Financing Human Capital Development for Economically Disadvantaged Children: Applying Pay for Success Social Impact Finance to Early Child Development

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ReadyNation

Washington DC
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1. Introduction

Advances in data availability and information technology make it possible to apply modern finance techniques to a wide range of economic and social problems that previously defied efficient pricing and optimal resource allocation. This work of drawing together data, analytical power and finance to address social problems is referred to as social impact finance and is attracting the attention of a wide range of private and public institutions concerned about economic development and human wellbeing.[3] As in any other area of applied economics, operational success depends on development of effective models of finance and contracts.

Contract models bring to the surface unique problems in social impact finance and provide guidance on how to frame the relationships among the parties in a project. The main parties include the providers of interventions and services that achieve desired goals, the government and investors that want to achieve those goals, and the evaluators who assess whether the goals have been achieved and justify making success payments to the organizers of the project. Equally important, the parties include the people impacted by the interventions. Their lives may be altered profoundly. Contracts also have to anticipate and address adverse possibilities.[4]

Financing models illuminate specific challenges in scaling projects and provide guidance on what kinds of assets are best to use to achieve given goals, drawing on decades of private capital market and philanthropic experience. The range of asset types that could be deployed in social impact finance projects include everything from traditional bank loans, to fixed maturity bonds, preferred stock and even ultimately to globally marketable pass-through assets.

Two kinds of financial instruments

The financial models presented in this paper are very simple and intended solely to illustrate some basic pay for success financial mechanics. The focus on prekindergarten is intended to provide granularity to broader discussions of how to apply PFS social impact finance to early child development.

This paper presents two financing models for how to pay for early child development programs. The models examine combinations of government, philanthropic and private funding. The private funding takes either of two forms – straight fixed-maturity, fixed-rate debt, and payment pass-through obligations. The results show that operational financing plans can be constructed by combining resources from government, philanthropy and private investors.

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[3] David Erickson, ed. "Pay for Success Financing," *Community Development Investment Review* 9 (1), Federal Reserve Bank of San Francisco, April 2013
http://www.frbsf.org/publications/community/review/vol9_issue1/review-volume-9-issue-1.pdf

[4] See "Early Childhood Pay for Success Social Impact Finance: Organizational Steps, Memorandum of Understanding and Contract Outlines", Report of the ReadyNation Working Group on Contracts in Early Childhood Social Impact Finance, June 2013 http://readynation.org/SIB/

The models can be used to analyze the basic PFS finance feasibility of a broad range of early childhood interventions. This paper uses the models to analyze the feasibility of providing high-quality two-year prekindergarten education to at-risk children. The models are applied to and financial return data are obtained for, a single cohort of three and four year-old low-income, at-risk children, and for five successive cohorts. Particular attention is paid to two quite different sources: the Granite School District (GSD) in Salt Lake City, Utah, and the GSD's Title I preschool[5]; and the Bethlehem Area School District (BASD) in Bethlehem Pennsylvania and Pennsylvania's Pre-K Counts prekindergarten program[6].

The models reveal the finance mechanics of one group (cohort) of children as they move through public school from kindergarten through 12th grade, and for five successive groups of children. Variations of the models are shown that highlight important features of the models when key assumptions are varied. No attempt is made in this paper to conduct a full sensitivity analysis. This is left for future research.[7] In addition no attempt is made to include other public school cost reduction effects, such as lower needs for English language learning services or grade retention. This too is left to future research.

Cost of remediation and income inequality

Early childhood research shows that public school elementary school special education assignment rates for three and four year-old socially and economically disadvantaged children can be significantly reduced by providing the children quality prekindergarten (pre-k) educations.[8] Several studies indicate that the reduction in public school special education costs resulting from the lower assignment rates may be large enough to pay for the initial pre-k using "pay for success" (PFS) social impact finance principles.[9] The reason for this is the very high cost of remediation. It simply costs much more to correct or manage behavioral and learning deficiencies when children are five years old or older, than it does to provide developmentally appropriate experiences when they are three and four years old and personality, social and cognitive capacities are developing very rapidly.

A similar possibility appears to exist with respect to home visiting prenatal counseling for at-risk mothers. Evidence suggests the counseling improves maternal nutrition and health sufficiently to significantly reduce the incidence of low birth-weight births. The reduction in incidence together with

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[5]Janis Dubno and Lindsay Dolce, *A Sustainable Financing Model for High Quality Preschool for At-Risk Children,* Voices for Utah Children & Early Learning Ventures, Presentation to the National Business Leader Summit on Early Childhood Investment, July 2011, Boston, MA, http://www.readynation.org/uploads/20110713_SustainableFinancingModelPresentationtoPAESNationalBusinessLeaderSummitBostonJuly222011.pdf

[6] Robert Dugger and Robert Litan, *Early Childhood "Pay-For-Success" Social Impact Finance: A PFS Bond Example to Increase School Readiness and Reduce Special Education Costs,* Report of Kauffman Foundation-Ready Nation Working Group on Early Childhood Finance Innovation, April 2012 pp 49-51, 56-57
http://www.readynation.org/uploads/db_files/Kauffman-ReadyNation%20PFS%20Report%2012041922.pdf

[7] The Excel spreadsheet used to calculate the results is available on the ReadyNation website under the Working Groups tab: Social Impact Finance Working Groups. Readers are encouraged to download the spreadsheet and adjust the assumptions to reflect local conditions or to reflect the cost and operating conditions of other early childhood interventions, such as prenatal counseling or infant and toddler nutrition. http://readynation.org/SIB/

[8] Steven Barnett, "The Economics of Early Childhood Programs: Lasting Benefits and Large Returns", National Institute Early Education Research, 2013
http://nieer.org/sites/nieer/files/Economics%20of%20ECE_Loyola_Nores.pdf

[9] Dubno and Dolce (2011)
http://www.partnershipforsuccess.org/uploads/20110713_SustainableFinancingModelPresentationtoPAESNationalBusinessLeaderSummitBostonJuly222011.pdf

the large difference in post-delivery healthcare costs between low birth-weight and normal birth-weight deliveries may be sufficient to cover the costs of the prenatal counseling in a PFS project.[10]

The primary motivation for applying PFS finance principles to early childhood interventions is to increase the availability of intervention services and improve long-term workforce competitiveness and per capita income growth, without increasing public and private costs.[11] A secondary motivation is income inequality. Evidence is mounting that income inequality is, to a significant degree, the result of inequalities in economic opportunity that arise at the earliest points in life from differences in access to prenatal and postpartum nutrition, parenting, healthcare and early education and their cumulative effects on individual capabilities, character traits and health.[12] If an insufficient supply of quality early childhood resources for at-risk children and their parents is a cause of the early opportunity differentials, applying PFS principles holds the promise of reducing income inequality.

Organization of this paper

Section 2 of this paper, Pay for Success Social Impact Finance, provides a general discussion of the subject and applied finance challenges.

Section 3, Early Childhood Pay for Success Finance, focuses on applying PFS principles to early childhood interventions.

Section 4, Structure of Returns and Sources of Funds, discusses monetary and non-monetary social and economic returns and the near and long-term timing of returns, justifications for philanthropic and government PFS investments, and "No Child Left Behind Act" Title I funds.

Section 5, Returns to Prekindergarten, focuses specifically on near and long-term returns to high quality prekindergarten and highlights the two specific pre-k programs that benchmark this paper's financial projections.

Section 6, Descriptions of the Financing Models, provides term definitions and discusses the key model assumptions.

Section 7, Model Projection Results, reviews the model results, nothing particularly the returns on private, philanthropic and state government investment.

Section 8, Projection Variations, adds federal government investment to the models, changes funding proportions and reviews the effects, and comments on possibly implementing the Obama administration's "pre-k for all" proposal with individual state PFS projects.

Section 9, Future Research, highlights key findings of this report and lists items for future research.

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[10] See: E. Lee, S. D. Mitchell-Herzfeld, A. A. Lowenfels, R Greene, V. Dorabawila, K. A. DuMont, "Reducing Low Birth Weight Through Home Visitation: A Randomized Controlled Trial", *American Journal of Preventive Medicine*, Volume 36, Issue 2 , 154-160, February 2009 http://www.ajpmonline.org/article/S0749-3797(08)00845-3/abstract

[11] See:
  o Starting Smart, *Finishing Strong: Fixing the Cracks in America's Workforce Pipeline Through Investments in Early Child Development*, Institute for Workforce Competitiveness, US Chamber of Commerce, 2012, http://www.readynation.org/uploads/db_files/US%20Chamber%20RN%20Brochure%20Low%20Res72.pdf
    Timothy Bartik, Investing in Kids: Early Childhood Programs and Local Economic Development, Upjohn
  o Institute, 2011 http://www.upjohn.org/Publications/Titles/InvestinginKids

[12] James Heckman, "The Economics and Psychology of Human Development and Inequality Lecture I" and "The Economics and Psychology of Human Development and Inequality Lecture II: Understanding the Origins of Inequality and Understanding Effective Interventions and the Channels Through Which They Work," Marshall Lectures, University of Cambridge, Cambridge, UK. May 17-18, 2011 http://sms.cam.ac.uk/media/1144897

Summary of Findings

"Cost avoidance" and "outcome improvement"

Pay for success (PFS) is a category of social impact finance in which success payments are made by government for "cost avoidance" or "outcome improvement". Cost avoidance refers to actual reductions in governments operating costs that are the result of an intervention. Outcome improvement refers to measured changes in outcomes in desired directions that are the result of an intervention. Government may be willing to make success payments on the basis of achieved cost avoidance or measured outcome improvement or both. The attractiveness of focusing on cost avoidance is it provides a source of funds for making success payments. The attractiveness of also focusing on outcome improvement is it permits consideration of a wide range of less measurable but fully acknowledged near-term and long-term economic and social benefits. Cost avoidance and outcome measurement are not mutually exclusive. In fact, the most effective PFS projects will almost certainly combine elements of both approaches. The cost avoidance approach provides a source of funds for making success payments, and the outcome improvement approach provides a basis for government and philanthropic investment.

Increasing social wellbeing

PFS finance can increase overall public wellbeing by increasing the returns to the public sector on investments in early childhood interventions. As an example, the longer term internal rate of return (IRR) on government investments in pre-k for at-risk children is estimated to be 7 percent when government pays the full cost of the pre-k itself. If government pays only half the cost and other investors pay half, the government's IRR rises, provided the returns paid to the other investors is less than 7 percent. Even when one of the benefits of a specific intervention, such as pre-k's special-ed costs reduction, are backed out of the calculation, the government's IRR may still be higher than it would be if the government paid for the intervention entirely itself.

Financial feasibility

The simple models presented in this paper show that for what seem to be a reasonable set of base-case assumptions and combinations of private, philanthropic, and government investment, PFS pre-k could be financially feasible for fixed-maturity fixed-rate obligations such as bank loans or bonds, and for interest and principle payment pass-through obligations similar to mortgage and auto-loan pass-throughs. Confirmation of this conclusion will depend on the findings of rigorous feasibility research that tracks children from pre-k entry through third grade, implementation of proof-of-concept projects and upgrading state and federal information about children prenatal to age-five and beyond.

Mix of private, state and federal investment

The models are designed to provide constant returns to fixed-debt and pass-through investors. This is done to highlight the features of the two financing approaches as they bear particularly on the returns to the state. Three funding variations are presented. The highest return arises from a mix of 50 percent private, 25 percent state, and 25 percent federal. This combination reveals that the Obama administration's recent early education initiative could be the foundation of a PSF pass-through structure that is very attractive to state governments.

Applying PFS to the Obama administration early education proposal

The administration recently proposed to work toward making high quality pre-k available to all four year-olds for families with incomes under 200 percent of poverty, beginning with a $1.3 billion appropriation in 2014. The federal share would be 90 percent of the total cost in the first year and a 10

percent state match, with the federal share diminishing incrementally each year to 25 percent in 10 years. Examining the Obama administration's "pre-k for all" plan through the lens of a PFS project funded from 50 percent private, 25 percent state, 25 percent federal sources reveals important features of the plan. Regardless of how it is implemented, the plan would realistically take many years. It would need to be scaled up slowly to assure adequate numbers of well-trained pre-k teachers and appropriate facilities. Nevertheless, if it were to begin as PFS projects in individual states and grow slowly, when the $1.3 billion federal commitment level is reached, it would involve an equal state commitment, serve 450 thousand at-risk children, and require philanthropic commitments totaling present-value $431 million, and pass-through PFS obligations totaling present-value $2.546 billion. What could induce philanthropy to contribute $431 million? As discussed in Section 8, a 5 percent IRR might. Such a return would be feasible if states were willing to share 5 percent of their 11.63 percent financial IRR.

2. Pay for Success Social Impact Finance

"Pay for Success" refers to performance-based contracting between government and providers of social services arranged by an intermediary or lead contractor. "Under this construct, government pays when results are achieved as opposed to providing up-front and on-going payments for services."[13]

Two Concepts of "Success"

"Success" has come to have two meanings -- "cost avoidance" and "outcome improvement". Cost avoidance refers to actual reductions in governments operating costs that are the result of an intervention. Outcome improvement refers to measured changes in outcomes in desired directions that are the result of an intervention. An example of cost avoidance is the dollars and cents reduction in hospital neonatal intensive care costs associated with fewer low birth-weight births that are the result of prenatal counseling for at-risk young mothers. An example of outcome improvement is the measured reduction in low birth-weight births resulting from the prenatal counseling.

Government may be willing to make success payments on the basis of achieved cost avoidance or measured outcome improvement or both. The attractiveness of focusing on cost avoidance is it provides a source of funds for making success payments – by reducing low birth-weight health remediation costs, certain hospital budget funds are freed up. The attractiveness of also focusing on outcome improvement is it permits consideration of a wide range of less measurable but fully acknowledged near-term and

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[13] Case Study: Preparing for a Pay for Success Opportunity, Third Sector Capital Partners, April 2013, p 4 http://www.thirdsectorcap.org/wp-content/uploads/2013/04/Third-Sector_Roca_Preparing-for-Pay-for-Success-in-MA.pdf See also:
- o Megan Golden, "Developing a Social Impact Bond: Lessons from a Provider", The Children's Aid Society, January 2013 http://www.childrensaidsociety.org/files/upload-docs/CAS_FINAL_Report.pdf
- o "What Is Pay for Success?" Third Sector Capital Partners, October 2012 http://www.thirdsectorcap.org/what-is-pay-for-success/faq/
- o "A New Tool for Scaling Impact: How Social Impact Bonds Can Mobilize Private Capital to Advance Social Good."Social Finance. October 2012 http://www.socialfinanceus.org/sites/socialfinanceus.org/files/small.SocialFinanceWPSingleFINAL.pdf
- o Michael Bloomberg, City of New York, "Bringing Social Impact Bonds to New York City" August 2012 http://www.nyc.gov/html/om/pdf/2012/sib_media_presentation_080212.pdf
- o Laura Callanan, Jonathan Law, and Lenny Mendonca, "From Potential to Action: Bringing Social Impact Bonds to the U.S." McKinsey & Company, May 2012 http://mckinseyonsociety.com/social-impact-bonds/
- o Jeffrey Liebman, "Social Impact Bonds: A Promising New Financing Model to Accelerate Social Innovation and Improve Government Performance." Center for American Progress, February 2011 http://www.americanprogress.org/issues/2011/02/pdf/social_impact_bonds.pdf

long-term economic and social benefits. By reducing low birth-weight births, for example, a wide range of economic and social maternal and infant wellness benefits can be rewarded in proportion to their perceived value.

Cost avoidance and outcome measurement are not mutually exclusive. In fact, the most effective PFS projects will almost certainly combine elements of both approaches. The cost avoidance approach provides a source of funds for making success payments, and the outcome improvement approach provides a basis for government and philanthropic investment.

Project Challenges

PFS programs must address a number of obstacles to be workable.

1. Disjointed or insufficient acquisition and sharing of data on individual child prenatal to five health, nutrition, and education
Unclear returns on the PFS investment project or intervention
2. Delays between the PFS intervention investment and the return
3. Difficulty in linking government cost reductions or revenue gains solely to the PFS investment intervention
4. Multiple government jurisdictions with conflicting priorities and child migration among jurisdictions
5. Resistance to paying PFS investors from public cost savings or revenue gains
6. Insufficient personnel or data to administer and evaluate PFS program performance
7. Incentive inconsistencies among the parties to the PFS financing

From the PFS investor standpoint, to be attractive PFS programs must to have:

1. Strong state and local business, philanthropic and government support
2. Government commitments that extend beyond election cycles
3. Rigorous statistical demonstrations of projected benefits
4. Sound legal foundations for PFS issuing organizations
5. Clear enforceable contracts among PFS participating entities
6. Bonds or other PFS assets with terms familiar to investors
7. Good working relationships with the investment underwriting, institutional and foundation investor sectors

Absence of standard error estimates or analysis

Efficient capital allocation requires understanding how returns varied in the past. If the average of past returns on an investment is high and variation is low, investors can have higher confidence in the investment. "Standard error" is a measure of past variation and is an important measure of investment risk. If the standard error is high, investors perceive more risk and have less confidence they will earn the average return. An important aspect of calculating standard error is the number of observations. The more observations there are the more accurately standard error and risk can be measured. If the return on investment and its standard error are calculated from hundreds of observations – hundreds of individual stocks, for example, and hundreds of stock portfolios -- investors have more confidence that they understand the investment and will earn the average of past returns.

In capital markets average returns consist of simple percentages, and average returns and standard errors are calculated from hundreds, and in some instances thousands, of observations on assets and from portfolios of those assets, over many decades. Average returns in early childhood research consist of often hard-to-define health, behavior and education effects. And these "returns" and their standard errors are calculated from relatively small numbers of children in individual studies. It is, in fact, the size

of the standard errors that leads experts such as University of Chicago professor, Jim Heckman, and former Federal Research Bank official Art Rolnick, to point out that when the effects of certain early childhood programs on child outcomes are statistically significant, despite small sample sizes, it means the underlying forces at work in the programs are very powerful.

At another level of uncertainty, the findings of studies are observations in an investment decision and can have at least two effects on standard error estimates. First, if there are very few studies as is now the case in early childhood research, standard errors will be higher. Second, if the "true" workings of a program are unknown, statistical models of the program may yield widely divergent findings. In such instances, the high variance of the findings raises standard error estimates. In studies of the deterrent effect of capital punishment, for example, some studies find large deterrent effects, and others find a "negative" deterrent effect, that is, additional executions lead to more murders. The studies individually find little uncertainty in deterrence effect estimates and thus have low standard errors. But taken as a whole, because of the wide range of deterrence estimates across all studies, the studies have a high standard error and are uninformative. [14]

At this point in the development of PFS finance, uncertainty is very great. Operations uncertainties include feasibility study accuracy, contract terms and enforcement, debt-issuing organization integrity, and cost savings collection. Financial uncertainties include market liquidity, uniformity, and comparative terms and performance histories. PFS assets share many characteristics of mortgages, and like mortgages, before early-learning social impact assets can be used to finance preschool on a significant scale, a great amount of experience with them will need to be acquired. The number of PFS arrangements, feasibility studies, and volume of outstanding obligations will need to be statistically large enough to reduce standard error estimates sufficiently to establish investor confidence on a national and perhaps global basis.

To be manageable, this report cannot explore standard error measurement. This is a task for future research. In this report, program effect returns are accepted as provided, and uncertainties about the distributions of returns are dealt with by using high social discount rates, by making conservative assumptions about special-ed assignment rates and the degree to which quality preschool can ameliorate learning disabilities, and by excluding key returns such as grade retention and English language learning cost reductions.

3. Early Childhood Pay for Success Finance and Process Steps

The central challenges to PFS project implementation are (1) obtaining sound statistical research that firmly establishes an economic linkage between an intervention and an early childhood benefit, (2) devising contracts between the parties in a PFS project, which capture the benefit monetarily and which all parties are willing to sign, and (3) monetizing the returns within a timeframe acceptable to investors.

The two financing models presented in this paper are based on a process that addresses these challenges to a significant degree. The process involves these conditions and steps:

1. State laws and regulations are in place authorizing state agencies and jurisdictions to enter into PFS contracts with social impact finance intermediaries, and the state in a way comparable to Massachusetts, which has put in place a framework to assure

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[14] Daniel S. Nagin and John V. Pepper, *Editors, Deterrence and the Death Penalty*, Committee on Law and Justice, Division of Behavioral and Social Sciences and Education, National Research Center, National Academy of Sciences, 2012, http://www.nap.edu/chapterlist.php?record_id=13363&type=pdf_chapter&free=1

investors that if "success payments" have been earned, the appropriate state agency or jurisdiction will make the payments.[15]

2. Working within state laws and regulations, private, philanthropic, and government leaders agree to target a socially important outcome – in this case, increasing school readiness where success is measured by the amount of special education cost avoidance in public schools.

3. Feasibility research has been done to ascertain whether a specific child development intervention applied to particular children in the government's geographic jurisdiction can produce enough near-term government cost avoidance and longer-term outcome improvements to justify investment by private, philanthropic and government interests. In general, feasibility studies involve longitudinal analyses of the difference between the remediation costs associated with a statistically appropriate sample of children, or their parents, who receive the intervention, and a sample of those who do not. However, other methodologies for quantifying cost avoidance may emerge that provide sufficient evidence to justify a PFS project. Feasibility research takes into account the government's fixed, variable and marginal costs associated with the remediation, and the time it will take for the government to adjust its operations to fully benefit from the cost avoidance made possible by the intervention.[16]

4. Once feasibility is established, private and philanthropic investors provide the necessary capital to establish an intermediary to manage the PFS project. The intermediary can be any kind of for-profit, non-profit, or special purpose government entity. In other contexts, intermediaries are referred to as "lead contractors" or "enterprises".

5. The intermediary and the government enter into a contract, in which the government agrees to pay the intermediary a "success payment" to the extent cost avoidance and/or outcome improvements have occurred. If there is no cost avoidance or outcome improvement, the government owes no payment to the intermediary. Note that success payments need not be rigidly related to outcomes. Provision can be made for the government to make a minimum payment to the intermediary regardless of cost or outcome success, with greater success associated with less than proportional payments.[17]

6. The intermediary enters into a contract with pre-k providers to provide high quality pre-k education services to cohorts of children. The pre-k providers and the children served are comparable to those analyzed in the feasibility research.

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[15] The Massachusetts statute establishes a "Social Innovation Financing Trust Fund" to assure funding of social impact contracts that meet the requirements of the statute. Under the statute the Secretary for Administration and Finance requests an appropriation for each fiscal year that a contract is in effect, in an amount equal to the expected payments that the commonwealth will ultimately be obligated to pay in the future based upon service provided during that fiscal year, if performance targets are achieved.
http://www.malegislature.gov/Content/Documents/Budget/FY2013/ConferenceReport-H4219.pdf

[16] See for example: *A Guide to Calculating Justice-System Marginal Costs*, VERA Institute of Justice, May 2013, http://www.vera.org/sites/default/files/resources/downloads/marginal-costs-guide.pdf

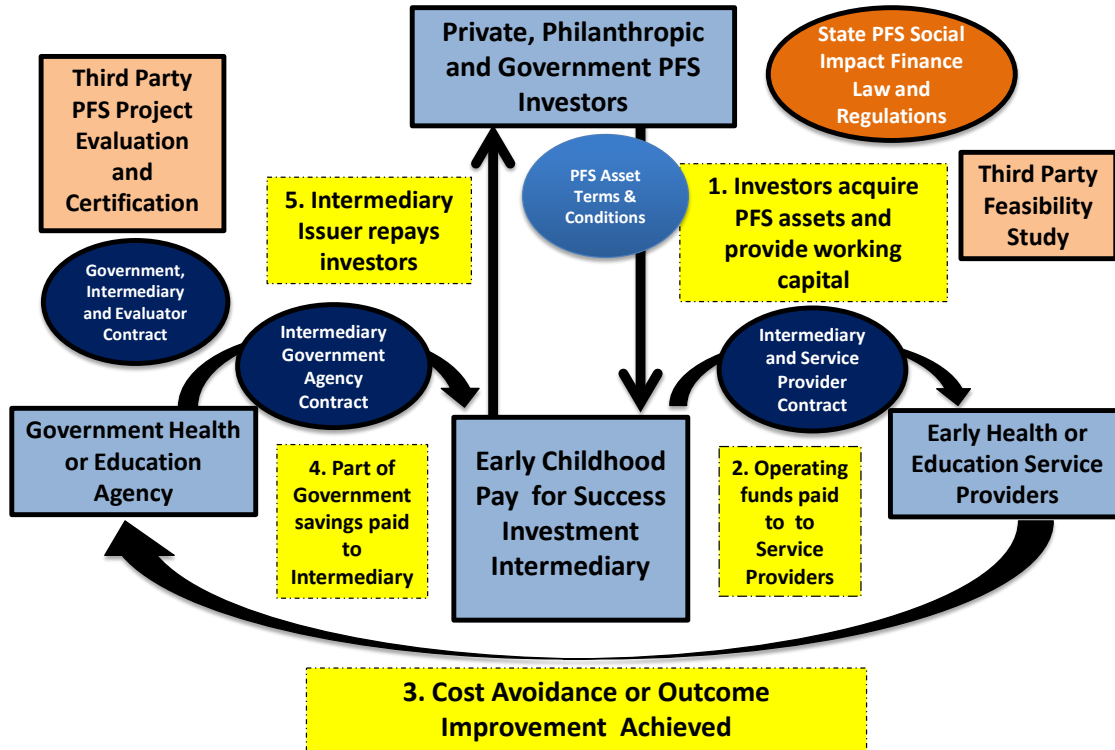[17] See, for example, the success payment schedule in Michael R. Bloomberg, "Brining Social Impact Bonds to New York City", City of New York, August 2012, p 7
http://www.nyc.gov/html/om/pdf/2012/sib_media_presentation_080212.pdf

7. The intermediary and government together enter into a contract with an independent evaluator to determine each year whether the special education assignment rate of the PFS pre-k graduates is lower than comparable children who did not have pre-k service and by how much. The evaluator's report is used to authorize the government entity to make "success payments" to the intermediary. If there is no cost avoidance or outcome improvement, the government owes no payment to the intermediary.

8. The intermediary obtains capital from philanthropic, private and government sources to pay for the pre-k services and operate the intermediary. The capital raised can take many forms. From philanthropies, the capital can be outright grants or project-related investments (PRIs). Depending on the terms, philanthropic capital may or may not earn interest or be repaid. Private capital can be common or preferred stock, loans, or short or long-term securities. The private capital will almost always involve dividend or interest payments and in the case of debt instruments will be repaid. Government capital can take the form of guarantees, matching funds, or any of the forms available to philanthropic or private investors.

9. In the models presented in this paper, the intermediary pays for its operations using funds from philanthropy and pays for pre-k services with funds from private, philanthropic and government sources. The justification for private investment and PRI philanthropic investments is cost avoidance -- the near-term financial return on the investment. The justification for philanthropic grants and government subsidies and guarantees is outcome improvement -- the long-term economic and social long-term returns on early childhood investments.

10. As special education cost avoidance occurs and is confirmed by the evaluator, success payments are made to the private and philanthropic investors. Under many conditions, special education cost savings exceed the amounts required to be paid to the investors. This residual is paid to the state government and is available for any purpose including increasing the number of children served by the project.

The main financial flows and contract agreements are shown in the chart below.

Pay for Success Social Impact Finance flow of funds (arrows) Statute and Contracts (ovals)

Private, Philanthropic and Government PFS Investors

State PFS Social Impact Finance Law and Regulations

Third Party PFS Project Evaluation and Certification

PFS Asset Terms & Conditions

5. Intermediary Issuer repays investors

1. Investors acquire PFS assets and provide working capital

Third Party Feasibility Study

Government, Intermediary and Evaluator Contract

Intermediary Government Agency Contract

Intermediary and Service Provider Contract

Government Health or Education Agency

4. Part of Government savings paid to Intermediary

Early Childhood Pay for Success Investment Intermediary

2. Operating funds paid to to Service Providers

Early Health or Education Service Providers

3. Cost Avoidance or Outcome Improvement Achieved

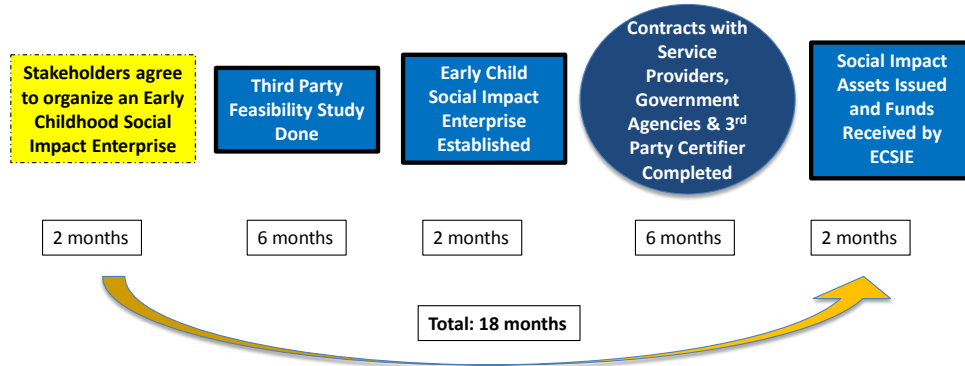This chart highlights the three main contract agreements in dark blue. In addition to these three, there are contract agreements between the organizers and the researchers who conduct the initial feasibility study, a variety of kinds of financial agreements between investors and the intermediary, and there may be agreements between the service providers and the parents of children served in an intervention.

The time frames likely to be involved in setting up a PFS project and preliminary confirmation of success are shown in the charts below:

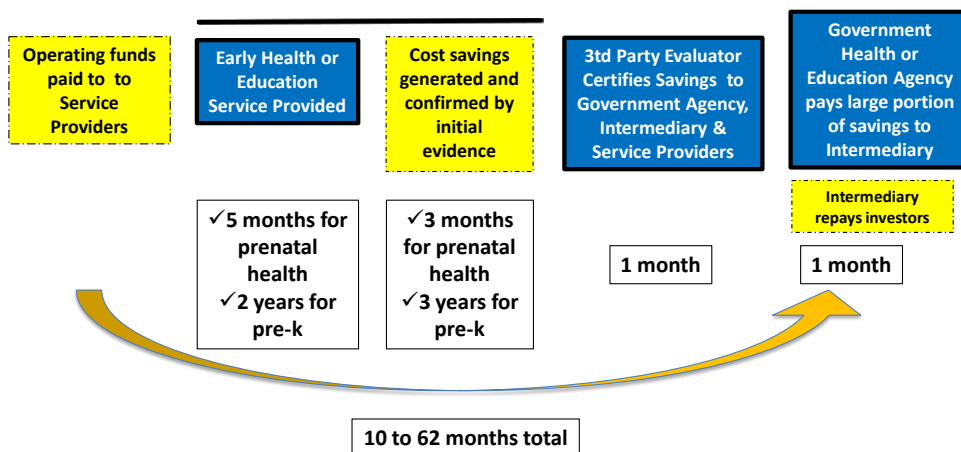# Early Child Social Impact Enterprise Program: Establishment and Funding Time Line

State Law and Regulation Enactment: Unknown
Establishment and Fundraising Phase: 18 Months

Stakeholders agree to organize an Early Childhood Social Impact Enterprise	Third Party Feasibility Study Done	Early Child Social Impact Enterprise Established	Contracts with Service Providers, Government Agencies & 3rd Party Certifier Completed	Social Impact Assets Issued and Funds Received by ECSIE
2 months	6 months	2 months	6 months	2 months

Total: 18 months

Intervention Service Provision and Preliminary Investment Success Time Line

Intervention Service Delivery and Initial Success Indication

- **8 months for prenatal (5 mo average prenatal + 3 mo postpartum)**
- **60 months for pre-k (2 yrs pre-k, 3 yrs k-2nd grade when 90% of special-ed assignments completed)**

Operating funds paid to to Service Providers	Early Health or Education Service Provided	Cost savings generated and confirmed by initial evidence	3td Party Evaluator Certifies Savings to Government Agency, Intermediary & Service Providers	Government Health or Education Agency pays large portion of savings to Intermediary
	✓5 months for prenatal health ✓2 years for pre-k	✓3 months for prenatal health ✓3 years for pre-k	1 month	Intermediary repays investors
				1 month

10 to 62 months total

4. Structure of Returns and Sources of Funds

A central question in early childhood PFS finance is the involvement of government and philanthropy in funding projects. In a pure "cost avoidance" PFS project, private investors would put up all the capital needed to establish and operate the project and reap the financial gains. Unfortunately, there are few examples of projects that have returns high enough and certain enough to justify private investors taking the entire risk, especially since one of the most important risks is the government's willingness and ability to legislatively appropriate the funds to make "success payments" when they are due.

Some participation by philanthropy and government appears to be necessary for most if not all projects. Can investment by governments and philanthropies be justified? Do these entities get "outcome improvement" returns of the kind that have historically justified their support of child development projects? Evidence conclusively indicates the answer is yes. There are valuable returns that are not monetizable within the time frames of private investment markets. These are the returns that government and philanthropy have long supported.

Long-term returns to state and federal governments and philanthropy from investments in quality prekindergarten

Early education generates a wide range of monetizable and non-monetizable returns. Monetizable returns are ones that can be accurately measured and captured in workable contracts within investable timeframes. Non-monetizable returns are valuable to individuals and society, but often take ten or more years to realize and are difficult to measure and capture in workable contracts. But the returns are very real, and any assessment of the returns on government and philanthropic investments in PFS pre-k projects need to be viewed in the context of the all-in benefits of quality prekindergarten to the public sector.

These benefits include everything from improved parent productivity, lower special education costs, lower adolescent and young adult crime, higher employment rates, higher earnings and tax revenues, lower healthcare costs and stronger regional per capita income growth.[18, 19] Many studies have looked at the economic return cost/benefit question. The estimated all-in returns on quality pre-k to the public sector range from 7 percent to 21 percent per year.[20] This long-term all-in return is the internal rate of return (IRR) when government pays the entire cost of the pre-k.

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[18] James J. Heckman and Dimitry V. Masterov, "The Productivity Argument for Investing in Young Children", Working Paper 5, Invest in Kids Working Group, Committee for Economic Development, October 4, 2004, pp 11-14 http://www.readynation.org/docs/ivk/report_ivk_heckman_2004.pdf

[19] Timothy Bartik, Investing in Kids: Early Childhood Programs and Local Economic Development, Upjohn Institute, 2011 http://www.upjohn.org/Publications/Titles/InvestinginKids

[20] For a comparison of research findings, see p 126, Table 8 in J. J. Heckman, S. H. Moon, R. Pinto, P. A. Savelyev, and A. Q. Yavitz, "The rate of return to the High Scope Perry Preschool Program, *Journal of Public Economics*, 94(1-2), 114{128. 2010
http://heckman.uchicago.edu/sites/heckman.uchicago.edu/files/uploads/Heckman_etal_2010_RateofRtn-to-Perry.pdf
See also:
- o A. J. Rolnick and R. Grunewald, "The Economics of Early Childhood Development as Seen by Two Fed Economists", Community Investments, Federal Reserve Bank of San Francisco, Fall 2007
- o C.R. Beleld, M. Nores, W. S. Barnett, and L. Schweinhart, "The High/Scope Perry Preschool program: Cost-benefit analysis using data from the age-40 followup", *Journal of Human Resources* 41(1), 162-190, 2006
- o http://www.frbsf.org/publications/community/investments/0709/economics_early_childhood.pdf
- o W. S. Barnett, *Lives in the Balance: Age 27 Benet-Cost Analysis of the High/Scope Perry Preschool Program,* High/Scope Press, Ypsilanti, MI: 1996

In PFS projects, however, the government does not pay the entire cost of the pre-k. The cost is shared with private and philanthropic investors. As a result, the all-in government IRR may be higher. For discussion purposes we can use 8 percent to demonstrate this feature of PFS finance. 8 percent is roughly the middle of the ranges provided by James Heckman et al in their 2010 re-estimation of the Perry Preschool results. Assume then that the long-term all-in government IRR is 8 percent. If private investors and philanthropists participate in a PFS pre-k project and pay half the cost of the pre-k, the return to the state will rise, provided the return paid to the non-government investors is less than 8 percent. For example, if private and philanthropic investors invest in a PFS pre-k project and receive an average IRR of say 5 percent, then the state's IRR will increase from 8 percent to 10 percent. The state obtains a long-term all-in 8 percent IRR on the one-half of the pre-k it pays for, and it gets an additional 3 percent (8 percent less 5 percent) on the half of pre-k paid for by the private and philanthropic investors.

To see what this could mean in a pre-k PFS project, the near-term return from lower special-ed costs needs to be backed out of the long-term IRR estimate. Arthur Rolnick, University of Minneapolis, and Robert Grunewald, Federal Reserve Bank of Minneapolis, backed special education out of their 15 percent all-in estimate of the public IRR. Grunewald reported that "internal rate of return would be 2.5 percent lower if special education benefits are removed from the total and public IRR calculations." That is the internal rate of return to the government would be reduced from 15 percent to about 12.6 percent.[21] If a similar adjustment were applied to the Heckman estimate, the government's all-in IRR not including special-ed cost reductions would probably be around 6 percent. Adding the 3 percent IRR gained from financing the pre-k using a PFS arrangement, it is not unreasonable to think the government's all-in IRR could rise to 9 percent.

Near and Long-term Returns

The willingness to invest money in an uncertain project and not get paid back for a decade or more is critically important. Private investors are usually unable to put money at risk for more than 10 years. Government investors, of course, do it all the time. Local, regional, state and the national government with voter support raise money through taxes and bond issues, and spend it on projects with diffuse, uncertain, but very valuable and often very long-term returns. This is the reason we have highways, bridges, water treatment plants, and a public school system. Philanthropic investors are also able and accustomed to committing resources to projects with long-dated defuse net benefits. To a considerable degree this is charitable gifts can be deducted from state and federal income taxes. One of the advantages of PFS finance is it offers the possibility to increase the allocation of resources to activities we know have strong longer-term benefits by adding private investors to the funding mix.

"No Child Left Behind Act" Title I Funds and Early Education PFS Finance

Investments by localities and states in early child development have national economic development and per capita income-increasing effects. Accordingly, it is entirely appropriate for citizens across the nation to invest in the life success of children in local regions and states. Recognizing this, Congress in 1965 enacted the Elementary and Secondary Education Act (ESEA), now known as the No Child Left Behind Act of 2001, the name given during the administration of President George W. Bush.

Title I, Part A, of ESEA authorizes federal assistance to Local Education Agencies (LEAs) to improve the academic achievement of disadvantaged children, by meeting the needs of low-achieving children and by closing the achievement gap between high and low performing children. The focus of Title I on high-

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[21] Email exchange between Rob Grunewald and the authors, June 4 2013.

risk children directs resources to high economic return uses and makes Title I funds particularly attractive for early learning PFS projects.

To receive Title I funds, at least 40 percent of students in a school district must live in poverty. Title I funds can be used for early childhood education from birth to age 5, in addition to serving children in kindergarten through 12th grade.[22] How a school district uses Title I funds to meet the purposes of Title I depends on whether a district chooses to operate as a targeted assistance program or a school-wide program. A school district that operates a targeted assistance program may use its Title I funds only to provide supplemental services to eligible students selected for those services because they have the greatest need for assistance, such as a student at risk of failing to meet the State's academic achievement standards. In this case, the funding follows the eligible child.

A school-wide program is a comprehensive reform strategy designed to improve the achievement of low-achieving students and those at-risk of not meeting the state's student academic achievement standards by upgrading the entire educational program in a Title I school with a poverty percentage of forty percent or more. In this case, Title I funds used in a Title I designated school can benefit all children in the school regardless of socio-economic status. There is a process that LEAs must use, under ESEA, to determine which schools receive Title I funds. The LEA must first reserve funds for certain required or optional activities, and then must rank its schools by the percentage of children in poverty in each school. Whether a school receives Title I funds depends on where the school stands in the ranking. Schools with a greater percentage of students living in poverty are served first.[23]

Any Title I LEA or school may use its Title I funds, in whole or in part, to operate a preschool program that is consistent with Title I requirements. An LEA may use its Title I funds to operate a preschool program as a district-wide program or a school-wide program. In a district-wide program, funds would be allocated across the district for eligible children. In a school-wide program, Title I funds would be allocated to schools as describe above, to the benefit of all children in the school, based on its ranking. Districts may also use Title I funds in coordination with other preschool programs, such as Head Start, to support eligible children. All Title I requirement apply to the preschool program.

The ease with which a school district can blend PFS investor funds and Title I funds to provide pre-k for at-risk kids will depend on whether the district operates a targeted assistance program or a school wide program. The school district will have more flexibility to blend these funds if it operates a targeted assistance program, as it can target eligible children in any school location. If the school district operates a school-wide program, it can still blend funds if the classroom capacity for pre-k in the Title I schools exceeds the amount of Title I funding allocated to the pre-k program. In either case, investor funds would supplement Title I funds to increase access for at-risk children, rather than supplant existing Title I resources used for early education.

5. Prekindergarten Economic Returns and Benchmark Pre-k Programs

Pre-k and Special Education Costs

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[22] Barnett, W.S. , & Hustedt, J.T. (2011). *Improving Public Financing for Early Learning Programs.* New Brunswick: Rutgers, State University of New Jersey, National Institute for Early Education Research.

[23] Email correspondence with Todd Stephenson, Office of Elementary and Secondary Education, U.S. Department of Education. See also: http://www2.ed.gov/ policy/elsec/leg/esea02/107-110.pdf; http://www.gpo.gov/fdsys/pkg/CFR-2012-title34-vol1/pdf/CFR-2012-title34-vol1-sec200-77.pdf

The costs of pre-k and special-ed in the U.S. vary greatly. In order to focus on model mechanics and general results, this model builds on data from two "real world" examples: the Granite School District in Salt Lake City Utah and the Bethlehem Area School District in Bethlehem Pennsylvania. The models assume pre-k and special-ed costs that are at the high-end of range of costs seen in most areas of the U.S. and more than four times those in the Granite School District and about one and a half times more than those in the Bethlehem Area School District.

Special education assignment rates by child age

A key reason PFS finance may work in early education is the speed at which longer-term special education costs appear to be known. Though special education expenditures for an individual child can last for 13 years from kindergarten through 12th grade, the amount of the spending can be projected fairly accurately by 3rd grade. As the chart below shows, the maximum number of children in special education nationally is reached by the end of the fourth grade (age 9), a little over 90 percent by the end of third grade (age 8) and well over 80 percent by the end of the second grade (age 7). The drop-out rate for special-ed students is quite high. The sharp decline in the number of children in special-ed in the final years of high-school after age 16 reflects the drop-out rate.

It is anecdotally reported that once children are assigned to special education they stay in special-ed through high school. However, longitudinal data on when individual children actually enter and leave special-ed are not available at the national level. Such data would enable researchers to understand better the size and timing of early childhood program effects on school performance. For the limited purposes of this paper, it is assumed that once assigned to special education, children stay in the program throughout their k-12 education experience.

Chart 5.1   Number of Children in Special Education by Year

Number of Children Recieving Special Education Services Under IDEA Part B, 2007
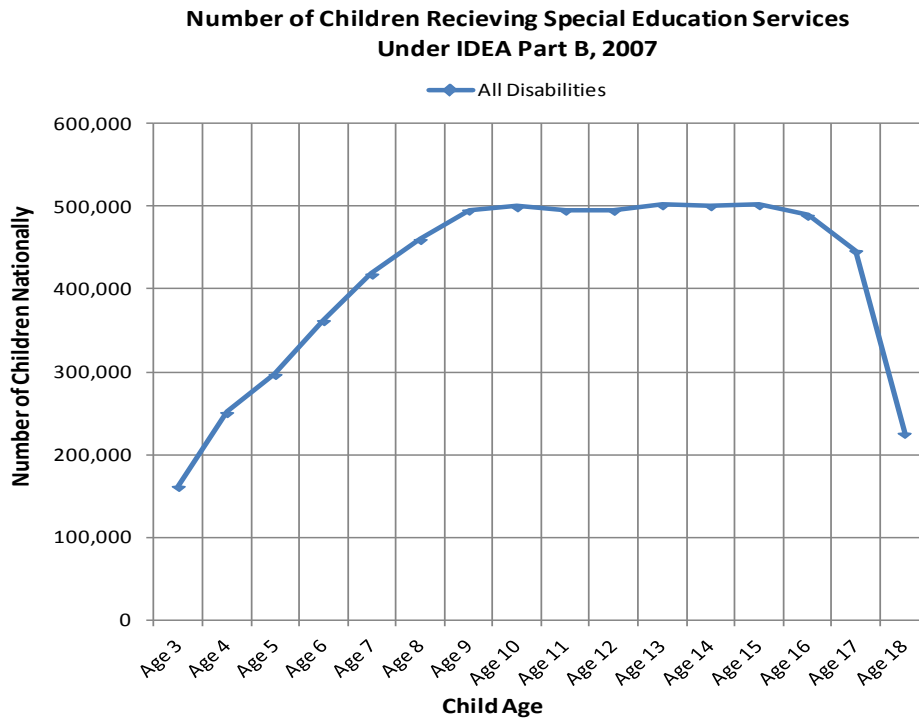
Source: U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB #1820-0043: "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act," 2007. Data updated as of July 15, 2008.

Granite School District

The most recently completed study of the effects of prekindergarten on special education was done in 2011 by the Voices for Utah Children (VUC) and Salt Lake City's Granite School District (GSD) Preschool Services. It is a longitudinal study of the outcomes associated with three cohorts of 3 and 4 year-old children in 11 schools most impacted by poverty and who attended the GSD Title I prekindergarten program beginning in the 2006-7 school year. In these school districts, 74 percent of students were eligible for Free and Reduced Lunch (FRL) in the 2007-8 school year. The total number of children in these cohorts was 737.[24] The study found that that GSD prekindergarten is associated with a reduction in the projected rate of potential special-ed assignment from an average of 30 percent of the 737 at risk children studied to about 1.5 percent, after accounting for mobility.

According to the GSD study, the Granite School District provides preschool services in their Title I schools for a cost of $ 900 per year for a 3 year old (1/2 day classes, 2 days a week) and $1,500 per year for a 4 year old (1/2 day classes, 4 days a week). No state funds are used in the preschool program. The Utah state government currently does not fund preschool. These costs are covered by funds from Title I, grants, and parent co-payments (when allowable under Title I regulations). Accordingly for two years, the cost of preschool per child that could be made part of a state and/or school district PFS contract is $2,400.[25]

Also, according to the study, the state appropriates an annual amount of $2,577 per child (in 2010) for non-severely disabled children for special education. The study assumes children tend to remain in special education through high school – 13 years – a total expense of $33,501, which when discounted at 2 percent gives a present value cost of special education per child of $25,897.[26]

While the Granite Preschool does implement an inclusive environment, and special education preschool students are integrated into Title I classrooms, none of the children included in the study received special education preschool services. The cost data include only regular preschool education services. The costs of severe physical and mental disabilities that cannot be ameliorated by preschool were specifically not included in the sample.

The report's authors use the cost-benefit relationship -- paying $2,400 for two year preschool to obtain a present value benefit of $25,897 -- to propose a "sustainable financing model", in which the cost savings achieved through reduced special education use is reinvested back into the preschool program to serve more at-risk children. If implemented, the model would shift resources from remediation to prevention and scale-up high quality preschool programs for at-risk children.

Bethlehem Area School District

The largest study of early education effects is the 2006 Pre-K Counts (PKC) study done by the Heinz Foundation and Early Childhood Partnerships in Pennsylvania. It spanned a three year period from 2005-2008 and involved 21 school districts and 10,002 children. The PKC study projected that Pre-K Counts is associated with a decline in the rate of special-ed assignment from the 21 school's historical average of 18 percent, to 2.4 percent.[27] The authors of this study noted the possibility that Pre-K Counts might

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[24] *A Sustainable Financing Model,* p 1

[25] *A Sustainable Financing Model*, p 5

[26] Revised results provided by the authors.

[27] S. Bagnato, J Salway, and H Suen, *Pre-K Counts in Pennsylvania for Youngsters' Early School Success: Authentic Outcomes for an Innovative Prevention and Promotion Initiative*, Heinz Foundation and Early Childhood Partnerships. 2009, p 15

result in net government special education cost savings but went no further. The study's findings were applied to a specific school district to investigate the amount of special education cost avoidance that could possibly be achieved.[28]

Pre-K Counts is a public-private partnership among philanthropies and state government departments managed through the Pennsylvania Office of Child Development and Early Learning. The goal of Pre-K Counts (PKC) was to stimulate the development of an early care and education network which would expand quality options; infuse education into child care routines; set standards for quality, professional development, and early learning; and serve as a catalyst to create and unify a "system" for prevention and care for all young children.

Of the roughly 15,000 eligible three and four year-old children in Lehigh and Northampton counties in 2005-2008, only 527, or 3.3 percent, were in Pre-K Counts preschool.[29] Judging from district data and the PKC study, Pre-K Counts could be expanded many times over with strong school-readiness benefits and without incurring effect reductions due to reaching saturation points. Furthermore, increasing early learning investment would strengthen per capita income growth and the Lehigh and Northampton county economy.[30]

Special-ed cost per student in this district is estimated to be $9,713. This amount includes just the special-ed costs that can be ameliorated by quality preschool. Here is how the estimate is obtained. The Bethlehem Area School District (BASD) in 2010-11 had a total of 14,881 students, of which 2,396 students, or 16.1 percent, were in special education.[31] BASD's total 2010-11 budget was $197,685,263, of which 73 percent ($85,350,275) was allocated to regular education and 27 percent ($52,468,525) to special education.[32] The per student cost of regular education for all students was $9,758, and the per student cost of special education was $21,899.

Because special-ed students are also in regular-ed, the convention is to subtract the cost of regular-ed from special-ed to get the cost of special-ed only. The result is a simple estimate of per student BASD special-ed cost per year -- $12,141. Chapter 2 explains that about 80 percent of the costs of special-ed disabilities can be treated by prekindergarten. The remaining 20 percent cannot. In the example calculations the special-ed cost estimate downward by 20 percent.

The cost per student for Pre-K Counts preschool is accurately known. It is exactly what the state government pays providers. The cost for full-day pre-k is $7,850.[33]

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http://www.heinz.org/UserFiles/Library/SPECS%20for%20PKC%202009%20Final%20Research%20Report%20201130 09.pdf

[28] Dugger and Litan, pp 58-79

[29] Appendix B, Pre-K Counts: End of Year Report 2009-2010, Pennsylvania Department of Education, Office of Child Development and Early Learning http://www.portal.state.pa.us/portal/http;//www.portal.state.pa.us;80/portal/server.pt/gateway/PTARGS_0_251 851_1058396_0_0_18/PA_Pre-K_Counts_2009-2010_End_of_Year_Report.pdf

[30] See Bartik, *Investing in Kids: Early Childhood Programs and Local Economic Development,* pp 79-89 http://www.upjohn.org/Publications/Titles/InvestinginKids

[31] Bethlehem Area School District, Federal Education Budget Project, New America Foundation http://febp.newamerica.net/k12/PA/4203570

[32] Bethlehem Area School District 2012-13 Proposed Preliminary Budget, Bethlehem Area School District, Bethlehem PA, January 2012, p 3. For the purposes of this working group report, the spending on Gifted and Talented program was shifted out of the Special Education budget and put into the Regular Education budget. http://www.beth.k12.pa.us/business/budget/1213budget/BASD_1213_Preliminary_Budget.pdf

[33] From discussions with Susan Mitchell, Chief, Division of Standards and Professional Development Office of Child Development and Early Learning, Departments of Public Welfare and Education, Harrisburg, PA

6. Descriptions of the Financing Models

The two models reflect two widely used financing methods and are referred to in brief as "fixed-debt" and "pass-through". The descriptions below proceed in stages, each introducing additional assumption detail and calculation complexity. The discussion begins with definitions of key terms, which are capitalized in the general descriptions for clarity but not in the detailed descriptions and subsequent discussions.

The descriptive discussion follows the subsection listing below:

Important Model Definitions

General Features of Both Financing Models –Base Case Assumptions
Fundamental Relationships
Fixed-Debt Model – General Description
Pass-Through Debt Model – General Description

Charts showing the basic operation of the fixed-debt model for a single cohort

Detailed Features of Both Models –Base Case Assumptions

Fixed-Debt Model – Detailed Description

Pass-Through Debt Model – Detailed Description

Achieving Self-financing PFS Sustainability

Important model definitions

A. <u>Amelioration Rate</u> means the percentage of disabilities that account for special education costs and which can be ameliorated by two-year prekindergarten. Evidence from national and state special education studies show that about 80 percent of the disabilities that cause children to be assigned to special education can be treated by prekindergarten.[34] The estimate of reported government total special education cost reduction is adjusted downward by multiplying the cost of special education per child by the number of children in the Cohort and by the Amelioration Rate.

B. <u>Cohort</u> means a group of children consisting of the Treated Population and the Untreated Population in one Intervention Cycle. A cohort is a group of children who receive three- and four-year old prekindergarten and those who do not over a single 24 month period. In this paper a cohort consists of 500 three and four year-old at-risk children attending a prekindergarten under contract with the Intermediary.

C. <u>Cost Avoidance</u> means the Government special education cost reduction for one Cohort of children. It is calculated by multiplying reported operating cost reductions by the Measurement Error Discount.

D. <u>Evaluator</u> means an independent third-party entity selected by the Intermediary and the Government to assess how much Cost Avoidance has occurred in accordance with the Evaluator Contract, and, if Cost Avoidance has occurred, to authorize the Government to make a Success Payment to the Intermediary in accordance with the Government Contract.

E. <u>Evaluation </u>means, for each Intervention Cycle, the assessment by the Evaluator of Cost Avoidance for such Intervention Cycle. Payment for the evaluation is provided for in the models

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[34] For a full discussion of this matter see Dugger and Litan, pp 37-41.

in two ways. There is provision for setting up the evaluation framework in the initial cost of establishing the project. Thereafter, there is a provision for a charge of $100 per child per year, totaling $50,000.

F.   Feasibility Research means the reports, studies, analyses, or the like of the effects of an Intervention on Government Cost Avoidance. The cost of the feasibility research is included in the initial cost of establishing the project.

G.   Fixed-Debt means a loan or debt security that requires the Intermediary to pay interest to Investors on a regular basis and repay principle at a specific point in time.

H.   Government means the regional, state or federal government or government agency or other entity, which is comparable to the entities that are the subject of the Feasibility Research and which has jurisdiction over the Treated Population and the Untreated Population.

I.   Government Contract means the contract that contains the terms and conditions for the payment of a portion of the Government's Cost Avoidance as a Success Payment to the Intermediary.

J.   Intermediary means an entity organized by regional business and philanthropic leaders that contracts with Providers, Government and an evaluator, and borrows from Investors to operate a pay for success early childhood intervention project. In other contexts, terms such as "lead contractor" or "enterprise" are used to refer to an Intermediary. An intermediary can take any legal form authorized to borrow money. It can be a corporation, partnership, trust, non-profit 501c3, etc.

K.   Intervention means the specific prenatal to age five early childhood service, treatment, curriculum, protocol or the like, which is the subject of the Feasibility Research and is to be provided under the Provider Contract. For this paper, Intervention means quality prekindergarten for at-risk three and four year-old children.

L.   Intervention Cycle means the time prescribed for an Intervention to be provided to a single Cohort. As examples, an Intervention Cycle could be up to nine months for prenatal counseling and 24 months for three- and four-year old prekindergarten.

M.   Investor refers to a bank, foundation, individual or other entity that provides loan and other forms of capital to the Intermediary.

N.   Measurement Error Discount means a percentage rate that provides a way to adjust Success Payments to account for data quality and possible errors in the Feasibility Research and Evaluator analysis. This discount reduces the government's risk that it will make Success Payments when they have not actually been earned. The discount rate is applied to reported special education operating cost reductions to obtain the Cost Avoidance from which Success Payment amounts are derived.

O.   Pass-Through means an obligation that requires the Intermediary to pass through to Investors a percentage of all Success Payments. Unlike standard fixed-maturity bond obligations, whose principal is repaid at maturity, the principal of a pass-through security is repaid over the life of the debt. The percentage of the Success Payments "passed through" to Investors includes interest and principle. Using Feasibility Research findings, the pass-through percentage is set in advance in the Pass-Through contract at a level projected to be sufficient to assure that Investors receive an acceptable rate of return on their original capital investment. The rate of return, however, is not guaranteed.

P.   PFS Assets means fixed interest and fixed maturity loans, and pass-through securities extended by the Intermediary to Investors to raise capital to cover operating expenses and prekindergarten Scholarship costs.

Q.   PRI means a "program related investment" by a foundation. Unlike a grant, a PRI is expected to be repaid with interest. Under US tax laws, a PRI has to meet three tests: 1) its primary purpose is to further the tax exempt purposes of the foundation; 2) the production of income or property is not a significant purpose (meaning that a prudent investor seeking a market return would not enter into the transaction); and 3) it is not used to lobby or support lobbying.[35] In a PFS project PRIs can be used to facilitate repayment of fixed-maturity liabilities if project cash flows are insufficient.

R.   Provider means a private non-profit or for-profit entity or public entity that provides the Intervention.

S.   Reserve Account means an account on the books of the Intermediary into which Success Payments that exceed the amounts needed to pay operating expenses and interest due on fix-maturity borrowings. Amounts in the Reserve Account are used to first repay principle on fix-maturity debt and then to service PRI obligations. Any remaining amounts in the account are allocated to state government.

T.   Scholarship means the per child payment made by the Intermediary to pay for prekindergarten education services.

U.   Success Payment means the portion of the Cost Avoidance paid to the Intermediary for successfully reducing the operating costs of the Government. The Success Payment is obtained by multiplying the Cost Avoidance by the Success Percentage.

V.   Success Payment Cycle means the sequence of events beginning with the provision of the Intervention to one Cohort and ending with the last distribution of any resulting Success Payment.

W.   Success Percentage means the applicable percentage of the Cost Avoidance, agreed to by the Government and the Intermediary, which the Government must pay to the Intermediary when confirmed by the Evaluator.

X.   Treated Population means the population of all children, parents, caregivers, families or the like who receive the Intervention.

Y.   Untreated Population means the population of all children, parents, caregivers, families or the like who do not receive the Intervention.

General features and explanation of base case assumptions of both financing models

Fundamental Relationships

In any PFS social impact finance arrangement the most important relationships are:

(1) The cost ratio – the ratio of intervention cost to remediation cost. The higher the cost of remediation is relative to the cost of intervention, the higher the possible cost avoidance will be, other things equal. For example, the more special-ed costs relative to pre-k, the less pre-k needs to reduce special-ed assignment rates in order to achieve threshold feasibility.

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[35] See, for example: Robert Jaquay, "Program-Related Investments", *Shelter Force Online*, National Institute of Housing, March/April 2001 http://www.nhi.org/online/issues/116/fundraising.html

(2) The effect ratio – the ratio of intervention effect to non-intervention effect. The more the intervention achieves the desired outcome, the more cost avoidance is achievable. For example, the more pre-k reduces special-ed assignment rates, the less difference there needs to be between the cost of pre-k and the cost of special-ed.

(3) The investor ratio – the ratio of investor capital to philanthropic and government capital. The more philanthropic and government capital there is in a PFS project , other things equal, the better will be the risk and return profile of the project for investors.

Basic Model Assumptions

Note that the GSD and BASD pre-k/spec-ed cost ratios comparable. The GSD ratio of per-year pre-k cost (average of the 3 year-old and 4 year-old pre-k) to special-ed cost is 47 percent. The BASD ratio is 65 percent. Other things equal, investing in a GSD project is far more promising.

BASD spec-ed	$12,141	GSD spec-ed	$2,577
BASD pre-k	$7,850	GSD pre-k	$1,200
Pre-k/Spec-ed	64.66%	Pre-k/Spec-ed	47%

For the purposes of this paper and to provide a more stringent test of feasibility, the special-ed and pre-k costs are assumed to be equal to the BASD data.

The GSD research indicates that GSD's effect ratio is very large, bringing special-ed assignment rates for the cohort of very at-risk children included in the study down from around 30 percent to 1.5 percent. BASD's is projected to be much smaller, bringing assignment rates down from 18 percent to 2.5 percent. Again, to provide a stringent test for feasibility, this paper for its base case uses the smaller BASD effect ratio rounded up to 3 percent.

The base case assumptions are --

Cost of prekindergarten	$ 7,850
Cost of special education	$ 12,141
Special education assignment rate with PFS pre-k	3%
Share of PFS Scholarship costs paid by Investors	75%
Share of PFS Scholarship costs paid by philanthropy	0%
Share of PFS Scholarship costs paid by state government	25%
Share of PFS Scholarship costs paid by federal government	0%
Share of Intermediary operating costs paid by Investors	0%
Share of Intermediary operating costs paid by philanthropy	100%
Share of Intermediary operating costs pay by state government	0%

The financial return on the state government's investment is the amount of the annual success payment that is not remitted to investors for the life of the transaction. This amount is a residual obtained by subtracting from total success payments, the amount paid to investors, operating expenses, and the share of scholarship and operating costs paid by the state, and adding interest earned on the reserve account. The model calculates the state's investment return using present value (PV) and internal rate of return (IRR) calculations, subtracting and adding PVs of payments, expenses, costs and earning as appropriate. The return distributed back to the state can be used for any budget purpose including increasing the amounts the state invests in early child development.

Fixed-Debt Model – General Description

In the Fixed-Debt structure, Investors receive fixed interest and principal payments on a loan or bond with a given maturity, such as five or ten years. Investor funds are used to provide "scholarships" that pay for prekindergarten education services. The financial results of the fixed-debt structure for a single cohort of children and for five cohorts are shown in Table 7.1 and 7.2 below

The timely payment of fixed-debt interest and principle is guaranteed by philanthropic foundation commitments to make PRI investments to cover periods of negative cash flow. Generally brief periods of negative cash flow are expected in the first few years of an early childhood project when operating expenses will likely exceed Success Payments, and in the years when large payments need to be made to repay debt principle.

As shown in Graph 6.5, Success Payments will be greater in most years than interest and operating expenses. These excess amounts are allocated to an interest-earning Reserve Account to pay principal and interest when due. After the loans or bonds have been repaid in full, the balance of the Reserve Account and subsequent Success Payments are allocated first to pay PRI interest and principle, and then allocated to state government. Under some assumptions allocations to the Government will exceed its investment in the project, generating a positive internal rate return for the state.

Because the PFS project is organized under state law guaranteeing payment of legally contracted Success Payments and because PRI commitments assure timely interest and principle payment, the risk level of the fixed-debt should be low enough to enable local commercial banks to make loans to the Intermediary to fund the prekindergarten scholarships that qualify under the Community Reinvestment Act. Risk levels can be reduced by the organizers of the Intermediary by increasing the amount of philanthropic commitment in the financing structure. Given state law and PRI commitments, at rates on fixed-debt obligations should range between 3 percent and 5 percent. With any new financial instrument, market rates are difficult to determine. In this paper's base case, for illustrative purposes only, fixed-debt instruments are assumed to have a maturity of 10 years and an annual coupon rate of 4 percent.

Charts showing the basic operation of the fixed-debt model for a single cohort

The charts below provide an overview of how cost avoidance PFS finance works. Charts 6.1 through 6.3 show the numbers of children by year-by-year in PFS pre-k and then in elementary, middle and lastly high school. They show the number of children in special-ed as a result of PFS pre-k and the number that would be in special-ed without the PFS project, and the cost difference. Charts 6.4 and 6.5 show the sources over the life of a single-cohort project, and how private, philanthropic and government funds flow into fixed debt financing model and success payments are accumulated and then used together with PRI investments to retire the fixed-debt and leave at the end a positive reserve balance that is available for distribution back to the state or for reinvestment to provide PFS pre-k to successive cohorts of children.

Chart 6.1   Students in PFS pre-k and in K-12 public school

The red-line in the chart below shows the number of children in one PFS cohort. In the first year there are 500 three and four year-old children. In the second year only 250 – the four year-olds have entered kindergarten and the three year-olds have moved into the second year of PFS pre-k. The green-line shows the number of PFS pre-k graduates in public school. The slow decline in the line is due to the assumed 2 percent per year out-migration of children from the school district. They move to other districts and those districts do not pay success payments to the intermediary.

PFS Project Students and Graduates in K-12

Legend:
— PFS graduates in k-12 grades
— Children in PFS pre-k
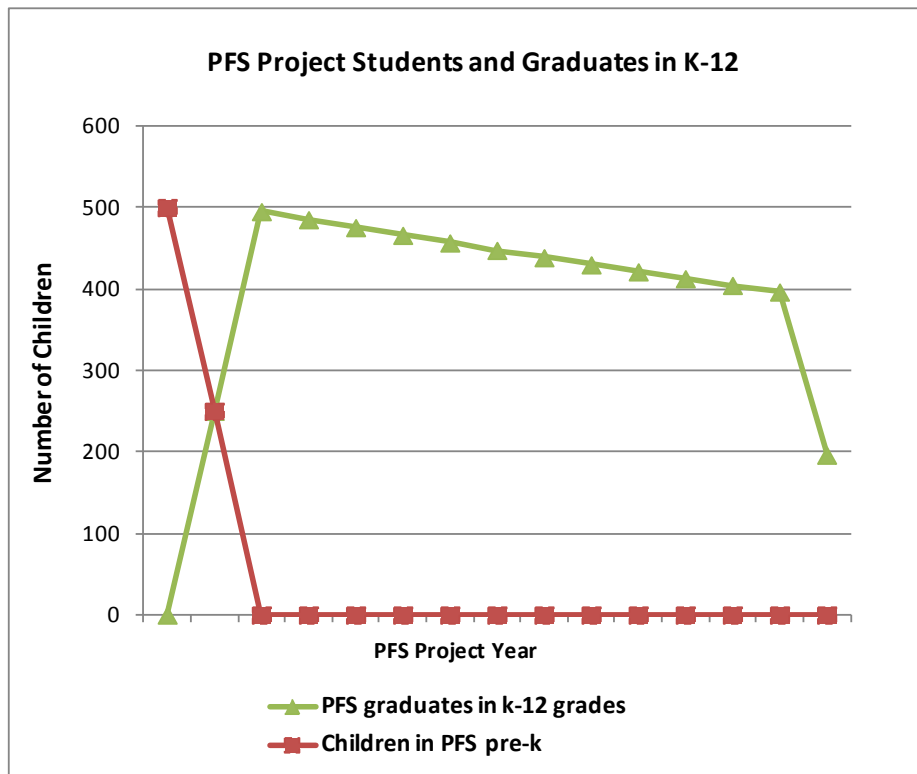
Chart 6.2   Numbers of children in special education

The blue line shows the total number of cohort children in K-12 public school. The red-line shows the number of children who would have been in special education without PFS pre-k. The green-line shows the number in special education with PFS pre-k. The difference between the red and green lines is the operational basis for PFS pre-k finance. It is the source of the success payments.

Comparison of Number of At-Risk Children in Special Education With and Without PFS Scholarships

Number of Children (y-axis): 0, 100, 200, 300, 400, 500, 600

PFS Project Year (x-axis)

- ◆ Total Number of Children in K-12
- ■ Number of Children in Spec-ed without PFS
- ▲ Number of Children in Spec-ed with PFS

Chart 6.3   Special Education Cost Comparison

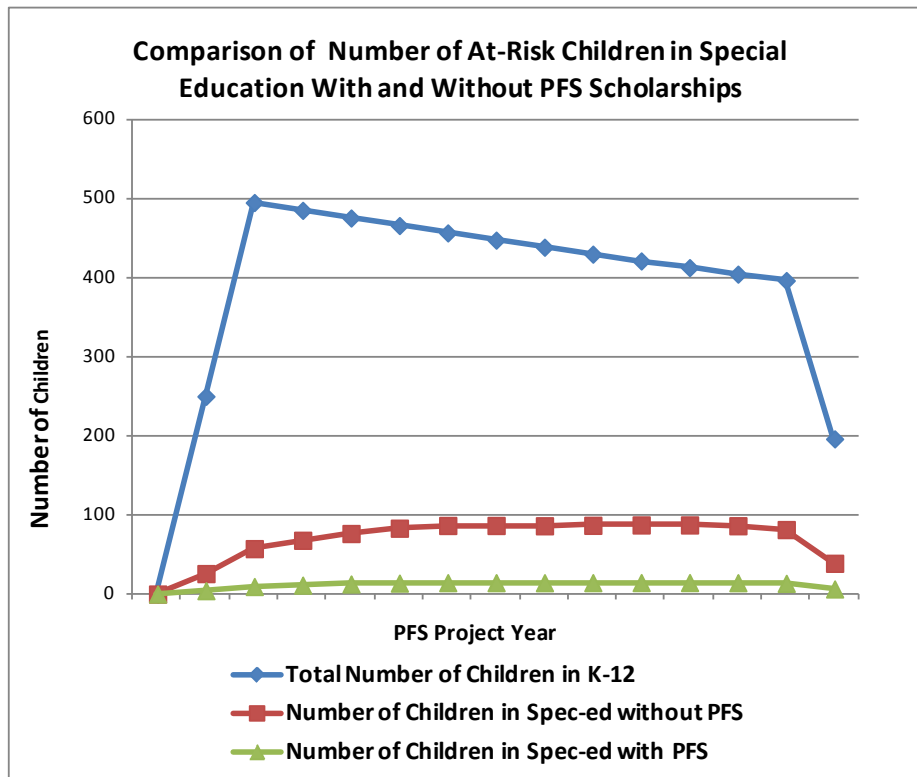The red line shows year-by-year what special education would have cost for 500 at-risk children in the absence of PFS pre-k. The green line shows the cost as a result of PFS pre-k. The cost difference is the cost avoidance from which success payments are paid.

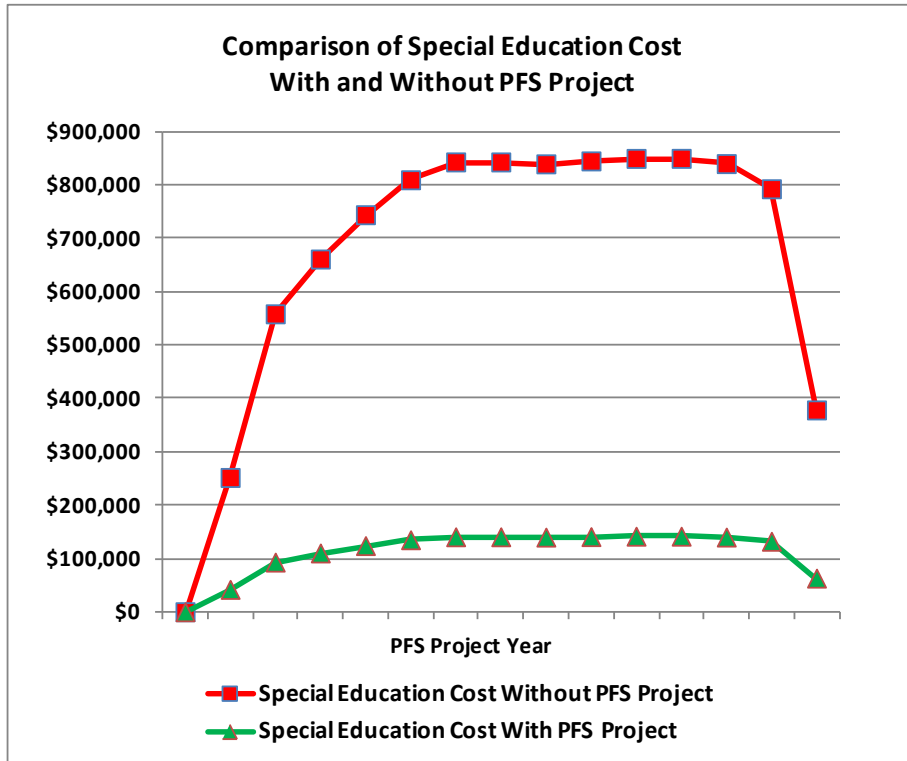Comparison of Special Education Cost With and Without PFS Project

Chart 6.4   Sources of funds

Here the blue, red, and green lines show the amount of funds allocated yearly by each of the key funding groups. The blue lines show philanthropic investments. The blue diamond line shows philanthropic grants to fund the operations of the PFS project. This line slowly declines over time because successive PFS projects sharing more and more of the original PFS project's operating costs. The blue star line shows PRI investments. Notice that the amounts of PRI fund investments are moderate in the early years then increase to about $700,000 in the 11th year in order to help pay off maturing fixed-debt obligations. The reason the PRIs are needed is clear in Chart 6.5. There are not enough accumulated success payments in the reserve account to fully pay off the maturing fixed-debt. Additional PRI obligations need to be extended.
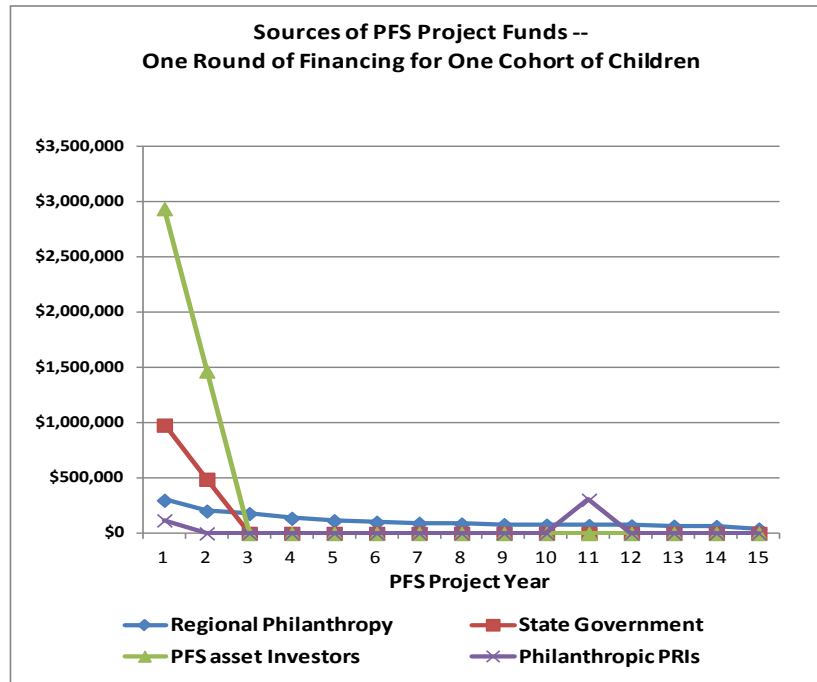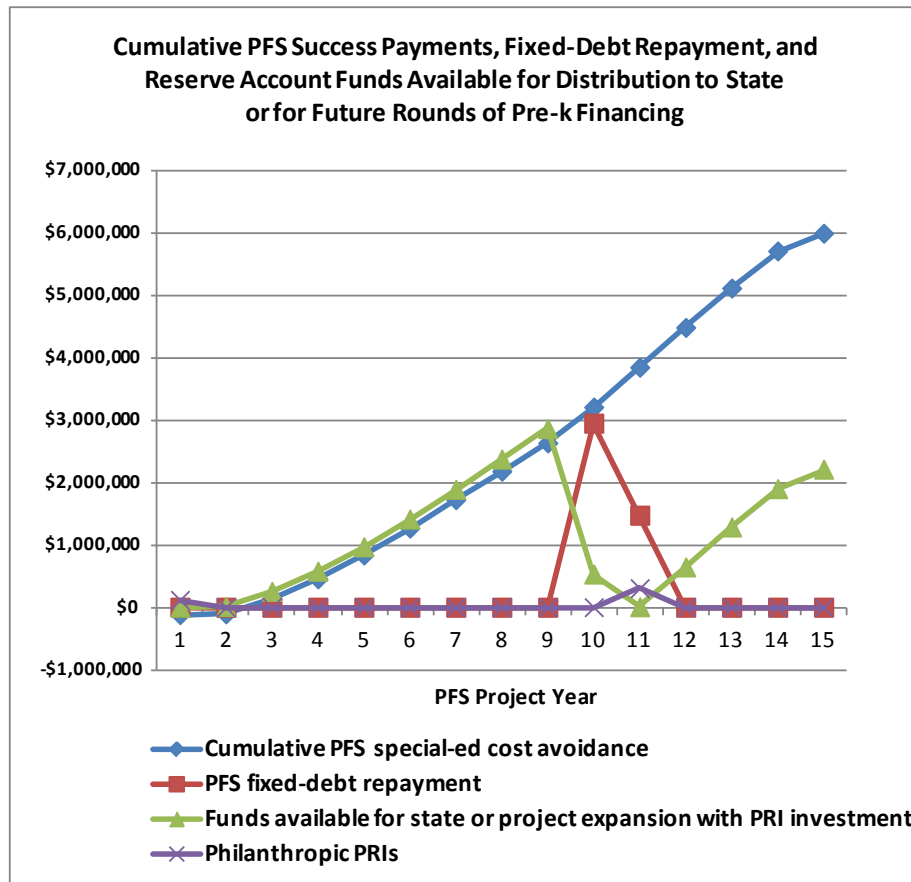

Sources of PFS Project Funds --
One Round of Financing for One Cohort of Children

Chart 6.5   Success Payments, Fixed-Debt Repayment and Reserve Account Balances

The blue line shows the steady accumulation of success payments on the balance sheet of the Intermediary up to the 10th and 11th years when the red-line fixed-debt has to be paid off. The green-line shows the growth of the reserve account for distribution to the state government or for reinvestment in successive rounds of PFS pre-k. In this example, the amount available for distribution or reinvestment appears is about $2.5 million less the roughly $700 thousand of outstanding PRI obligations and interest on them that will be paid off at in the 15th year. The financial results of the fixed-debt structure for one cohort of children are shown in Table 7.1.

Cumulative PFS Success Payments, Fixed-Debt Repayment, and Reserve Account Funds Available for Distribution to State or for Future Rounds of Pre-k Financing

Achieving self-financing PFS sustainability

For 500 at-risk children the cost of PFS pre-k costs about $4.6 million. The PFS project's annual operating costs are about $300 thousand. Thus If the project is able to accumulate a reserve fund of about $1.8 million at the end of each success payment cycle, as the green-line in Chart 6.5 suggests, and if the government chooses to reinvest the reserve account funds in successive rounds of PFS cohorts of children, it should be possible for the intermediary over time to accumulate enough funds in the reserve account to pay for pre-k scholarships and its operations without borrowing from private investors. By reinvesting the reserve account balance, the state government in time would replace the private investors, and eventually the philanthropic investors. When this happens, it would be capturing all the PFS gains itself. This is in essence the approach of the Sustainable Financing Model proposed in the Granite School District PFS research.

Pass-Through Debt Model – General Description

In the Pass-Through structure Investors receive annual payments consisting of a percentage of the Success Payments negotiated to achieve a target rate of return based on the projected performance of the PFS project in light of the Feasibility Research. These payments constitute interest payments and principle repayment. The actual yield on the Pass-Through depends on the amount and timing of the Success Payments. Pass-Through payments may vary from year to year because they depend directly on the amount of Success Payments actually earned.

In the Pass-Through structure, the debt instrument stands on its own – neither payments nor a given return on investment are assured by philanthropic PRI investment commitments. For this reason Pass-Through obligations have higher investment risk than fixed-debt obligations. Since a pass-through is a variable pay and variable duration financial instrument, with no philanthropic credit enhancement, a rate of return in the range of 5 percent to 7 percent would be reasonable in the current interest rate environment. For illustrative purposes in the base case scenario, 6 percent is assumed to be the target rate of return for pass-through investors.

Discussion of key base case assumptions

See Table 7.1 for a listing of the base case assumptions.

Special education assignment rates of socio-economically at-risk children expected to be assigned to special education without high-quality pre-school education using BASD an example, is assumed to be 18 percent. The percentage of at-risk children expected to be assigned to special education after receiving a high-quality pre-school education is 3 percent. This percentage does not take dosage effects into consideration. The difference in the number of at-risk children expected to be assigned to special education with high-quality pre-school intervention is further adjusted by two factors -- the percentage of disabilities that can be ameliorated by high quality pre-school and the expected number of prekindergarten children who will migrate out of the region each year.

Success payments are calculated as the difference between the annual special education costs of a cohort of low-income children without high-quality pre-school education and the projected annual special education costs of a cohort of low-income children with high-quality pre-school education. Success payments begin to accrue in year 2 of the project (when the four-year old half of the cohort enters elementary school) and continues through year 15 (when the second half of the cohort graduates from twelfth grade). Note that because of the need for Evaluator confirmation of actual Cost Avoidance, cash Success Payments should not be expected to be paid out until year 3. The present value of projected Success Payment cash flows is discounted at a rate of 3 percent.

Operating costs in years 1 and 2 include initial feasibility research costs, program set-up costs, costs of establishing and method to certify savings gains in special education. Beginning in Year 2, when the first half of a cohort enters kindergarten, operating costs increase to include monitoring costs per child per year through 12th grade. Both initial and annual operating costs are covered by philanthropic grants and contributions.

Fixed-Debt Model – Detailed Description

The model results in Tables 7.1 and 7.2 are for one round and five rounds of investment. In each round, about $5 million in fixed-debt is issued to provide scholarships to pay for one cohort of three and four-year old socio-economically at-risk children to attend high-quality pre-school programs. Half of each cohort (the four year-old children) attends pre-school for one year prior to entering elementary school and the other half of each cohort (the three year olds) attends pre-school for two years prior to entering elementary school. With any new financial instru ment, market rates are difficult to determine. In this paper fixed-debt instruments have a maturity of 10 years, and are assumed for illustrative purposes only, to have an annual coupon rate of 4 percent and an expected minimum yield to maturity of 4.17 percent.

Financial risk in the fixed-debt model is divided between private fixed-debt and philanthropic PRI investors. PRIs absorb negative cash flows and losses first and fix-debt second.

PRI debt is needed in each round of financing to cover fixed-debt interest payments in the first two years, before the full cohort enters elementary education and the evaluator can confirm success in achieving special education cost avoidance. The amount of PRI debt is equal the amount required to cover negative project cash flows in year 1 and year 2 and in years 10 and 11 when fixed-debt must be repaid, plus compounded annual interest at a rate of 1.5 percent. The maturity of the PRI bonds is 15 years. Negative project cash flows are calculated as revenue from success payments less bond interest payments, less operating costs.

Success payment revenues exceed bond interest payments and operating costs combined in years 3 and beyond. The free cash flows are accumulated in a reserve account that earns interest at a rate of 1.5 percent.

The state government's investment return is a residual equal to the amount left over from the annual success payments after subtracting fix-debt and PRI obligation interest and principle payments, operating costs, and the share of scholarship and operating costs paid by the state, and adding interest earned on the reserve account. The model calculates the state's investment return using present value (PV) calculations, subtracting and adding PVs of expenses and earning as appropriate. The return to the state can be used for any budget purpose including increasing the amounts the state invests in early child development.

Expanding the PFS project to include more children in rounds beyond year 3 can be done if the intermediary borrows against projected future success payments. Because the amounts of future success payments from a single cohort of children can be projected with a high degree of certainty after second grade, a well-managed intermediary should be able to borrow against those expected flows. How this could be done is left to future research.

Detailed Features of Both Models – Initial Assumptions

Table 6.1   Base case assumptions

PFS Student Demographics

Total number of 3- and 4-year-old children in PFS program	500
Number of 3-year-old students in first year	250
Number of 4-year-old students in first year	250
Expected % of PFS children who migrate out of the region each year	2%

Pre-k special education economic cost and effect assumptions

Cost of quality pre-K per socio-economically at-risk child per year (1)	$7,850
Expected growth rate of cost for a pre-K child per year	0.0%
Cost of special education per socio-economically at-risk child per year	$12,141
Percent of disabilities that can be ameliorated by pre-k	80%
Cost of special education adjusted by disability almelioration rate	$9,713
Expected growth rate of cost for a pre-K child per year	0.0%
Expected % of socio-economically at-risk children assigned to special education	18.0%
Expected % of socio-economically at-risk children assigned to special education with PFS	3.0%
Measurement error discount (reduces amount of success payment as % of special education cost	10%

PFS Operating Cost Assumptions

Total cost of PFS prekindergarten scholarships	$3,925,000
Project establishment, initial feasibility study and evaluator costs	$500,000
Enterprise operating costs per year (shared by successive PFS cohorts)	$250,000
Expected growth rate of operations costs	0.0%
Mentoring costs per PFS child per year (adds to enterprise operating costs)	$0
Expected growth rate of mentoring costs	0.0%
Monitoring costs per PFS child per year (adds to enterprise operating costs)	$10
Expected growth rate of monitoring costs	0.0%
Evaluation of special education cost avoidance per child per year	$100

PFS Asset Assumptions

State contribution Yes=1, No=0	1
Share of pre-K costs paid by state government	25%
Federal contribution Yes=1, No=0	1
Share of pre-K costs paid by federal government	0%
Investor contribution Yes=1, No=0	1
Share of pre-K costs paid by investors	75%

PFS Operating Expense Coverage Assumptions

Philanthropy covers PFS program set up expenses Yes=1, No=0	1
Philanthropic PRI covers PFS interest expense funding gap Yes=1, No=0	1
Share of operating expenses paid by investors	0%
Share of operating expenses paid by philanthropy	100%
Share of operating expenses paid by state government	0%

Interest Rate Assumptions

Discount rate	3.0%
Interest rate payable on PFS assets	4.0%
Interest rate payable on PRI bonds	1.5%
Interest rate earned on reserve account retained success payments	1.5%
PRI bond term (years) in single cohort scenario	14
PRI bond term (years) in five cohort sceanrio	18

IRR Assumptions

Investor required IRR in pass through model	6.0%

Pass-Through Debt Model – Detailed Description

As in the fixed-debt case, the model results shown in Tables 7.3 and 7.4 are for one round and five rounds of investment. In each round, about $6.6 million in pass-through debt is issued to pay for one cohort of three and four-year old socio-economically at-risk children to attend high-quality pre-school programs. Half of each cohort (the four year-old children) attends pre-school for one year prior to entering elementary school and the other half of each cohort (the three year olds) attends pre-school for two years prior to entering elementary school. The life of the pass-through debt associated with each cohort is 15 years – age 3 through age 18.

Financial risk in the pass-through structure is born fully by the pass-through investor. In essence, a pass-through investor bears the combined risks of the private and the philanthropic investors in the fixed-debt model. In general, then, the return on pass-through obligations should be at least as great as the sum of the PRI and fixed-debt yields in the fixed-debt model, and perhaps include a variable duration premium as well.

The percent of success payments to be paid to investors is a percentage negotiated in advance based on the feasibility research and projected project performance. In general, the success payment percentage will be set at a level that assures with reasonable confidence that investors will receive a yield at least equal to the sum of what the private and philanthropic investors receive in the fixed-debt structure. Nevertheless, they could receive significantly less. On the other hand, unless the contract limits the yield to at a specific level, they could receive more. If the pass-through debt contract caps the yield, returns above the cap rate will flow to the state. Success payment amounts above the amounts required to be paid to pass-through investors, is allocated to the reserve account.

PRI debt is not provided for in the base case pass-through model. However, bringing philanthropic PRI investment into the picture introduces interesting possibilities. One of them is revealed in Variation C in Table 8.1. Variation C assumes philanthropy pays all operating costs, and pre-k funding comes 50 percent from private pass-through investors, 25 percent from state government, and 25 percent from the federal government. These proportions are the same as the final stage of the Obama administration's recent early education proposal and have important potential implications. See Section 8 and results in Table 8.2 below.

7. Model Projection Results

Complete results are presented in the PFS Finance Modeling Spreadsheet on the ReadyNation website under the Working Group tab "Social Impact Finance Working Groups".[36] Download the spreadsheet, review the results, try different assumptions, and please feel free to contact the authors with comments, suggestions, and, of course, corrections.

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[36] ReadyNation, Social Impact Finance Working Group http://readynation.org/SIB/

Base Case – Fixed-Debt, Single Cohort

Table 7.1   Base Case – Fixed-Debt, Single Cohort

This table presents the financial results shown earlier in Chart 6.5. Under the base case assumptions, this PFS project pays for about $3.9 million of high-quality, two-year pre-k for 500 children and reduces special-ed assignment from 18 percent to 3 percent, which in turn generates about $6.5 million of present-value cost avoidance and about $5.8 million of success payments to the intermediary. The IRR to the fixed-debt lenders is 4.17 percent. The return to philanthropic PRI investors is 1.27 percent. And, the financial IRR to the state is 1.26 percent. This return to the state is in addition to the wide range of non-special-ed cost reduction longer-term economic and social returns. As discussed earlier, it is not unreasonable to think the government's non-special-ed IRR could be as high as 9 percent.

PFS Project Results:

PV of special-ed cost without PFS project	$	8,053,880
PV of special-ed cost with PFS project	$	1,342,313
PV of special-ed cost avoidance (budget savings)	$	6,516,084
Cost avoidance as a percent of special-ed cost without PFS		81%
PV of Success Payments to the Intermediary	$	5,864,476
Success Payments as percent of special-ed cost without PFS		73%

Funding Source Amounts:

PV of philanthropic grants	$	1,420,789
PV of philanthropic PRIs	$	334,123
PV of state government investment	$	1,415,131
PV of federal government investment	$	-
PV of private source investments	$	4,245,393
PV of project funding from all sources	$	7,415,436

Investor Results:

PV of Intermediary fixed-debt obligations acquired by Investors	$	4,245,393
PV of principle and interest payments to Investors	$	4,615,610
IRR to Investors (Yield to Maturity, not Coupon))		4.17%

Philanthropic PRI Results:

PV of Intermediary PRI obligations acquired by philanthropies	$	334,123
PV of principle and interest payments to philanthropies	$	295,932
IRR to PRI investors		1.29%

Government Results:

PV of Government investment	$	1,415,131
PV of net payments to Government for gen'l budget or more pre-k	$	1,121,823
IRR to State Government (incl inv inc and assuming PRI repaymnt in 15th yr)		1.26%

Base Case – Fixed-Debt, Five Cohorts

Table 7.2   Base Case – Fixed-Debt, Five Cohorts

This table reveals an interesting feature of fixed-debt PFS finance over multiple cohorts of children. Because the set up costs are amortized over successive cohorts, the amount PRI interest and principle needed to be repaid at the end of each cohort cycle is less, raising the IRR to the state slightly. In addition, the success payments for each cohort in years 11 through 13, after the PFS principal has been repaid, have a specific use. They are used to help pay interest and principal on PFS obligations issued to obtain the funds needed to pay for successive cohorts of children. In successive rounds, the availability of these funds reduces the need for PRI support.

The most important feature of the five-round results is how they clarify the possibility that the financing model could become self-sustaining. Sustainability requires that the government or the intermediary be able to borrow against or securitize its stream of expected success payments. Once a PFS project is well-established, this should be possible. Using the proceeds, the amount needed from private investors could be reduced steadily year by year. In perhaps four or five years, the project could be financed with just government and philanthropic resources. In a few years after that, the project could be supported solely with the internally generated and securitized success payments.

PFS Project Results:		
PV of special-ed cost avoidance (budget savings)	$	30,737,011
PV of Success Payments to the Intermediary	$	27,663,310
Funding Source Amounts:		
PV of philanthropic grants	$	5,835,873
PV of philanthropic PRIs	$	214,080
PV of state government investment	$	6,675,312
PV of federal government investment	$	-
PV of private source investments	$	20,025,937
PV of project funding from all sources	$	32,751,202
Investor Results:		
PV of Intermediary fixed-debt obligations acquired by Investors	$	20,025,937
PV of principle and interest payments to Investors	$	21,772,287
IRR to Investors		4.17%
Philanthropic PRI Results:		
PV of Intermediary PRI obligations acquired by philanthropies	$	214,080
PV of principle and interest payments to philanthropies	$	163,083
IRR to PRI investors		1.41%
Government Results:		
PV of Government investment	$	6,675,312
PV of net payments to Government for gen'l budget or more pre-k	$	5,117,521
IRR to State Government		1.27%

Base Case – Pass-Through, Single Cohort

Table 7.3   Base Case – Pass-Through, Single Cohort

Under the base case assumptions, pass-through obligations have a target rate of 6 percent. This requires the intermediary to allocate enough of the success payment flow to pass-through investors to reach the target rate. As shown in Table 8.1, the success payment allocation can vary widely from as low as about 60 percent to as high as 90 percent depending on the amounts of funding from private versus government sources. And as Table 8.2 shows, the allocation rises to about 95 percent as the special-ed assignment rate rises for PFS pre-k graduates. The higher the pass-through payment rate is, the less can be paid to the government. In almost all instances, the financial return to the state government is negative. For the base case, the government's IRR -6.27 percent. Again, keep in mind that the state's true all-in IRR, conservatively estimated and net of special-ed cost reductions, may be as much as 9 percent.

PFS Project Results:

PV of special-ed cost without PFS project	$	8,053,880
PV of special-ed cost with PFS project	$	1,342,313
PV of special-ed cost avoidance (budget savings)	$	6,516,084
Cost avoidance as a percent of special-ed cost without PFS		81%
PV of Success Payments to the Intermediary	$	5,864,476
Success Payments as percent of special-ed cost without PFS		73%

Funding Source Amounts:

PV of philanthropic grants	$	1,420,789
PV of philanthropic PRIs	$	-
PV of state government investment	$	1,415,131
PV of federal government investment	$	-
PV of private source investments	$	4,245,393
PV of project funding from all sources	$	7,081,313

Investor Results:

PV of Intermediary pass-through obligations acquired by Investors	$	4,245,393
PV of pass-through payments Investors	$	5,181,264
IRR to Investors		6.0%
(Percentage of success payments reach required pass-through IRR)		88.35%

Philanthropic PRI Results:

PV of Intermediary PRI obligations acquired by philanthropies	$	-
PV of principle and interest payments to philanthropies	$	-
IRR to PRI investors		0.00%

Government Results:

PV of Government investment	$	1,415,131
PV of pass-through payments to Government	$	683,211
IRR to State Government (continuous payment)		-6.27%

Base Case – Pass-Through, Five Cohorts

Table 7.4   Base Case – Pass-Through, Five Cohorts

Unlike the five-round fixed-debt example, because so much of the success payment stream has to be diverted to the pass-through investors, and because there is no income or loss-covering role for PRI investors (though there could be and the effect would be to reduce the pass-through target rate), the likelihood of achieving sustainability is low. Nevertheless, if a greater role for philanthropy or involvement of the federal government on a PRI basis is arranged as discussed earlier, the residual would be greater and sustainability might be possible in a reasonable number of years.

PFS Project Results:

PV of special-ed cost avoidance (budget savings)	$ 30,737,011
PV of Success Payments to the Intermediary	$ 27,663,310

Funding Source Amounts:

PV of philanthropic grants	$ 5,835,873
PV of philanthropic PRIs	$ -
PV of state government investment	$ 6,675,312
PV of federal government investment	$ -
PV of private source investments	$ 20,025,937
PV of project funding from all sources	$ 32,537,122

Investor Results:

PV of Intermediary fixed-debt obligations acquired by Investors	$ 20,025,937
PV of pass throughs to Investors	$ 24,440,534
IRR to Investors	6.00%
(Percentage of Success Payments to Investors that Results in Requried IR	88.35%

Philanthropic PRI Results:

PV of Intermediary PRI obligations acquired by philanthropies	$ -
PV of principle and interest payments to philanthropies	$ -
IRR to PRI investors	0%

Government Results:

PV of Government investmen for gen'l budget or more pre-k	$ 6,675,312
PV of pass-throughs to Government	$ 3,222,776
IRR to State Government	-6.27%

8.   Results of Varying Assumptions Regarding Funding Sources and Special-Ed Rates

Results of Varying Funding Assumptions

The returns to the state can vary widely depending on the funding shares born by private, philanthropic and government investors. As is evident in Table 8.1, the highest return arises from a mix of 50 percent private, 25 percent state, and 25 percent federal. Table 8.1 shows that even marginally increasing

federal participation, if only through the greater allocation of Title I funding for early education, for instance, has a significant impact on increasing the returns to the state in a pass-through structure. Instead of a -6.27 percent return in the base case, the state can leverage its return to 5.82 percent by blending state and federal funds to cover the 25 percent cost of non-PFS funding. Similarly, the state can leverage its return in the fixed bond structure from 1.27 percent to 8.28 percent. Again, this is in addition to the IRR of longer term economic and social outcome improvements discussed above, which state governments realize when investing in early education

What is particularly interesting about this variation is what it reveals about the potential attractiveness of the Obama administration's proposal to make high quality pre-k available to all four year-olds for families with incomes under 200 percent of poverty, beginning with a $1.3 billion appropriation in 2014. The federal share would be 90 percent of the total cost in the first year and a 10 percent state match, with the federal share diminishing incrementally each year to 25 percent in 10 years[37]. As Table 8.1 indicates, a 25 percent state, 25 percent federal split could be the foundation of a PSF pass-through structure like that shown in Table 8.2, which might be very attractive to state governments

Table 8.1   Results of Varying Funding Assumptions

Variation A: Funding Source: 75% Investor, 10% state, 15% federal		
	Fixed-Debt Structure	**Pass-through Structure**
		(Requires 88.35% of Success Payments paid to Investor to reach Target Return)
IRR to the Investor	4.17%	6.00%
IRR to PRI	1.29%	0%
IRR to the State	8.28%	5.82%

Variation B: Funding Source: 50% Investor, 50% state		
	Fixed-Debt Structure	**Pass-through Structure**
		(Requires 58.9% of Success Payments paid to Investor to reach Target Return)
IRR to the Investor	4.17%	6.00%
IRR to PRI	1.39%	0%
IRR to the State	2.14%	0.75%

Variation C: Funding Source: 50% Investor, 25% state, 25% Federal		
	Fixed-Debt Structure	**Pass-through Structure**
		(Requires 58.9% of Success Payments paid to Investor to reach Target Return)
IRR to the Investor	4.17%	6.00%
IRR to PRI	1.39%	0%
IRR to the State	7.45%	11.63%

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[37] "Early Learning: America's Middle Class Promise Begins Early", *ED.gov*, U.S. Department of Education, http://www.ed.gov/early-learning

Implementing the Obama administration plan in the form of individual state PFS projects along the lines of Variation C, would realistically take many years. It would need to be scaled up slowly to assure adequate numbers of well-trained pre-k teachers and appropriate facilities. If it were to begin small and grow slowly, when the $1.3 billion federal commitment level is reached, it would involve an equal commitment from state governments, serve 450 thousand at-risk 3 and 4 year-old children, and require philanthropic commitments totaling present-value $431 million, and pass-through investments totaling present-value $2.547 billion. What could induce philanthropy to contribute $431 million? A 5 percent IRR might. Such a return would be feasible if states were willing to share 5 percent of their 11.63 percent financial return.

Table 8.2   Obama 50% Private, 25% State and 25% Federal Pass-Through Structure

PFS Project Results:

PV of special-ed cost without PFS project	$	7,248,492,134
PV of special-ed cost with PFS project	$	1,208,082,022
PV of special-ed cost avoidance (budget savings)	$	5,864,475,837
Cost avoidance as a percent of special-ed cost without PFS		81%
PV of Success Payments to the Intermediary	$	5,278,028,253
Success Payments as percent of special-ed cost without PFS		73%

Funding Source Amounts:

PV of philanthropic grants	$	430,901,950
PV of philanthropic PRIs	$	-
PV of state government investment	$	1,273,617,919
PV of federal government investment	$	1,273,617,919
PV of private source investments	$	2,547,235,837
PV of project funding from all sources	$	5,525,373,625

Investor Results:

PV of Intermediary pass-through obligations acquired by Investors	$	2,547,235,837
PV of pass-through payments Investors	$	3,108,758,641
IRR to Investors		6.0%
(Percentage of success payments reach required pass-through IRR)		58.90%

Philanthropic PRI Results:

PV of Intermediary PRI obligations acquired by philanthropies	$	-
PV of principle and interest payments to philanthropies	$	-
IRR to PRI investors		0.00%

Government Results:

PV of Government investment	$	2,547,235,837
PV of pass-through payments to Government	$	2,169,269,612
IRR to State Government (continuous payment)		11.63%

Results from varying special-ed assignment rate assumptions

The models are very sensitive to the "sped spread" – the difference between the special-ed assignment rate without PFS pre-k and the rate with PFS pre-k. Using information from the Granite School District and Pennsylvania Pre-K Counts studies, a spread of 18 percent to 3 percent -- 15 percentage points -- was assumed in the base case of this paper. As the results in Table 8.3a and b show, a special-ed assignment rate reduction of less than 13 percentage points renders the base case fixed-debt model infeasible – the return to the state becomes so negative that even taking into consideration the non-financial economic and social returns, the project makes little sense. For the pass-through base case model, a rate reduction of less than 14 percent makes the project a non-starter.

Not surprising the variation that is most robust in the face of declining rate reductions, is Variation C. The reason of course is the introduction of a large costless funding source. Under the assumption that pre-k costs will be paid for with funds from 50 percent private, 25 percent state and 25 percent federal sources, and that philanthropy will pay project operating costs, the project remains viable for rate reductions as low as 12 percentage points.

In cases where the "sped spread" is less than 14 percent, other combinations of investor, state and federal funding, can improve the returns to the state. For instance, in the case where an 18 percent assignment rate is reduced to 8 percent (i.e. a 10 percent "sped spread"), a combination of 50 percent investor funding, 10 percent state funding, and 40 percent federal funding results in an IRR of 5.12 percent for the state in the Fixed Debt Structure and a -0.02 percent return to the state in the Pass-Through structure. Including the all-in benefits of reduced crime, increased academic achievement, and increased earning described above, a PFS project would continue to be in the best interest of state government.

Table 8.2a   Results for Various Special-ed Assignment Rate Reduction Assumptions

Base Case: Funding Source: 75% Investor, 25% state

	Fixed-Debt Structure					
	Reduction of special education assignment rate due to PFS pre-k					
	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	4.17%	4.17%	4.17%			
IRR to PRI	1.29%	1.23%	1.22%			
IRR to the State	1.26%	-1.49%	-5.79%	*Return too low*	*Return too low*	*Return too low*

	Pass-through Structure					
	Reduction of special education assignment rate due to PFS pre-k					
	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	6.00%	6.00%	*Below target rt*	*Below target rt*	*Below target rt*	*Below target rt*
% of Success Payment Payout	88.35%	94.65%				
IRR to the State	-6.27%	-14.81%	*Return too low*	*Return too low*	*Return too low*	*Return too low*

Variation A: Funding Source: 75% Investor, 10% state, 15% federal

	Fixed-Debt Structure					
	Reduction of special education assignment rate due to PFS pre-k					
	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	4.17%	4.17%	4.17%	4.17%		
IRR to PRI	1.29%	1.23%	1.22%	1.22%		
IRR to the State	8.28%	5.34%	0.74%	-11.96%	*Return too low*	*Return too low*

	Pass-through Structure					
	Reduction of special education assignment rate due to PFS pre-k					
	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	6.00%	6.00%	*Below target rt*	*Below target rt*	*Below target rt*	*Below target rt*
% of Success Payment Payout	88.35%	94.65%				
IRR to the State	5.82%	-5.48%	*Return too low*	*Return too low*	*Return too low*	*Return too low*

Table 8.2b Results for Various Special-ed Assignment Rate Reduction Assumptions

Variation B: Funding Source: 50% Investor, 50% state

Fixed-Debt Structure
Reduction of special education assignment rate due to PFS pre-k

	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	4.17%	4.17%	4.17%	4.17%	4.17%	4.17%
IRR to PRI	1.39%	1.39%	1.39%	1.39%	1.39%	1.29%
IRR to the State	2.14%	1.01%	-0.30%	-1.88%	-3.87%	-6.56%

Pass-through Structure
Reduction of special education assignment rate due to PFS pre-k

	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
% of Success Payment Payout	58.90%	63.10%	67.95%	73.65%	80.35%	88.35%
IRR to the State	0.75%	-1.58%	-4.23%	-7.38%	-11.34%	-17.03%

Variation C: Funding Source: 50% Investor, 25% state, 25% Federal

Fixed-Debt Structure
Reduction of special education assignment rate due to PFS pre-k

	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	4.17%	4.17%	4.17%	4.17%	4.17%	4.17%
IRR to PRI	1.39%	1.39%	1.39%	1.39%	1.39%	1.29%
IRR to the State	7.45%	6.26%	4.88%	3.22%	1.13%	-1.70%

Pass-through Structure
Reduction of special education assignment rate due to PFS pre-k

	from 18% to 3%	from 18% to 4%	from 18% to 5%	from 18% to 6%	from 18% to 7%	from 18% to 8%
IRR to the Investor	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
% of Success Payment Payout	58.90%	63.10%	67.95%	73.65%	80.35%	88.35%
IRR to the State	11.63%	8.54%	5.09%	1.10%	-3.79%	-10.59%

9. Future Research

We conclude with some general comments on aspects of five areas of applied PFS finance.

As noted at the outset, the models presented in this paper are very simple and intended solely to illustrate some basic PFS financial mechanics. The focus on pre-k is intended to provide granularity to broader discussions of how to apply PFS social impact finance to early child development. In any actual application, variations of the Fixed Debt and Pass-Through structures, additional structures, along with additional combinations of funding sources, would need to be explored to find the most efficient allocation of resources, leverage, and risk in order to optimize financial returns to participants in a PFS project.

Implementing operational PFS projects will be helped significantly if future research focuses on at least five areas of PFS finance: (1) Standard error estimates of the distribution of returns on PFS assets. (2) PFS project capital structures, risk, subordination and loss absorption. (3) Sensitivity analysis of returns to variations in parameter values and financial structures. (4) Pre, concurrent and post intervention data needed to evaluate near-term financial returns and longer-term all-in outcome improvements. (5) Research methodologies to use when needed data are limited.

Standard error estimates

Research on the standard error of PFS asset returns is needed. If nothing concrete can be said about the distribution of PFS asset returns, it will be hard market PFS assets beyond a community of early

childhood philanthropists. To do more requires enough observations on PFS asset returns over time to derive the distribution parameters or methods to estimate standard errors by other means.

Capital structures and subordination

Though perhaps useful pedagogically, the fixed-debt and pass-through models presented in this paper are quite simple. Research is needed that provides guidance on what structures of the capital account and loss absorption are in optimal for PSF projects.

Sensitivity Analysis

As the review of results indicate, PFS returns are sensitive to the type of obligation used (fixed-debt or pass-through), funding composition (private, philanthropic, state and federal), and outcomes (special-ed assignment rate). Research is needed on sensitivity to changes in all dimensions of a PFS project.

Pre and concurrent intervention data

Research is needed on how to carry out robust feasibility research when data on what happened to children before, during and after an intervention are limited.

To know whether a specific early childhood intervention has an effect on outcomes or cost avoidance, PFS project developers need to know whether the identified intervention alone caused the outcome or cost change. That is, if it is observed that pre-k reduces special education incidence, developers need to be able to show that the incidence reduction is not the result of other programs that occurred before or while the child was in PFS pre-k. They need to have answers to questions like: Was the lower incidence due to pre-k or concurrent programs such as church Sunday school that a higher percentage of the treated population is attending, or to earlier education-enriched toddler day care, or to even earlier home visiting or parent training? To rule out these possibilities, researchers need good information on exposures of treated and untreated populations to a wide range of prenatal to age five programs.

Post intervention data

Research is needed to help jurisdictions analyze whether longer-term outcome improvements justify a project when data on the outcomes is limited or do not align with the data the jurisdictions have in hand.

Data on what happens to the treated and untreated populations after the intervention is crucial to determining whether to use PFS finance to fund a particular intervention in a specific jurisdiction. Pre-k provides clear examples. It might be that special-ed cost reductions are not quite large enough to justify undertaking a project, but if grade retention and English language learning costs were also included, the economics would be favorable enough to justify the project. To get the benefit of PFS finance, a school district would need to capture grade retention and ELL costs associated with each child.

At a deeper level, state and federal governments need to do a better job of gathering data on the most their most important asset – youth human capital.

Two pre-k related considerations: The disabilities that can be ameliorated by pre-k and the time profile of children in special education in the jurisdiction are critically important. This paper assumes an amelioration rate parameter that was derived in other research from national and Virginia data, not Utah or Pennsylvania data. The time profile assumes that once a child enters special-ed, they stay in special-ed. In an actual PFS project, both assumptions ideally should be replaced by parameters based on disability data and longitudinal special education entry-exit data from the jurisdiction's own data-files. Using parameter assumptions like the ones used in this paper would not mean a project should not be undertaken. The effect ratio (see page 22) may be so large that parameters based on plausible or

generally accepted amelioration and time profile findings may not matter much. If this is the case, such projects should be undertaken.

The federal and state governments can help. For pre-k, they should improve and update IDEA data bases to provide sufficient information on disabilities and entry-exit from special-ed to enable early learning PFS projects to project more accurately near-term financial and longer-term all-in returns. More importantly for all forms of early child development, in recognition that youth human capital is the most valuable asset of any state and the nation, state and federal governments should gather the information about this most-valuable asset that enables the most efficient investment in it.

Longer-term all-in outcomes

Even with special-ed, grade retention and ELL costs included, a PFS pre-k project may still be at the margin, and what is needed is some indication of whether longer term social and economic outcome improvements justify the project. For pre-k, the major programs (Perry, Abecedarian, etc.) on which recent estimates of future outcomes are based, were in operation over three decades ago. Much has changed since then. While there are numerous reasons why the findings from the major programs are valid and recent benefit projections actually underestimate actual results, many jurisdictions do not keep the kind of data on their own youth populations that would enable the estimates to be used to easily derive accurate projections for the jurisdiction of longer term economic and social outcomes. If such projections could be derived, they would provide significant clarity on the whether an early childhood PFS project of any kind is justified.

In weighing the feasibility of an early child development PFS project, the all-in longer-term economic and social benefits need to be also considered. If a PFS pre-k project is feasible based on special education cost avoidance for a single school system, state and local governments benefit from longer-term all-in outcome improvements, as all the pre-k research indicate. To incorporate these all-in benefits, future research is needed to develop the methodologies to quantify and provide benchmarks for these benefits. Success in this will facilitate the development and expansion of PFS financing options for all kinds of early child development interventions.

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