small number of programs at each site. Each CBA will include cost estimates based on cost data collected for a single site—and no standard error for these site-level point estimates exists. Unfortunately, the variation in costs across the nine PACE programs for which cost data were collected does not provide viable information on the extent of measurement error at an individual program. This is because the programs vary greatly in ways that result in real cost differences. Examples include the population served, the types of degrees or certifications targeted, and the extent of direct assistance (e.g., stipends). As such, our sensitivity analysis will not address possible measurement error for PACE program costs. Rather, for each CBA, we will note how large an error in program cost measurement would need to be to alter the conclusions of the CBA.

Finally, **some parameters must be assumed** rather than taken from PACE program data. There is usually a range of estimates to choose from in the CBA literature. These include the marginal excess tax burden of government spending, the functional form specification for future earnings projections, the administrative cost rate of public benefits programs, and the social discount rate applied to future benefits and costs. This adds uncertainty as to which of the available estimates best serves the purpose for the PACE evaluation. Additionally, we must make assumptions on the costs associated with non-PACE program basic education and training that control group members may have accessed. This results in some uncertainty about the difference between treatment and control group costs. We will include this source of uncertainty in our discussion of the magnitude of error that would be needed in estimating program costs relative to control group costs to alter CBA conclusions.

3.4.2 Generating a range of CBA findings in the face of uncertainty

To address these uncertainties in formulating our CBA findings, we will conduct two variants of sensitivity analysis: a recalculation analysis and a Monte Carlo analysis. The recalculation analysis consists of calculating NPV with the same values used in the primary analysis for all but one element of the calculation at a time while varying the final focal element. For the Monte Carlo analysis, NPV will be calculated a very large number of times (more than 10,000) with the parameters subject to substantive uncertainty all drawn with each calculation from distributions of their probable values.

In the **recalculation analysis**, we will vary one element of the NPV calculation at a time, with high and low values for that element determined in a different manner depending on the type of uncertainty involved. Where a parameter's value is made uncertain by sampling

variation, we will use the standard error of the associated impact estimate to establish an upper bound and a lower bound for the parameter, set at the limits of a 95-percent confidence interval for the point estimate. Where a parameter's value is uncertain because it must be assumed, we will turn to the literature and, as necessary, our best judgment as to the most appropriate low- and high-end value alternatives for recalculating NPV. We will base our estimate of the lifetime earnings gains due to PACE on an impact estimate of 12 quarter earnings gains that will have a standard error and modelling assumptions that project this impact to an estimate of lifetime earnings gains. These assumptions are subject to the third type of uncertainty inherent in assumed parameters or models. To account for both types of uncertainty, we will recalculate NPV using upper- and lower-bound alternatives for estimated lifetime earnings. Values for the alternatives will be the highest (upper) and lowest (lower) of the ends of the 95-percent confidence intervals across all models that we considered in developing a preferred point estimate. That is, the maximum value within the confidence intervals for considered models will provide the high alternative value while the minimum value within the confidence intervals will provide the low alternative value.

We will report results of the recalculation analysis in a table displaying the value of each of the uncertain parameters used in the primary analysis and the alternative low- and high-end alternatives examined for sensitivity purposes. The table also will show the NPV that results from each scenario from the overall societal perspective and from any additional perspective affected by the change. Because we will conduct the recalculation analysis for multiple alternative values for a number of parameters, we will simplify the presentation of the findings by including only results that suggest that the uncertainty may materially alter the CBA findings. We will include results in the table only if alternative values for the parameter in question result in a change of sign in the calculated NPV or if the resulting change in NPV is greater than 20 percent.

For the **Monte Carlo analysis,** we will replace point estimates and assumed parameters with random draws from appropriate distributions for the uncertain parameters all at once, repeated many times. This allows us to calculate many estimates of NPV (from the societal perspective)—one for each draw. In this type of analysis, the distribution used for each parameter is determined by identifying an appropriate statistical distribution, either from the literature or based on possible values for the parameter, and using available information on probable values the parameter could take on to specify the form of the distribution. We will follow this approach and first look to the literature in selecting and parameterizing a distribution. If the literature does not specify a standard distributional assumption for a parameter, we will use the normal distribution for parameters based on a point estimate with a standard error and a uniform distribution for parameters that may fall within a given reasonable range. For example, we will use a normal distribution parameterized using our modeled estimate of the gain in lifetime earnings due to PACE participation to generate the random draws for the lifetime earnings parameter in the NPV

calculation. We will specify the mean of the distribution to be the point estimate from our preferred model of lifetime earnings gains. We will set the standard deviation to equal the largest standard error from among all of the models of lifetime earnings that we consider in projecting the 36-month impact findings into lifetime earnings gains. As another example, we will replace the value for the marginal effective tax rate with random draws based on an appropriate distribution of possible values (e.g., uniform) that includes the likely range of values for the marginal effective tax rate based on available literature.

In the Monte Carlo framework, NPV values for all varying parameters are replaced simultaneously. To reduce the dimensionality of the Monte Carlo analysis, we will consider only parameters that pass the filter of the replacement analysis. We will vary only those parameters found to materially alter findings when varied alone in the recalculation analysis. We will compute NPV for each of a large number (more than 10,000) of simultaneous random draws across all of the uncertain elements that pass this filter.

We will present the resulting large number of estimates of NPV as an empirical distribution (e.g., histogram or kernel density plot) and summarized by key characteristics including the mean and standard deviation of the estimates. The calculated mean should be very similar to the original NPV calculated in the primary analysis (because all distributions used for individual parameter random draws will include the original point estimates, typically as mean values). The standard error of this mean will indicate the uncertainty concerning the estimate of net benefits, analogous to the standard error of an individual impact estimate.

Finally, the fraction of net benefit calculations from the Monte Carlo study that are negative will provide an indication of the probability that the net benefits of the PACE program are negative.

3.5 Analysis timeline for the CBAs

Exhibit 3-5 shows the schedule for selecting the CBA sites and producing a draft report for each of them. The schedule is necessarily approximate, as it depends on when the 36-month impact results are available and which sites are selected for the CBA. A more detailed schedule, with due dates for each draft CBA report, will be provided after the CBA sites are selected.

Exhibit 3-5: Timeline for conducting CBAs

Action/Deliverable or *Related Deliverable*	Timeframe	Notes
Select up to six programs based on information available, which will include PACE 18-month findings, information developed to select sites for the 72-month study, and program elements.	Summer/Fall 2017	Approximately 6 months prior to the first 36-month impact report.
First 36-month impact findings are available.	*Dec 2017*	*This is the timeframe for the first draft 36-month report. The first draft 36-month report for the earliest CBA site could be later.*
CBA sites two through six 36-month impact findings are available.	*Jan 2018 to Jan 2019*	*These are dates for draft 36-month reports.*
Draft CBAs each completed within 2 months following the draft 36-month impact reports (except Report 1 will be later to ensure we can make all six consistent).	May 2018 to Mar 2019	The first draft CBA will be completed 4 months after the draft impact report to allow us to refine methodology and sensitivity tests etc. before implementing for all six sites.
CPIO study ends.	September 2019	

4. Selecting Programs for Cost-Benefit Analyses

As noted above, the CPIO study design specified in the contract procuring this research calls for up to six of the nine PACE programs to be selected for cost-benefit analyses. The team will work with ACF to identify which six programs. The highest priority will go to sites with promising effects on important educational and/or employment-related outcomes at 18 months in the PACE study. Where a program is found to have no impact on these outcomes, costs will outweigh benefits necessarily. Therefore, CBAs for sites with an expectation of positive impacts at 36 months will be the most informative.

We note that a similar approach is planned in the Career Pathways Long-Term Outcomes Follow-Up Study (CPLO), which will select study participants for follow-up interviews from among PACE programs with a higher likelihood of long-term impacts on outcomes based on earlier observed impacts. Because the CBAs are intended to complement the impact studies and build on the findings of the impact studies, we will work closely with the larger CPIO and CPLO research team to select programs for the CPIO CBAs that we anticipate will be selected for the CPLO impact studies and accompanying CPLO CBAs.

We suggest also representing a diversity of program types on the factors summarized in Exhibit 4-1 below and taking into account ACF interest. For example, at least one community or technical college should be included, and at least one initiative operated by a workforce investment board. Some diversity in target population and approach may also be useful.

Exhibit 4-1: Summary of program characteristics for consideration in CBA site selection

Program/Grantee	Target Population	Program Approach	Community or Technical College?	Operated by Workforce Investment Board?	Tentative Draft 36-Month Impact Report to ACF
Bridge to Employment in the Health Care Industry / San Diego Workforce Partnership	Individuals in San Diego County with income below 200% of the federal poverty line or receiving TANF and who have a high school diploma or equivalent.	Community-based navigators support training of low-income adults or TANF recipients in varied health care occupations. ITAs help participants pay for training; navigators provide supports.		X	Dec 2017

Program/Grantee	Target Population	Program Approach	Community or Technical College?	Operated by Workforce Investment Board?	Tentative Draft 36-Month Impact Report to ACF
Carreras en Salud / Instituto del Progreso Latino	Low-income Latino adults in Chicago with limited English proficiency and academic skills ranging from the 6th grade to 11th grade level.	Health care ladder offering opportunities ranging from low-level bridge programs to associate and bachelor's degrees in nursing.			Oct 2018
Health Careers for All / Workforce Development Council of Seattle	Adults with income below 175% of the federal poverty line or receiving TANF, as well as some individuals with higher incomes or skills but with other barriers.	Community-based navigators support training in several health career pathways for low-income adults or TANF recipients. Individuals receive ITAs for training or enroll in specified community college cohort programs.		X	Jan 2019
Pathways to Healthcare / Pima Community College	Low-income adults in Pima County below 70% of the federal poverty line.	Navigation and supports in 16 different health care occupations within five career pathways. Low-skilled participants start in College Readiness program.	X		Feb 2018
Patient Care Pathways Program / Madison College	Individuals testing below program entry requirements on ACT Compass®.	Two college bridge programs—one laddering to 1-year, and the other to 2-year health care credentials.	X		Feb 2018
Valley Initiative for Development and Advancement (VIDA)	Low-income students with at least 10th grade-level academic skills who are new or continuing college students.	Students receive core services for 2-3 years. Places students in programs providing training in projected high-growth fields.			Aug 2018

Program/Grantee	Target Population	Program Approach	Community or Technical College?	Operated by Workforce Investment Board?	Tentative Draft 36-Month Impact Report to ACF
Washington Integrated Basic Education and Skills Training (I-BEST)	Adults not meeting specified skill levels on placement tests for entry to occupational programs of interest.	Statewide community college program providing credit-bearing coursework in varied occupations, concurrent with basic skills or ESL instruction, as well as enhanced guidance and other supports.	X		Oct 2018
Workforce Training Academy Connect / Des Moines Area Community College	Low-income and low-skill adults, typically at less than 9th grade-level skills, with or without high school credentials.	Basic skills and multi-occupational trainings leading to a certificate.	X		Jan 2019
Year Up	Economically disadvantaged youth age 18-24 with high school credentials, screened for motivation and moderate level of risk factors.	One-year, full-time program providing customized skills training and corporate internships.			Oct 2018

NOTES: ESL is English as a second language. ITA is Individual Training Account. TANF is Temporary Assistance for Needy Families.

The timing of the analysis may also be relevant. The CBA for each site relies on the impacts identified in the impact analysis. To refine the methodology and ensure that all data-gathering needs are being met, we suggest selecting a "test case" program for the first CBA from among the three sites expected to have the earliest impact results. These are Madison College, Pima Community College, and San Diego Workforce Partnership. The draft impact report deliverable dates are shown in the exhibit.

The evaluation schedule requires that we begin identifying the six programs for CBAs in summer 2017. We will select programs based on likely positive impacts, indicated by data available at the time, which will typically include PACE 18-month impact study findings.

5. Data Sources for Conducting Cost-Benefit Analyses

This chapter catalogues and provides additional detail about the data sources introduced in Chapter 3. Some datasets are listed as being for the same purpose (e.g., both surveys and NSC data to identify educational/training attainment). This redundancy is built in so that the most complete and accurate measures of attainment can be used. We plan to follow the impact study's final approach to measuring outcomes while taking advantage of any additional information that may prove useful to the CBAs.

5.1 PACE program profiles

Profiles of each of the nine PACE programs were compiled as part of the PACE evaluation implementation study and published in 2014. The profiles give a high-level overview of each program; detail program goals, target population, and structure; and describe each program's career pathways components. The information on program structure and career pathways components was used to conduct background research that identified PACE program inputs. This research was completed in preparation for the cost data collection interviews we conducted as part of the PACE evaluation. Program profiles are available at **http://www.acf.hhs.gov/opre/research/project/pathways-for-advancing-careers-and-education**.

5.2 Qualitative data from the PACE implementation study

The PACE program profiles were based on site visits to the PACE programs in 2012 and 2013 that included interviews with program leadership and staff, review of documents related to the program, and observation of program activities. Site visit teams also had monthly monitoring calls in which they discussed study enrollment and program implementation. The research staff who conducted the site visits and maintained contact with the programs kept and organized notes documenting these visits that the study used to produce the PACE program profiles.

We found that these notes sometimes included additional detail on program components and structure that was useful in preparing for cost data collection interviews that had not been included in the PACE program profiles. So in preparation for our cost data collection interviews, we reviewed available site visitor notes and any available program documents collected during the site visits. If the staff who had conducted a program's site visit remained as a study team member, we met with that person to review our understanding of the program's structure and context.

5.3 Cost data collection interviews

In 2015, we conducted interviews with staff of each PACE program to gather information on its operations and costs. Program directors and financial officers participated in one- to two-hour phone interviews. These interviews and subsequent follow-up were used to determine a comprehensive list of program inputs and associated costs. The cost template reproduced in Appendix A provided a structure for this data collection effort.

Data collected in these interviews serve as the primary resource for estimates of PACE program unique elements.

5.4 18-month follow-up survey

An 18-month survey of treatment and control group members for the PACE evaluation was administered between November 2013 and May 2016 by phone, with follow-up for nonrespondents in person. The response rate was 77.2 percent (7,141 completes). The survey collected information on service receipt, postsecondary educational attainment, income and sources of income, debt, and participation in public benefits programs.

Information on educational attainment and the names of educational institutions in which students enrolled will be used in the CBAs. The names of institutions will be used to look up costs in the DCPD. Because for-profit educational institutions are less represented in the NSC data, the 18-month follow-up survey is a key resource for identifying enrollments at these institutions.

5.5 36-month follow-up survey

The 36-month survey that is part of the CPIO impact study is currently being administered. It launched in February 2015 and will be completed across all sites in May 2018 (and as early as late summer/early fall 2017 for some programs). The survey will capture treatment and control group members' more substantial progress toward major postsecondary credentials, such as an associate's degree and transfer to a 4-year institution, as well as more definitive evidence on career track employment and earnings, assets, and adult and child well-being.

Data from the 36-month survey will be used, together with the 18-month survey and NSC data, to determine the extent of mainstream educational and training attainment. The 36-month survey is also a key input to the impact studies that produce the estimates of earnings gains that we will use in the CBAs to project lifetime earnings gains.

5.6 National Student Clearinghouse data

As described in the *PACE Evaluation Design Report*, the primary source for documenting study participants' mainstream postsecondary education and training will be NSC data,

which are available for all nine PACE programs, under an agreement between PACE and NSC. The database contains a very limited number of basic data items—registration status at specific institutions and major degrees received—but importantly covers nearly all students at the vast majority of public (93 percent) and private nonprofit (87 percent) postsecondary institutions nationwide.

Coverage of enrollments at private for-profit institutions is substantially lower (53 percent), suggesting a need for careful assessment and potential adjustments for undercoverage if feasible. We will use to the 18- and 36-month survey self-reports of enrollment at for-profit institutions to make necessary additions to attendance observed in the NSC data for the purpose of estimating mainstream education and training costs.

5.7 Program records

The 18-month PACE study is collecting program records from all nine sites, including college records at the three college-based programs and from local colleges for the VIDA program. CPIO intends to continue to collect college records from sites that can extend existing PACE study data sharing agreements to the CPIO study. Details of the data that are available differ for each of the PACE programs. For most, detailed data are available only for treatment group members. However, we anticipate that this detail will prove helpful in determining the average amount of coursework associated with a degree or certificate observed in NSC data. We will use this additional detail to refine estimates of the costs of degree or certificate attainment.

5.8 Delta Cost Project Database

The DCPD is a longitudinal database derived from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). Data are currently available through the 2012-13 academic year, which we will use as the primary source for monetizing the costs of mainstream education and training. The data translate IPEDS information about finance, enrollment, staffing, credential completions, and student aid into analytic formats for analysis of revenues and expenditures in postsecondary education. The database includes information on more than 6,000 public, private not-for-profit, and private for-profit institutions, including information on revenues, sources of revenues, spending, and total operating expenditures.

5.9 National Directory of New Hires wage data

Derived from state Unemployment Insurance records, the NDNH contains quarterly employment and earnings data and Unemployment Insurance benefits for all UI-covered workers. For this study, NDNH data will be available for PACE study members from two years prior to random assignment to at least three years (12 quarters) after random assignment.

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Appendix A: PACE Program Cost Data Collection Template

[Program name] Cost Worksheet

Target time period:	**As implemented: [year with greatest PACE program enrollment]**
Actual time period:	
Documentation sources (expenditure reports)?	
Number of program students receiving services represented by costs:	
Do program students receive services for less than the full time period, a single time period (quarter), multiple time periods?	
On average, how many periods (type:_____) do recipients receive services?	
Costs of I-BEST program only; prorate item costs as necessary:	

Administrative / Management / Overhead		
Staffing: Salary	**Name/Title**	**Cost**
Staff 1:		
Staff 2:		
Staffing: Benefits	**Name/Title**	**Cost**
Staff 1:		
Staff 2:		
Other	**Description**	**Cost**
General "overhead" rate:		
Supplies/expenses/etc.:		
Program Activities		
Staffing: Salary	**Name/Title**	**Cost**
Staff 3:		
Staff 4:		
Staff 5:		

Staffing: Benefits	Name/Title	Cost
Staff 3:		
Staff 4:		
Staff 5:		
Other	**Description**	**Cost**
Supplies/staff expenses/etc.:		
Facilities:		
Program Assistance		
Direct support	**Description**	**Cost**
Transportation assistance:		
Cash assistance:		
Books, tools, course materials:		
Other:		
Tuition assistance beyond Pell and state grants	**Description**	**Cost**
Other Costs		
Any other program inputs not categorized as costs above?		