A Unified Welfare Analysis of Government Policies

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A Unified Welfare Analysis of Government Policies

- What government policies do the most to improve social welfare?
  - Should we spend more (or less) on health insurance?
  - Should we raise top marginal income tax rates?
  - Should we invest more in children? At what age?
- There is existing research analyzing the effect of many of these policy changes
  - But little work quantifying the broad trade-offs across policy categories
  - Often different welfare methods used (CBA, MCPF, cost per life saved…)
- **This paper:** Conducts a unified welfare analysis of historical policy changes in the US over the past half century
  - Study 133 policy changes spanning four major categories: Social insurance, education and job training, taxes and cash transfers, and in-kind transfers

Measuring the Marginal Value of Public Funds

- For each policy change, we draw upon estimates in existing literature to measure:
  - The benefits to its recipients (measured as willingness to pay)
  - The net cost to the government (inclusive of fiscal externalities)
  - We take the ratio of benefits to net cost to form its Marginal Value of Public Funds:

$$MVPF = \frac{Beneficiaries' \ Willingness \ to \ Pay}{Net \ Government \ Cost}$$

  - Differs from traditional benefit/cost ratios by focusing on incidence of costs on government

- Comparisons of MVPFs yield social welfare impacts
  - Suppose Policy 1 has $MVPF_1 = 1$ and Policy 2 has $MVPF_2 = 2$
  - More spending on policy 2 financed by less on 1 increases social welfare **iff** prefer to take $1 from Policy 1 beneficiaries to give $2 to policy 2 beneficiaries
  - MVPF quantifies the tradeoffs across policies
  - Infinite MVPFs correspond to policies that pay for themselves ($WTP > 0$ and $Cost < 0$)

Data and Approach

- Construct comprehensive sample of policy changes (more formally, “identification conditions”) from survey and review articles in the four domains
- For each policy change, translate estimated impacts into the MVPF
- Assess robustness to range of assumptions
  - Program Parameters (discount rate, tax rate, etc.)
  - Forecasting/Extrapolation of Observed Effects
  - Validity of Empirical Designs (RCTs/RDs vs. Diff-in-Diff; Peer Reviewed vs. not; etc.)
  - Publication Bias (Andrews and Kasy, 2018)
  - Missing Causal Estimates (e.g. restrict to subsets of policies with different sets of observed effects)
- Detailed appendices + posted .do files on GitHub for exploration

Results Roadmap

- Direct investments in low-income children have had the highest MVPFs
  - High MVPFs *throughout* childhood: K12, college and health, not just preschool
  - Many policies "pay for themselves" (e.g. 3 out of 4 child Medicaid expansions)
  - Lower MVPFs for policies targeting adults (MVPFs ranging from 0.5-2)

- Several exceptions:
    - Children: Large variation in estimates with some low MVPFs (e.g. SSI)
    - Adults: Policies with indirect impacts on children (e.g. Moving to Opportunity)

- Library of MVPFs provides tests of a range of theories (optimal taxation, in-kind vs cash transfers, optimal policy targeting, value of correcting market failures…)

- Lessons for future welfare analyses
  - Comparison to traditional Benefit-Cost analysis
  - Statistical decision theory to quantify value of future work reducing uncertainty

Outline

1. What We Do: Our Method and An Example
2. What We Find: MVPF Estimates and Robustness
3. Relation to Previous Theory
4. Lessons for Future Welfare Analyses

Outline

1 What We Do: Our Method and An Example

- **Deriving the MVPF**
- **Measuring the MVPF: An Education Example**

General Welfare Framework

- Goal: Illustrate how the MVPF translates "reduced form" policy changes into precise statements about the social welfare impact of those policy changes

- Define social welfare:

$$W = \int \psi_i u_i$$

  - u_i is individual i's utility function
    - Expected future discounted utility (e.g. $u_i = E[\sum_{t \geq 0} \beta^j v_{it}]$)
  - ψ_i is i's Pareto weight
  - Define $\eta_i = \psi_i \lambda_i$, where λ_i is the marginal utility of income
  - Ratios $\frac{\eta_i}{\eta_j}$ correspond to "Okun's Bucket" (Okun, 1976)

Impact of Policy Change on Social Welfare

- Consider policy change dp (e.g. change in tax rate, educ. subsidy, etc.)
- First-order welfare impact:

$$\frac{dW}{dp} = \int_i \psi_i \frac{du_i}{dp} = \bar{\eta}_p \int_i WTP_i$$

- $\int_i WTP_i = \int_i \frac{\frac{du_i}{dp}}{\lambda_i}$ is the sum of WTP by beneficiaries out of their own income for the policy
- $\bar{\eta}_p = \int \eta_i \frac{WTP_i}{\int_i WTP_i}$ is incidence-weighted average social marginal utility of income

Compare Policies by Normalizing by Cost

- Most policies (i.e. reduced-form variations, dp) are not budget neutral
  - Let R denote govt budget and $G = \frac{dR}{dp}$ denote impact on govt budget that must be financed
  - G includes any fiscal externalities from behavioral responses to the policy

- The Marginal Value of Public Funds (MVPF) of policy p is given by:

$$MVPF_p = \frac{\int WTP_i}{G} = \frac{Willingness\ to\ pay}{Net\ Cost}$$

- \$1 of govt spending on the policy delivers $\$MVPF$ benefits to the beneficiaries of the policy [Mayshar (1990), Slemrod and Yitzhaki (1996, 2001), Kleven and Kreiner (2006), Hendren (2017)]
  - Delivers $\bar{\eta}_p MVPF_p$ in social welfare

MVPF Facilitates Construction of Policies that Increase Welfare

- Take two (non-budget neutral) policies: policy 1 and policy 2
- Consider budget neutral policy, dp: increase spending on policy 1 financed from less spending (greater revenue) from policy 2
- To first order, combined policy increases social welfare ($\frac{dW}{dp} > 0$) **<u>if only if</u>**

$$\bar{\eta}_1 MVPF_1 > \bar{\eta}_2 MVPF_2$$

- MVPFs characterize price of delivering welfare to the beneficiaries through the policy
  - Motivates comparing policies with similar distributional incidence ($\bar{\eta}_1 \approx \bar{\eta}_2$)
  - Laffer effect occurs when $WTP > 0$ and $Net\ Cost < 0 \rightarrow MVPF = \infty$
- MVPFs (+ social preferences) are the building blocks for measuring the first-order welfare impact of policy changes

Outline

1 What We Do: Our Method and An Example

- Deriving the MVPF
- Measuring the MVPF: An Education Example

Admission to Florida International University

- Florida International University (FIU) had a minimum GPA threshold for admission that created a fuzzy discontinuity

- Zimmerman (2014) utilizes this discontinuity to examine the impact of FIU admission on earnings for 14 years after admission.

Impact of College Attendance on Earnings: Zimmerman (2014)

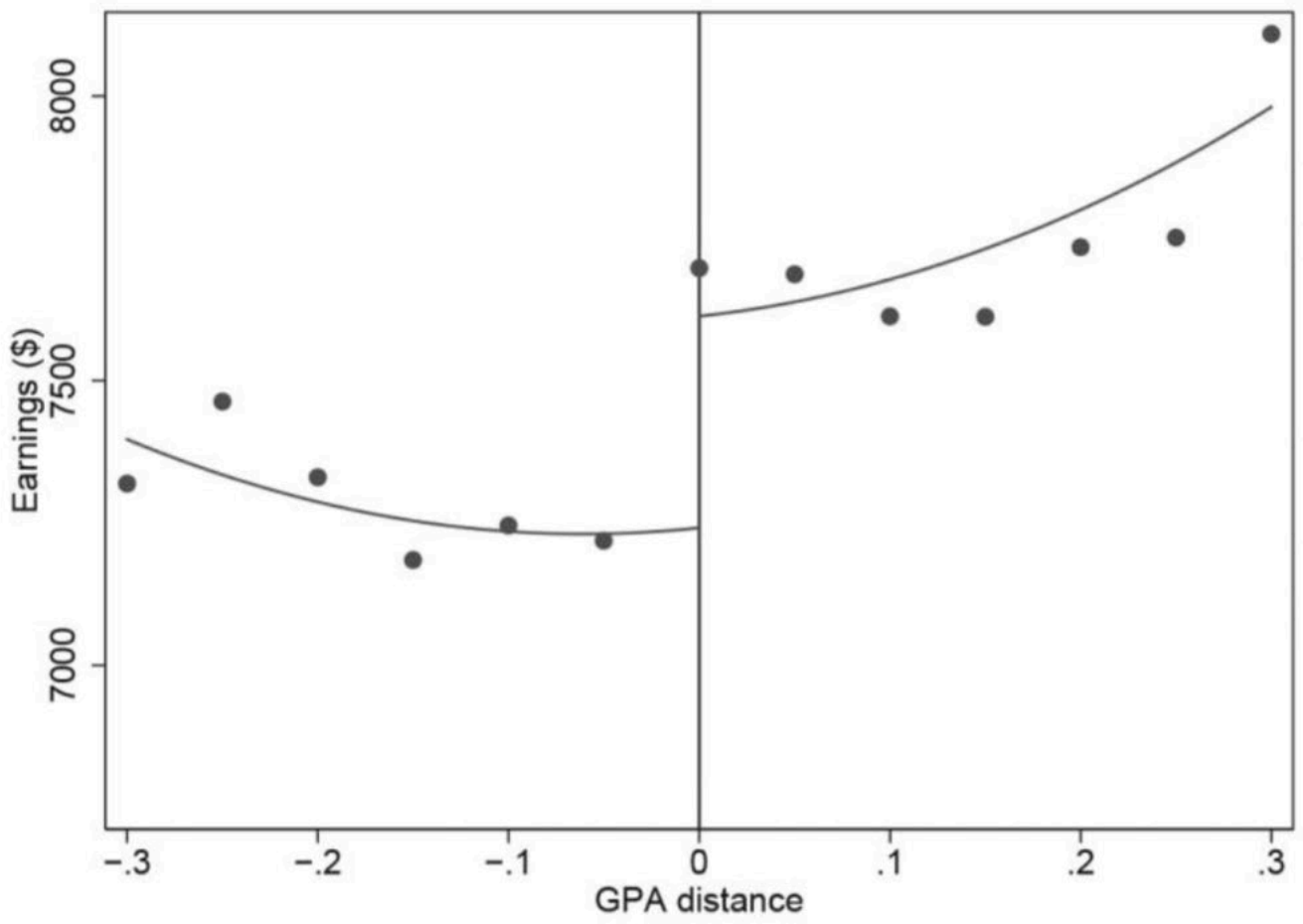
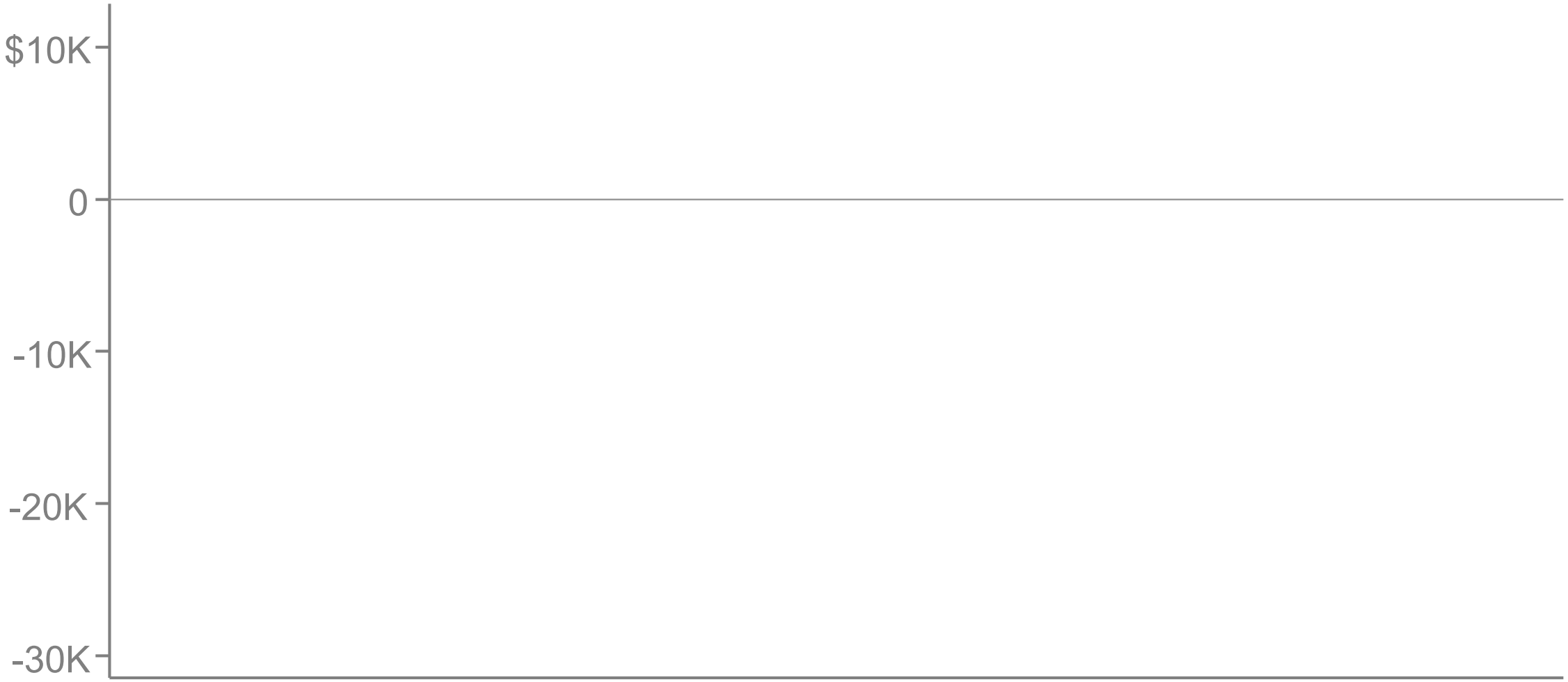


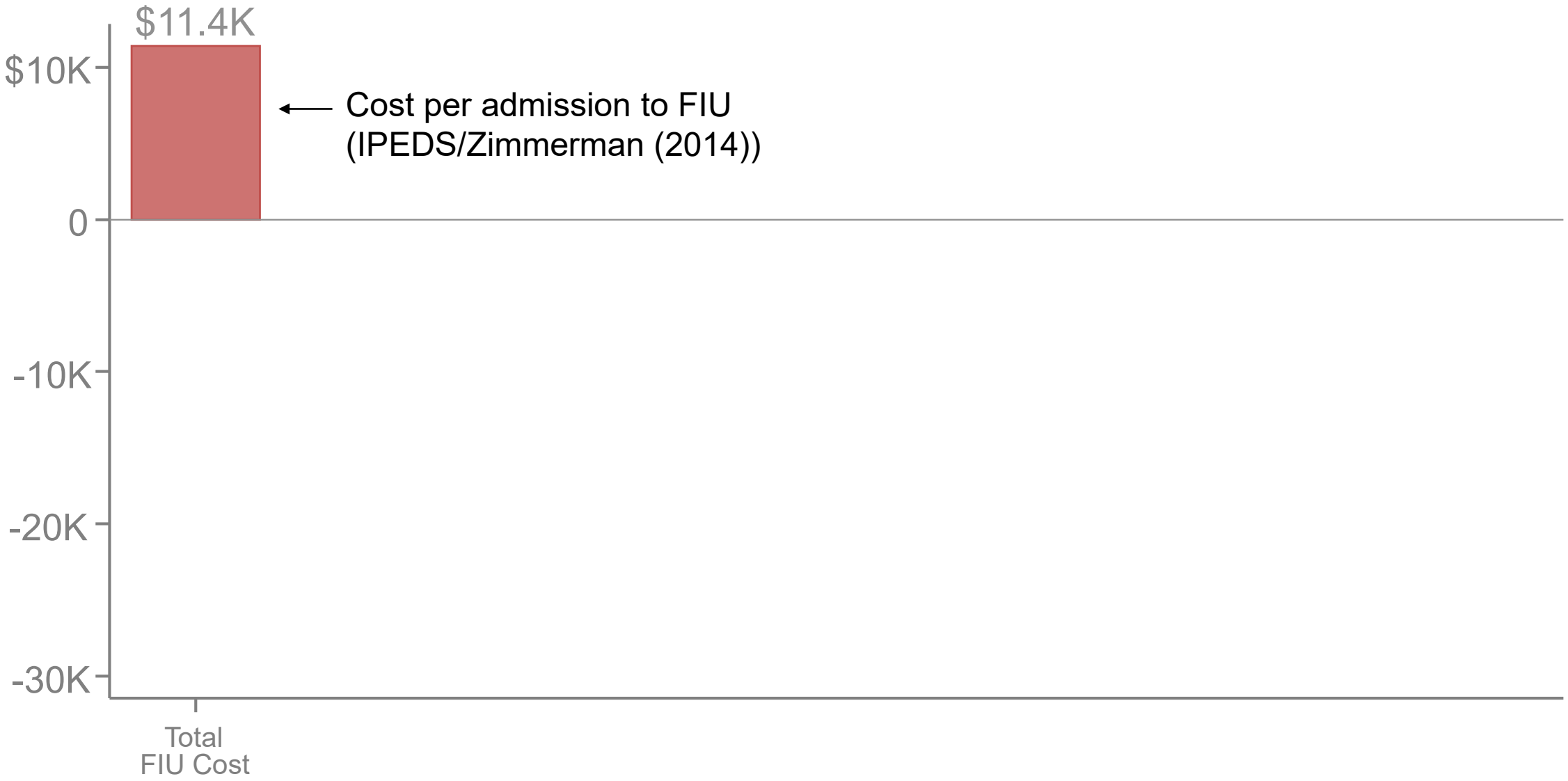
FIG. 8.—Quarterly earnings by distance from GPA cutoff. Lines are fitted values based on the main specification. Dots, shown every .05 grade points, are rolling averages of values within .05 grade points on either side that have the same value of the threshold-crossing dummy.

Net Cost to Government of Admission to Florida International University



Note: All amounts in 2005 USD, discounted using a 3% real interest rate

Net Cost to Government of Admission to Florida International University



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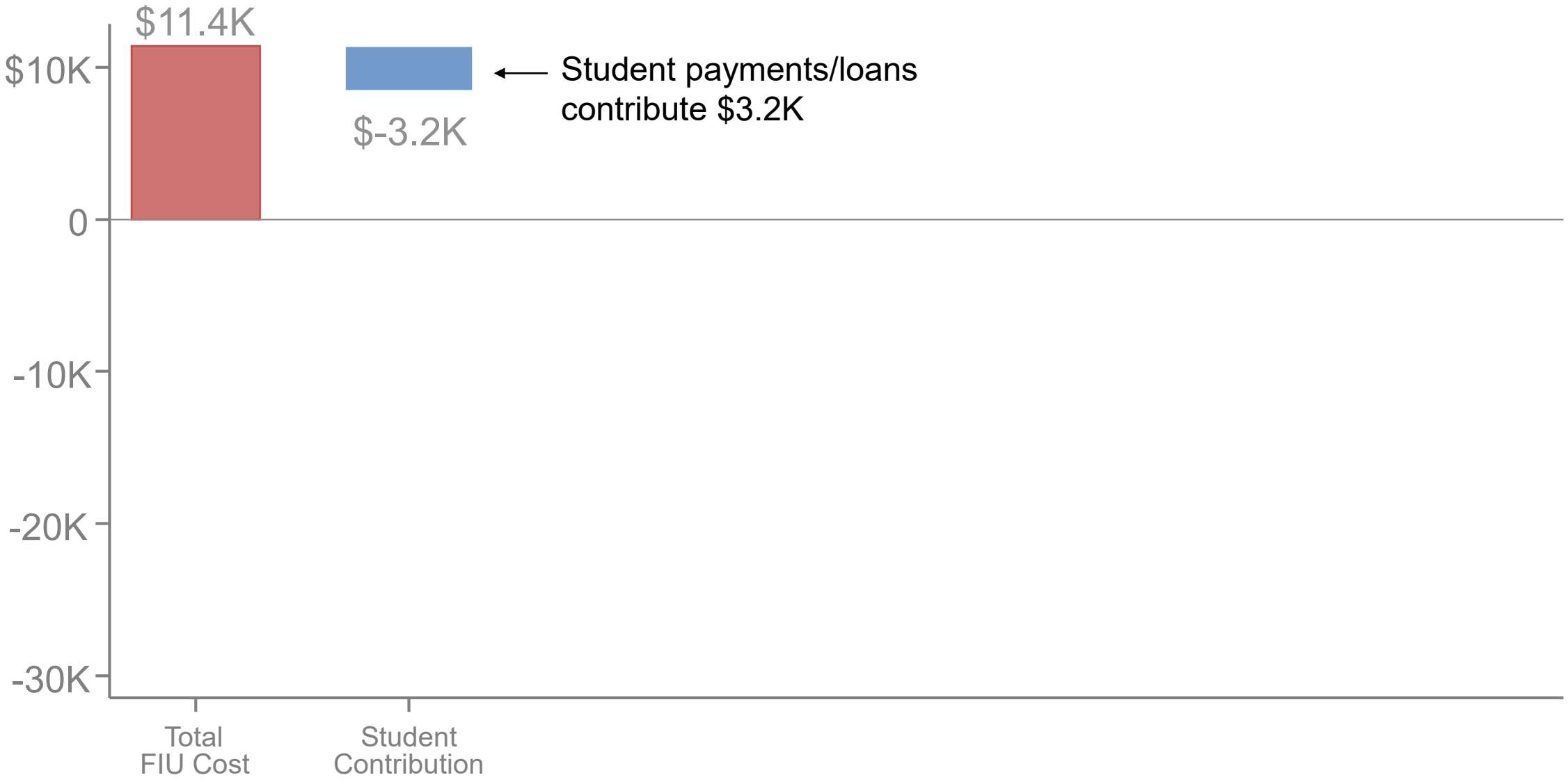

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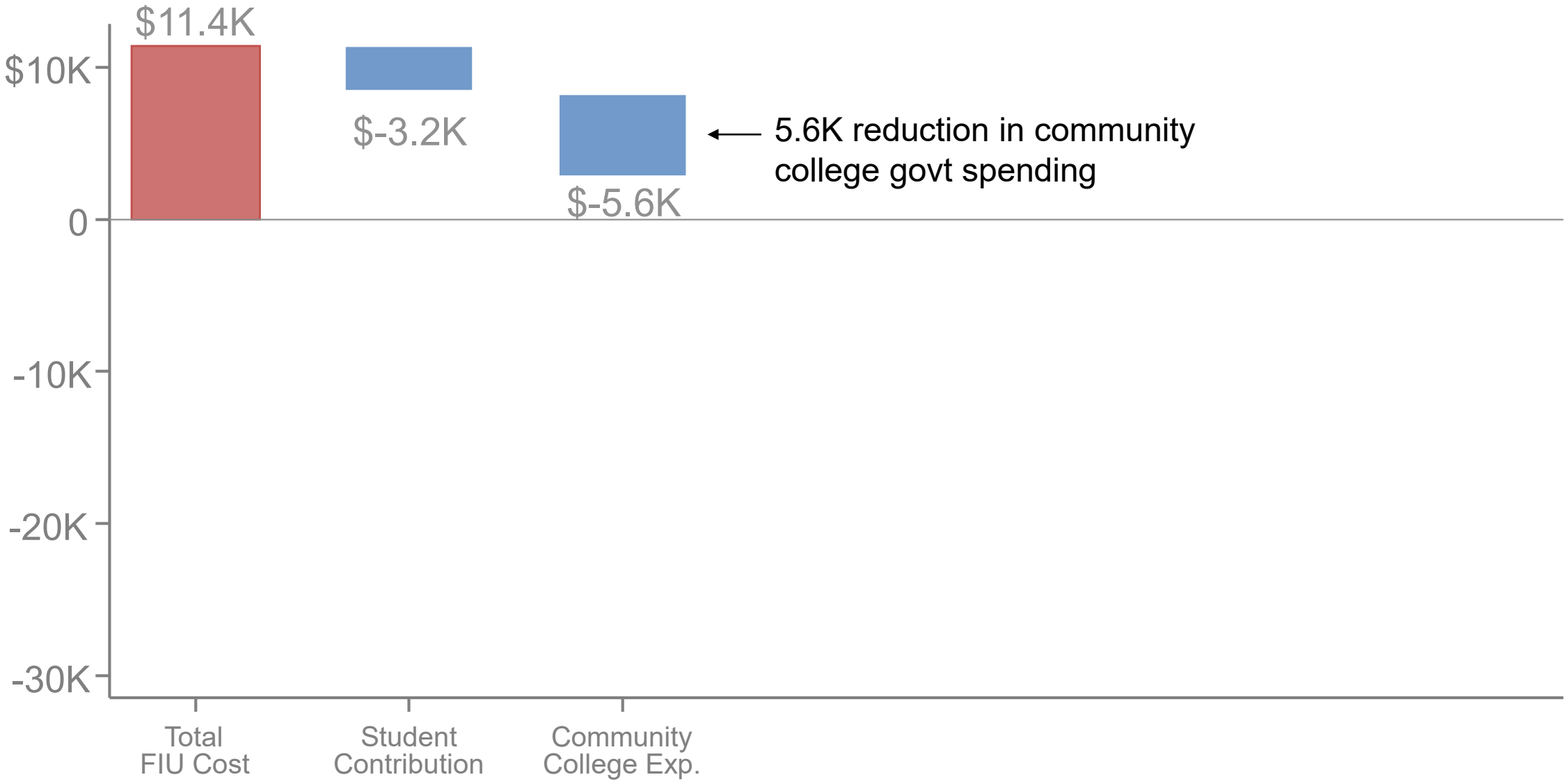

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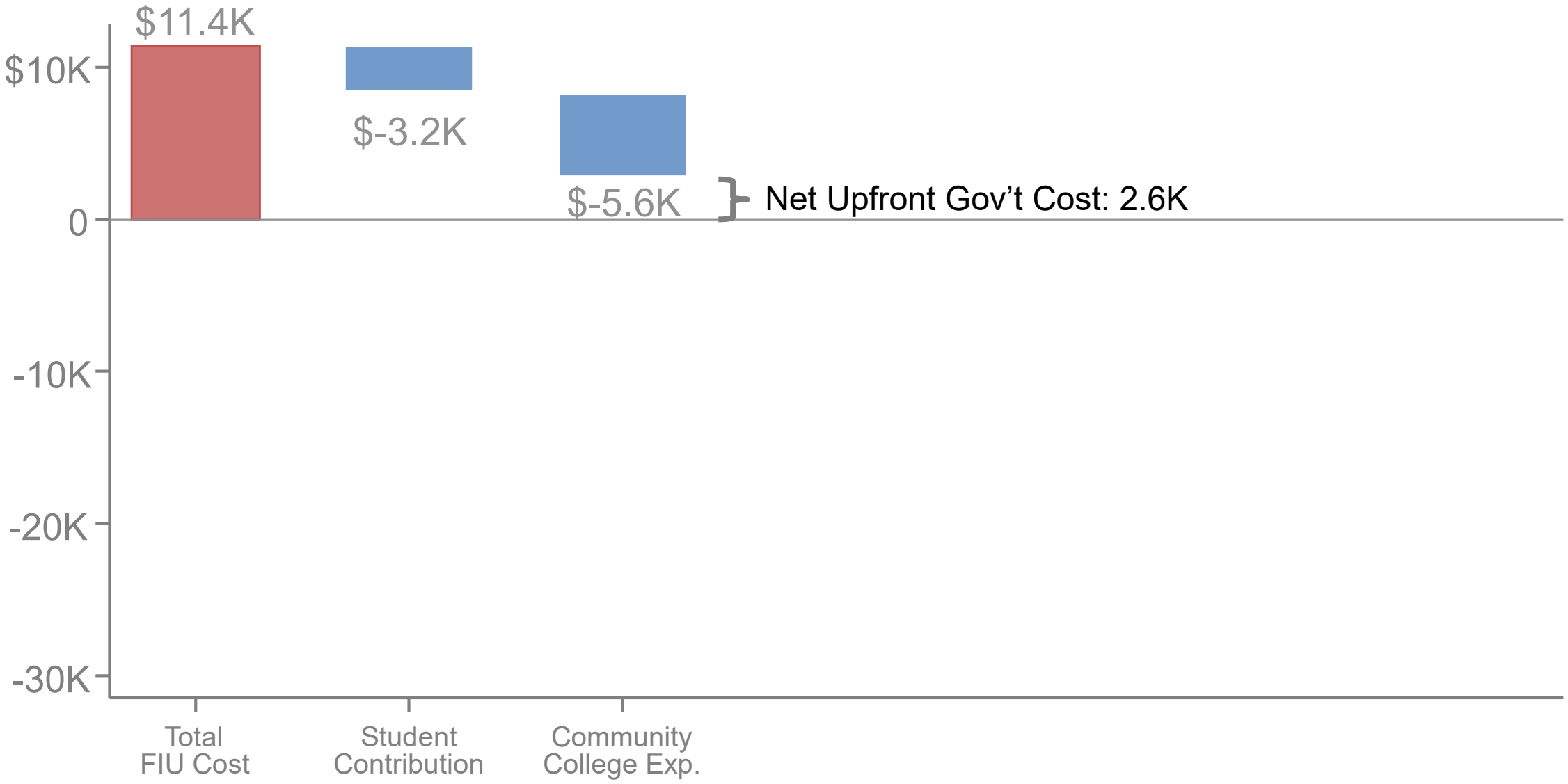

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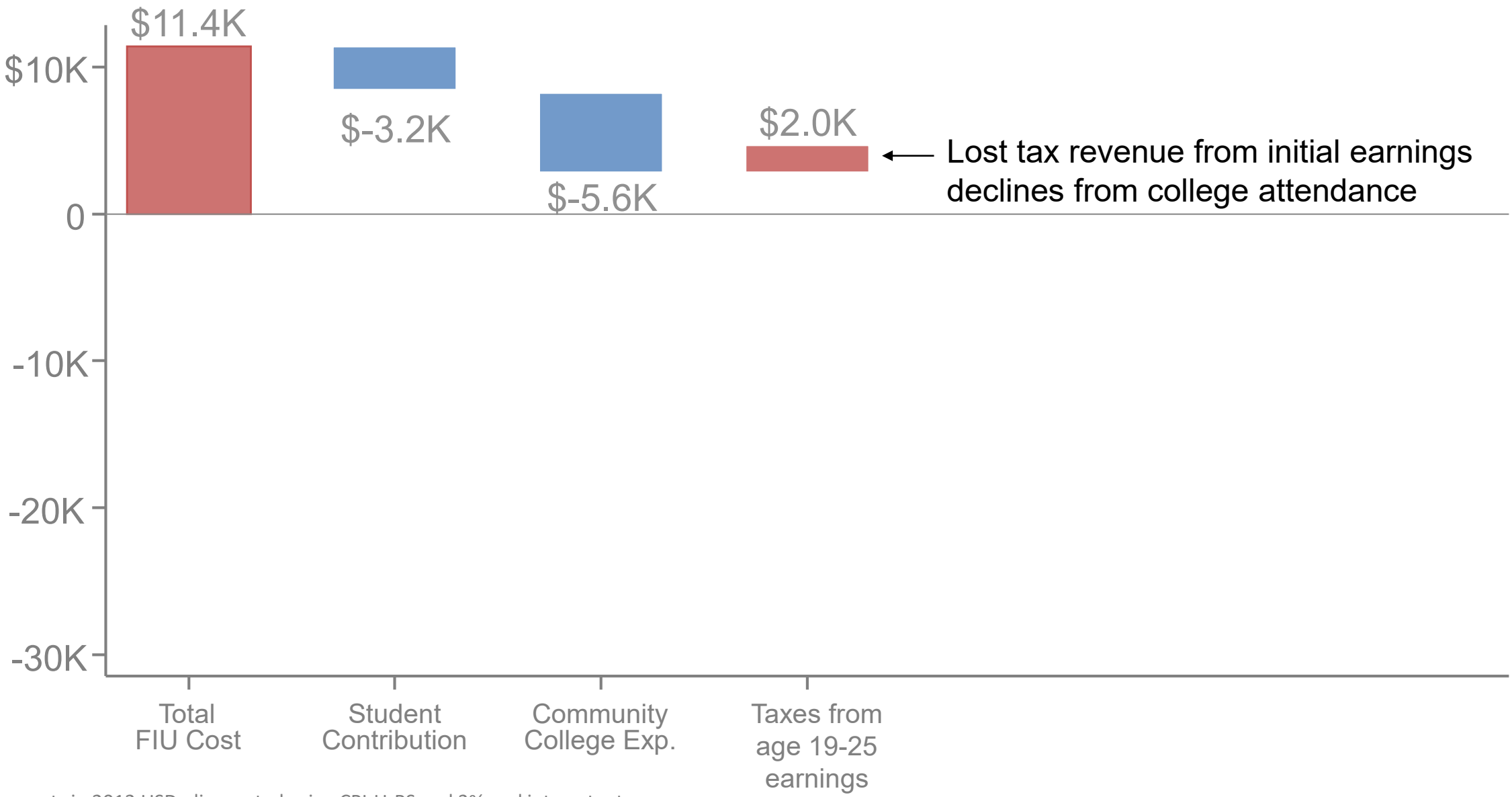

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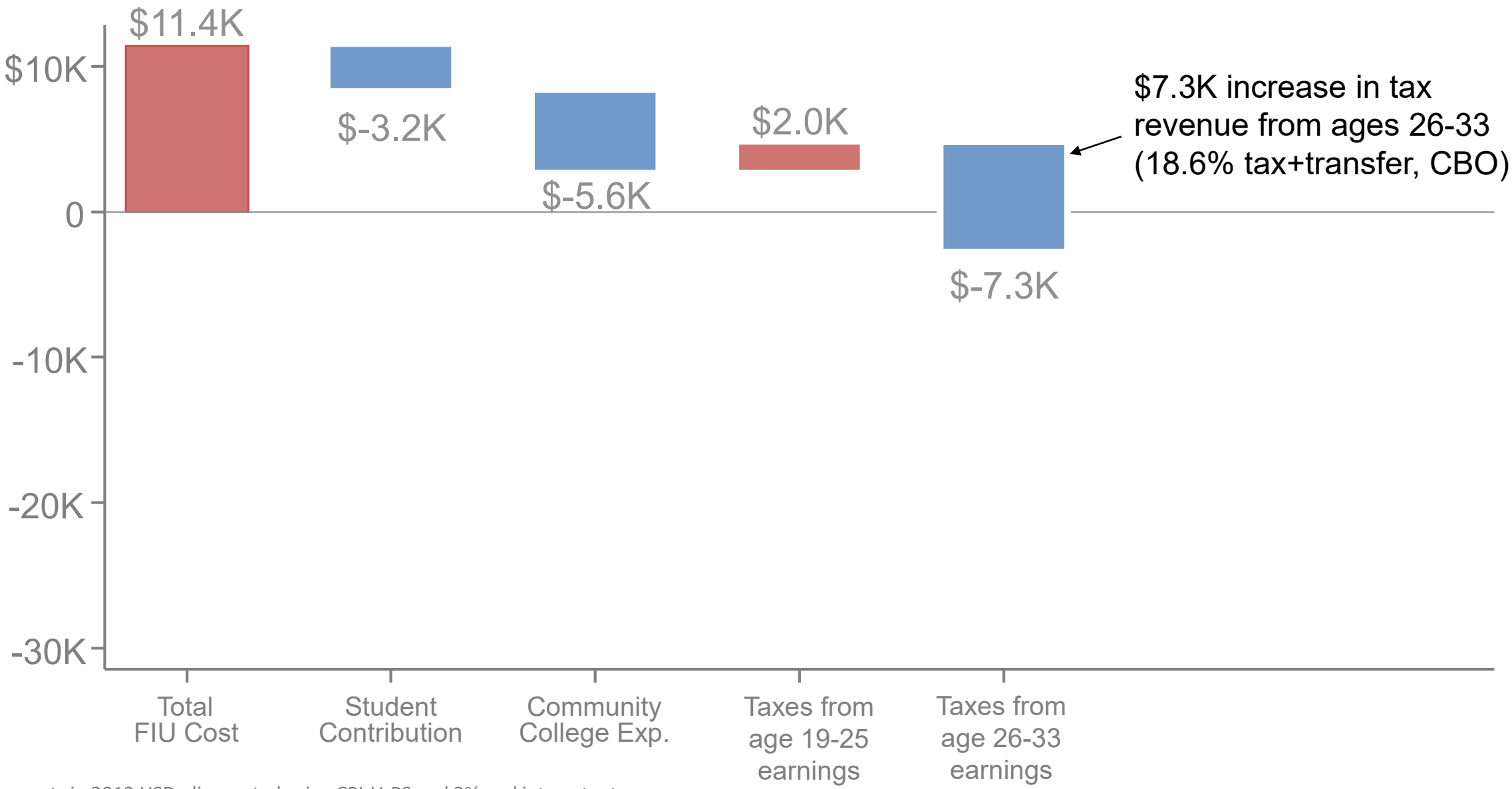

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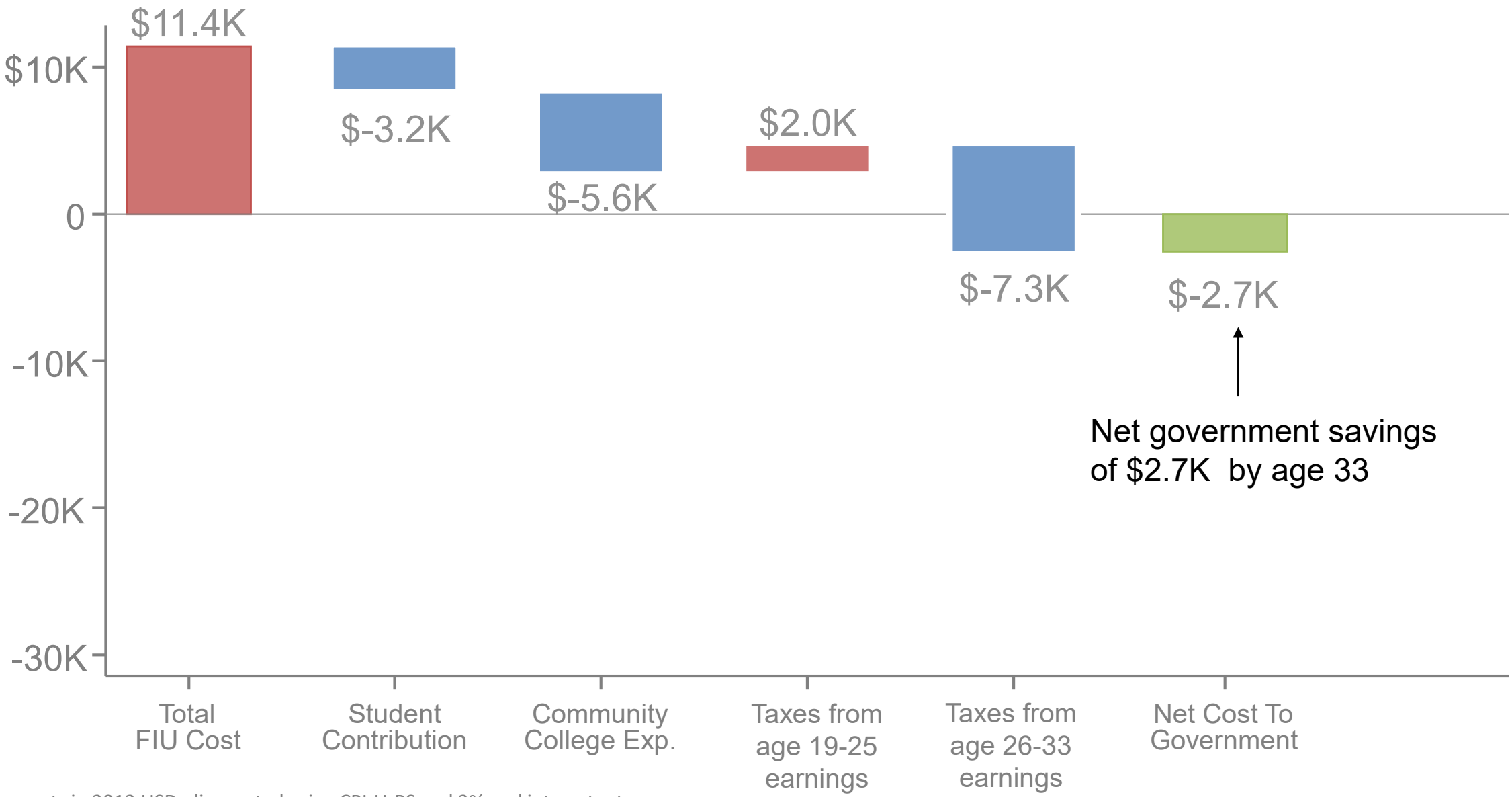

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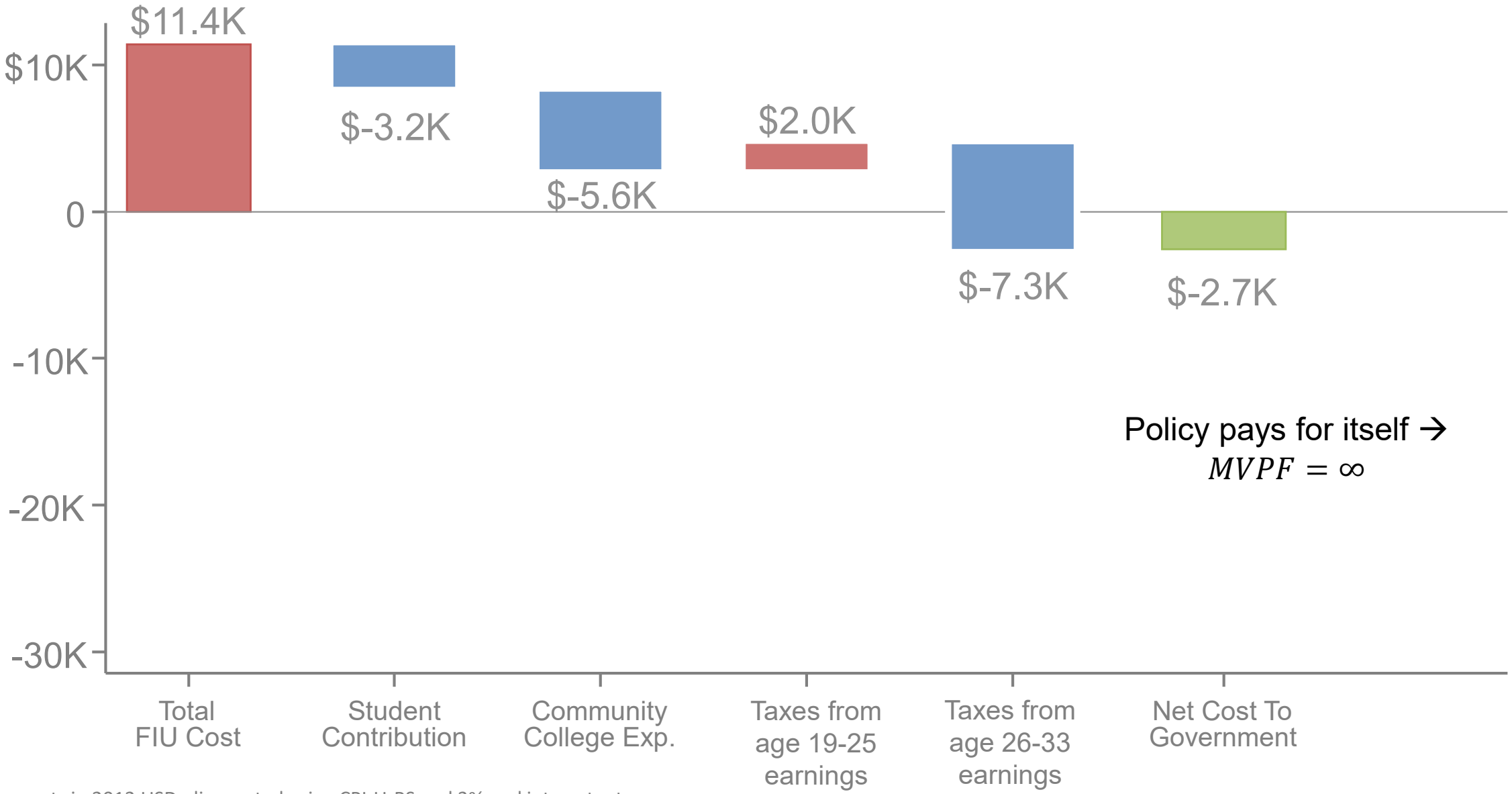

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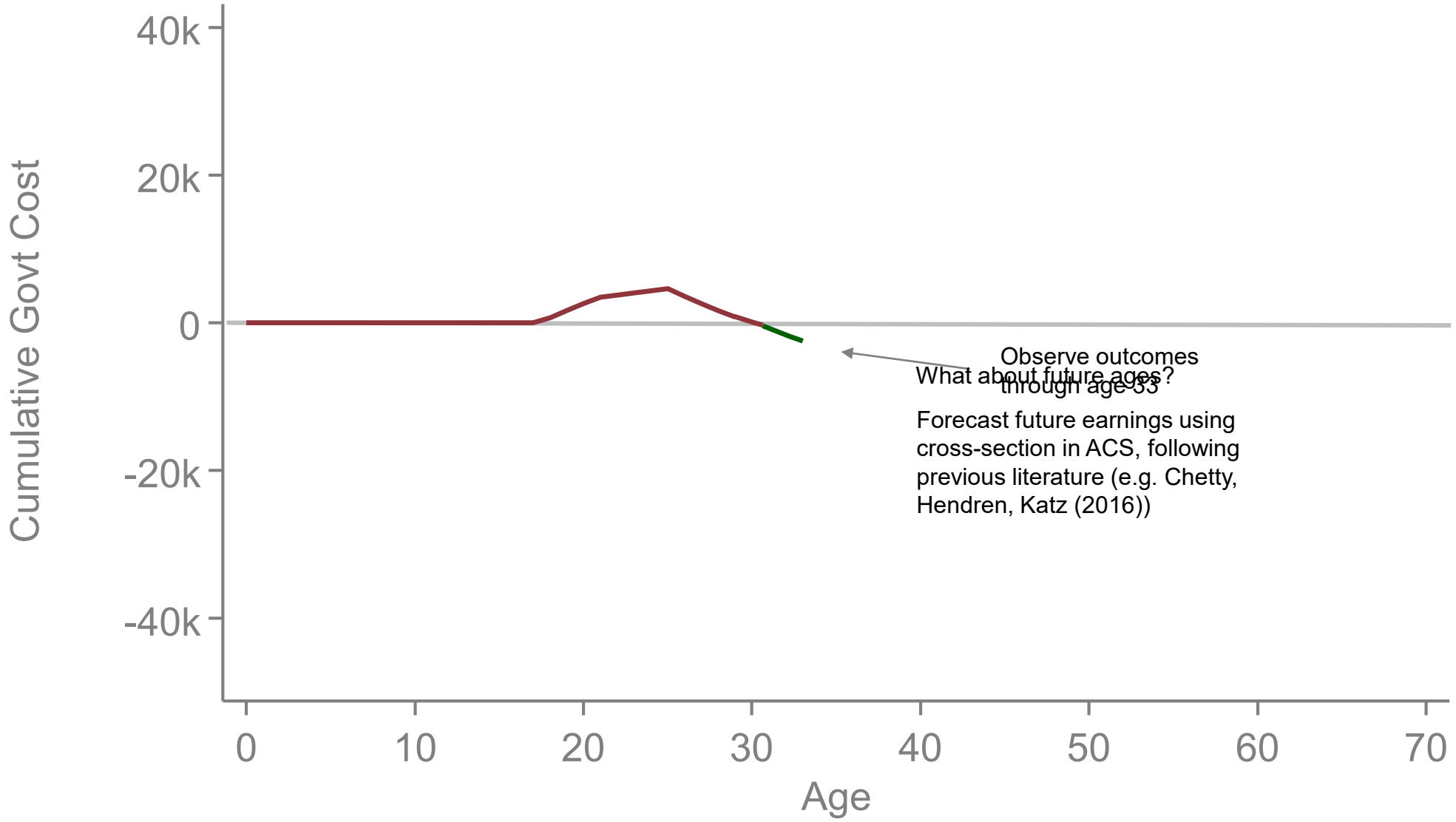
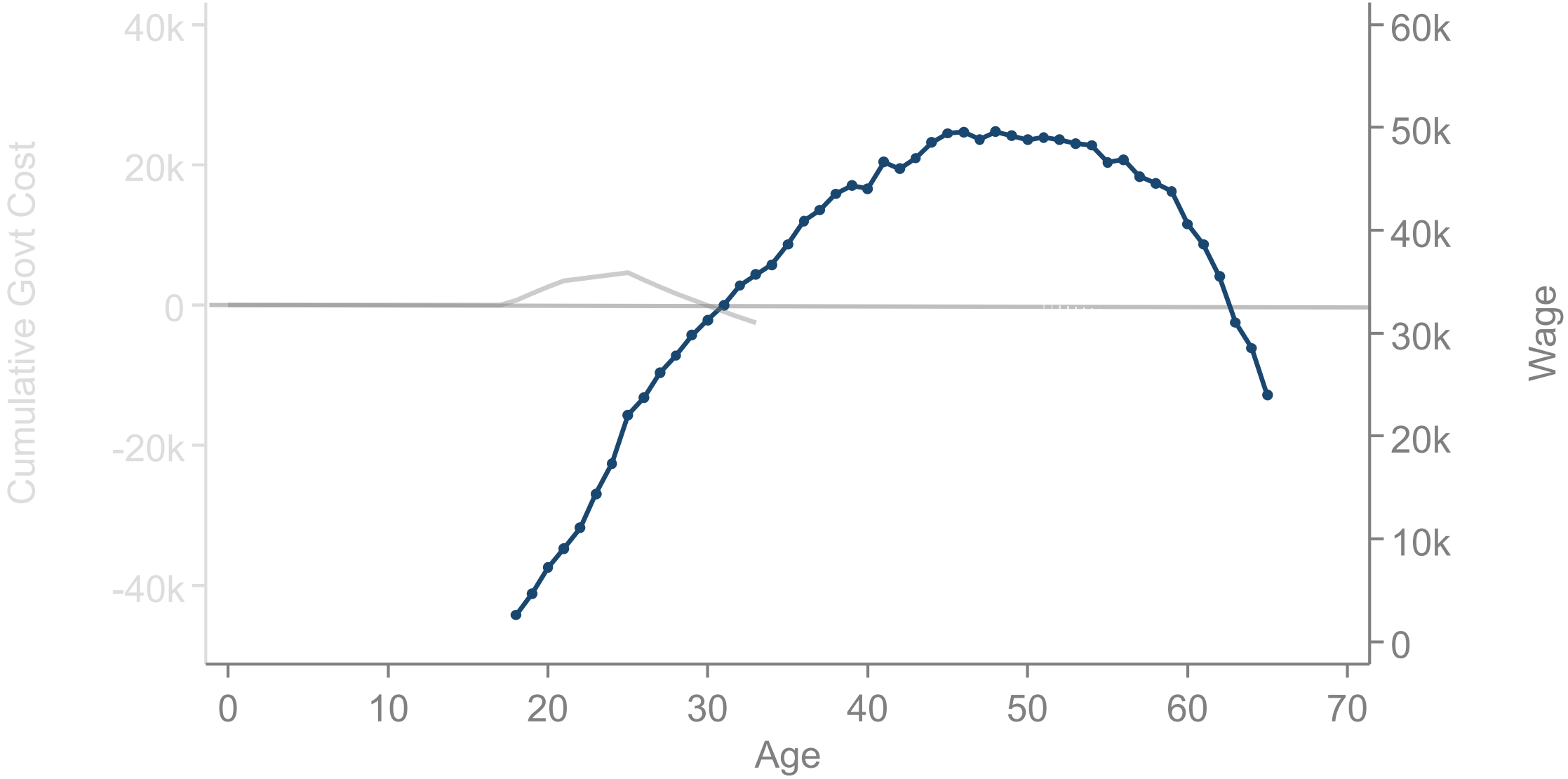
Net Cost by Age to Government of Admission to Florida International University



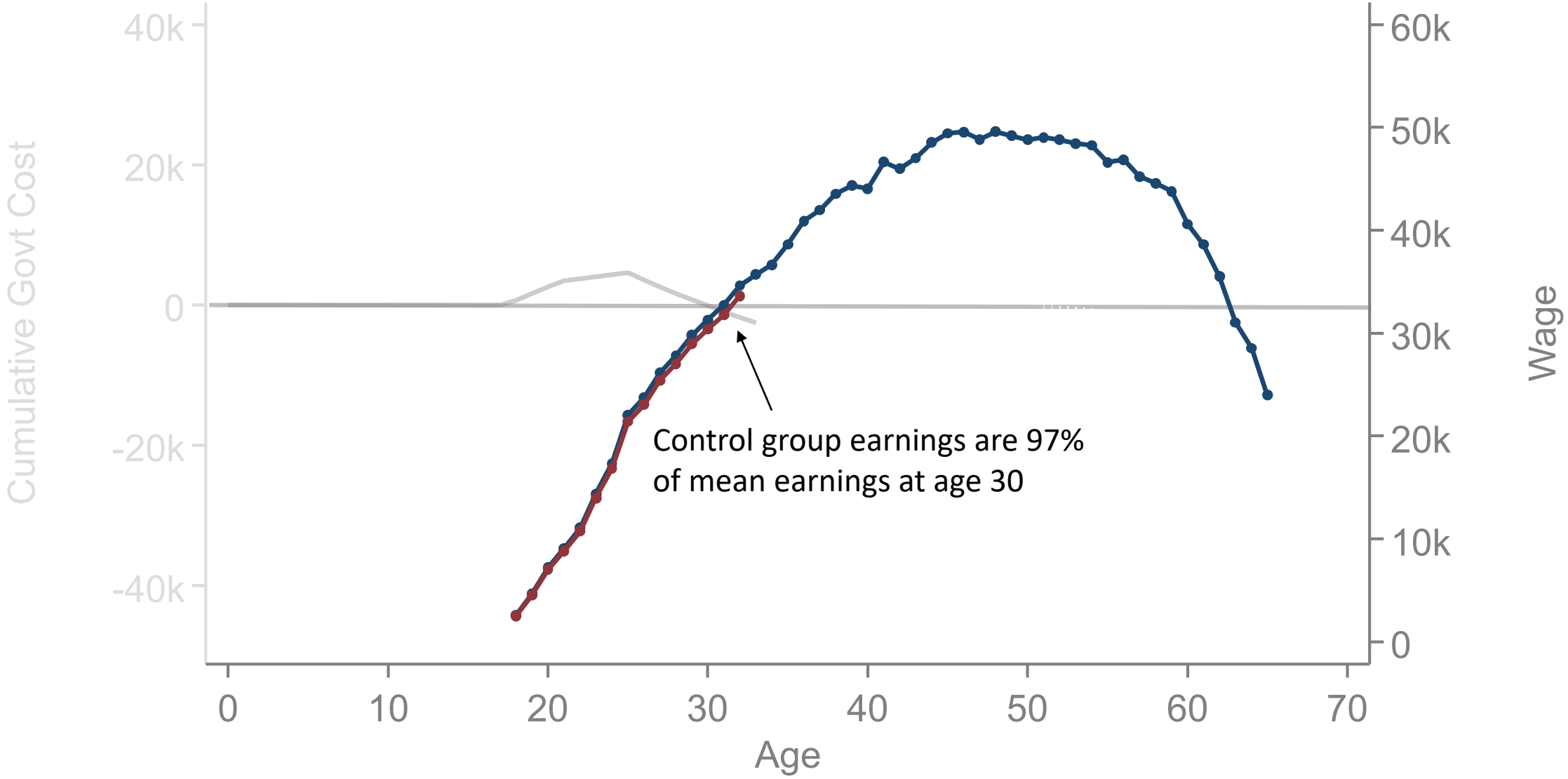
Forecasting Future Earnings using the Cross-sectional Age Distribution

Mean 2015 ACS Earnings by Age with 0.5% Growth



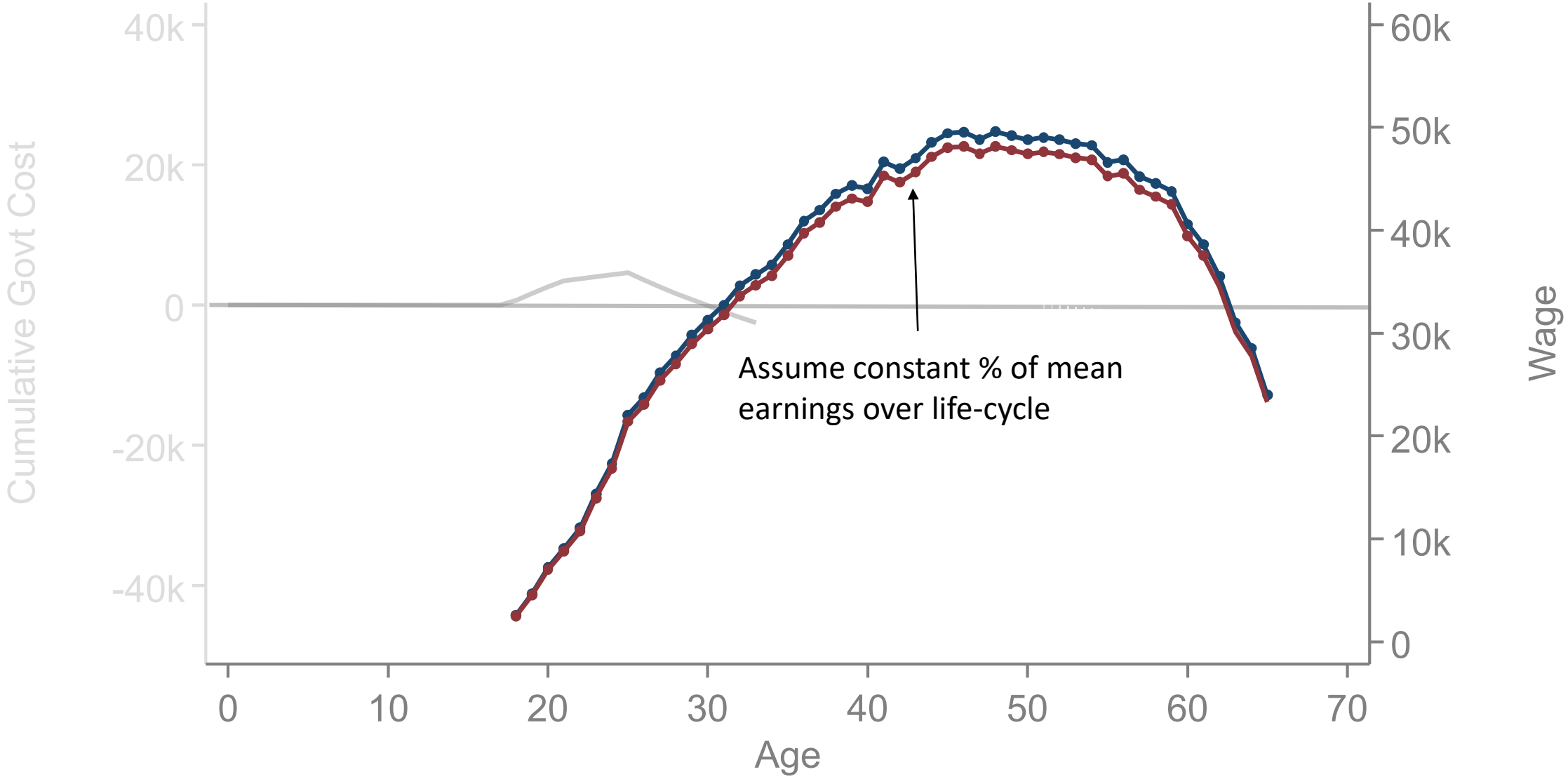
Forecasting Future Earnings using the Cross-sectional Age Distribution

Control Group Earnings



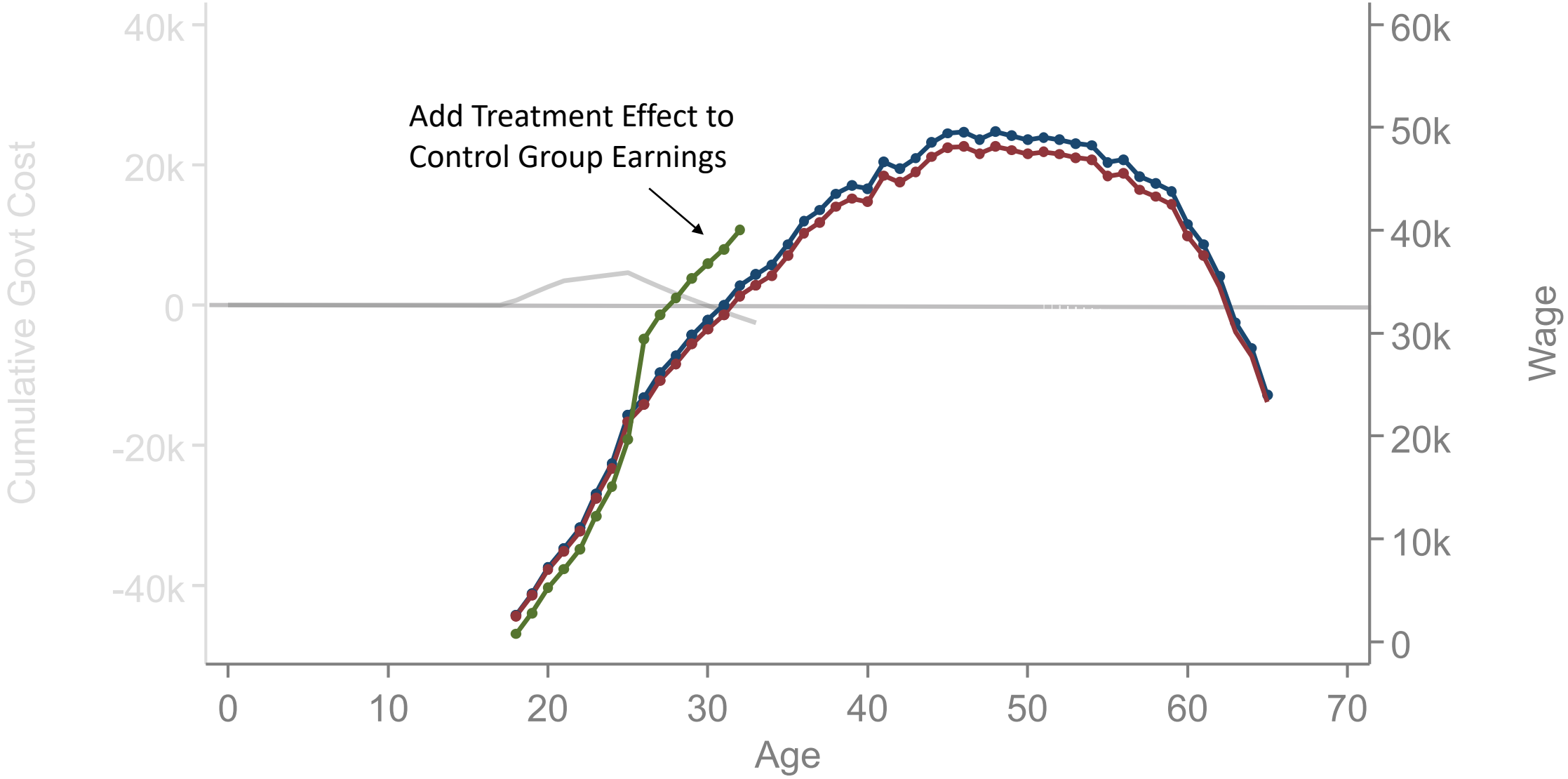
Forecasting Future Earnings using the Cross-sectional Age Distribution

Control Group Forecast



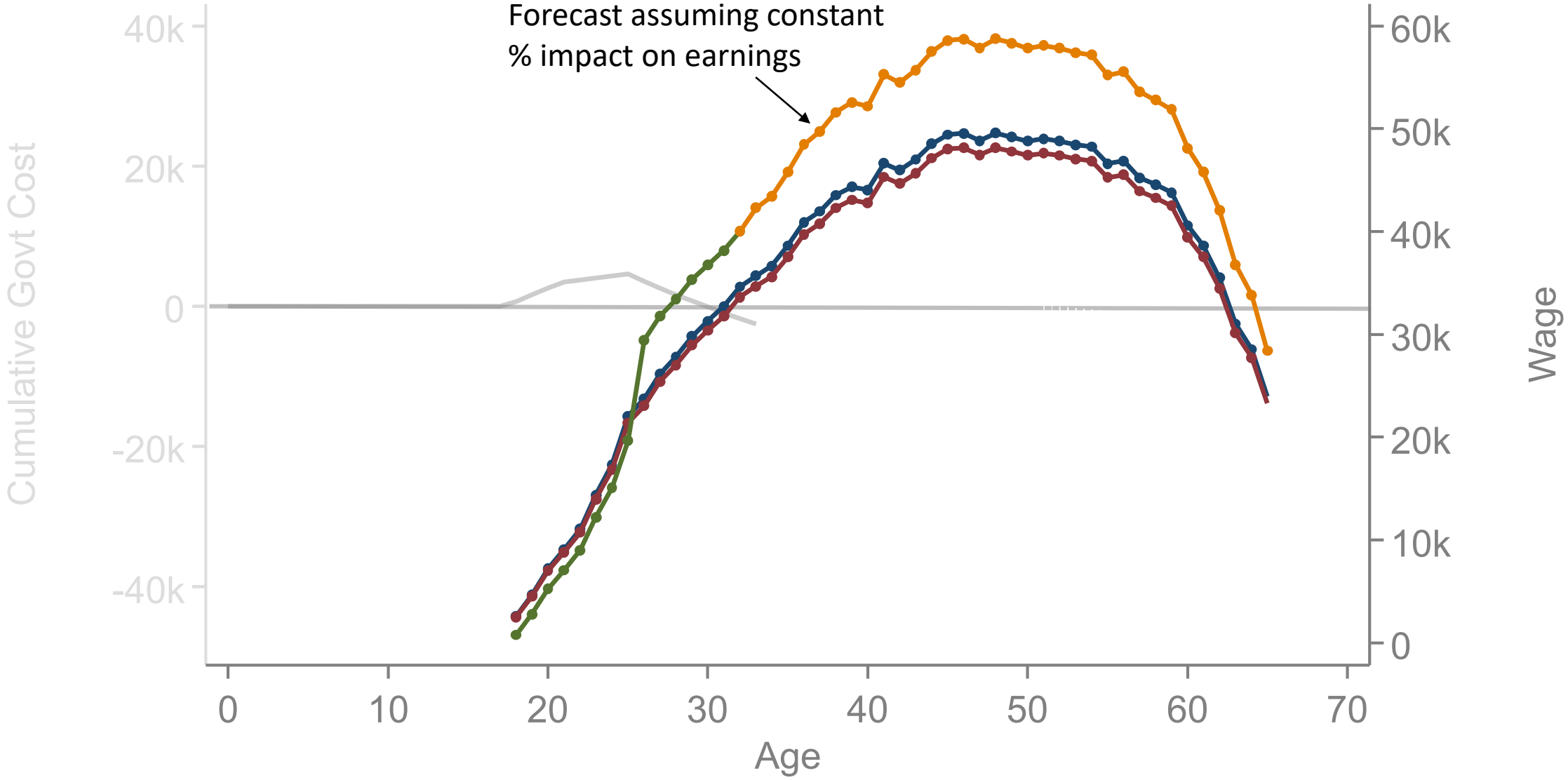
Forecasting Future Earnings using the Cross-sectional Age Distribution

Control Group Earnings + Treatment Effect



Forecasting Future Earnings using the Cross-sectional Age Distribution

Treatment Group Forecast



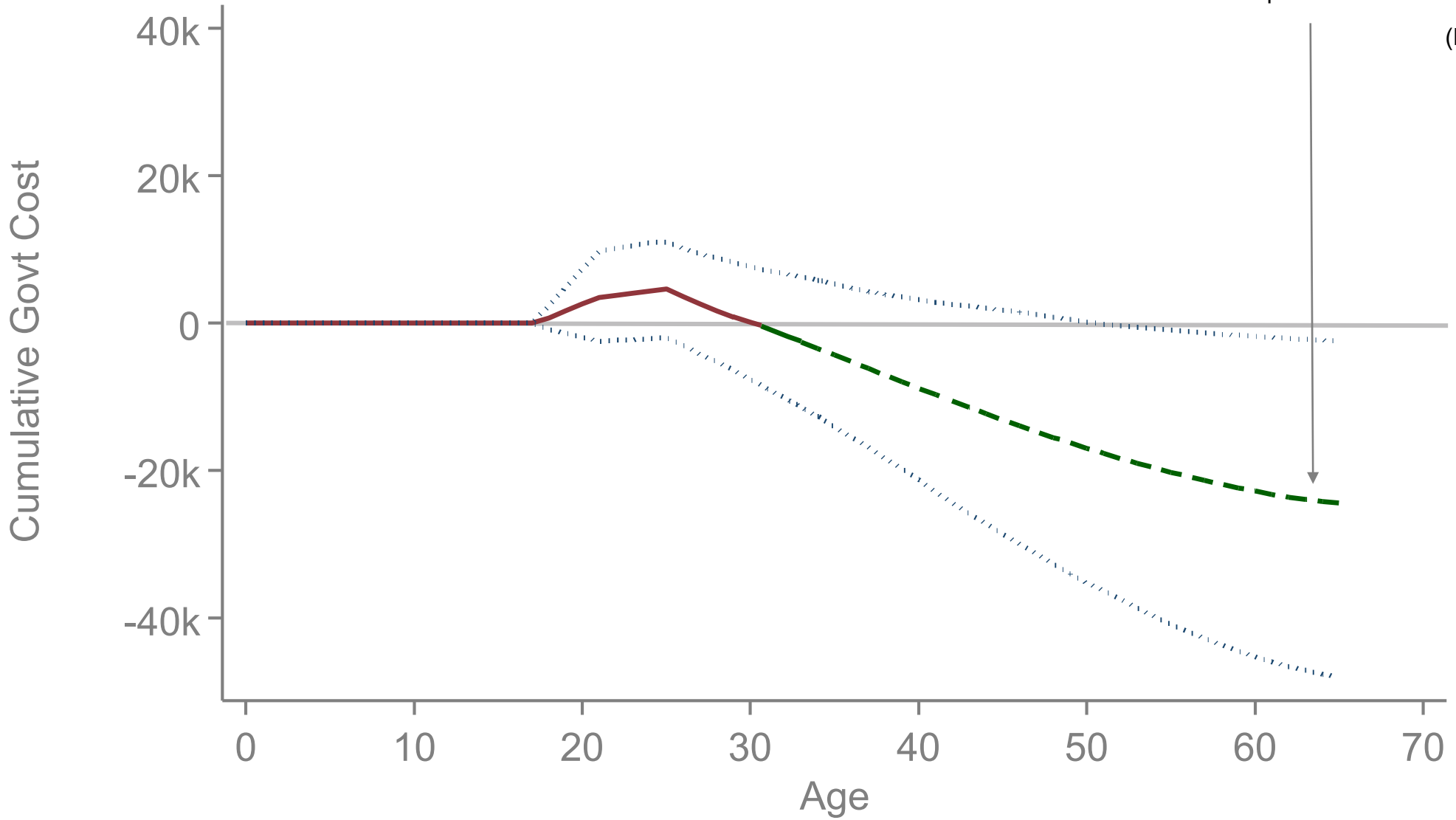
Net Cost by Age to Government of Admission to Florida International University

Forecasting Future Tax/Transfer Revenue

Original $11.4K cost returns $24.4K to the government over the person's lifetime

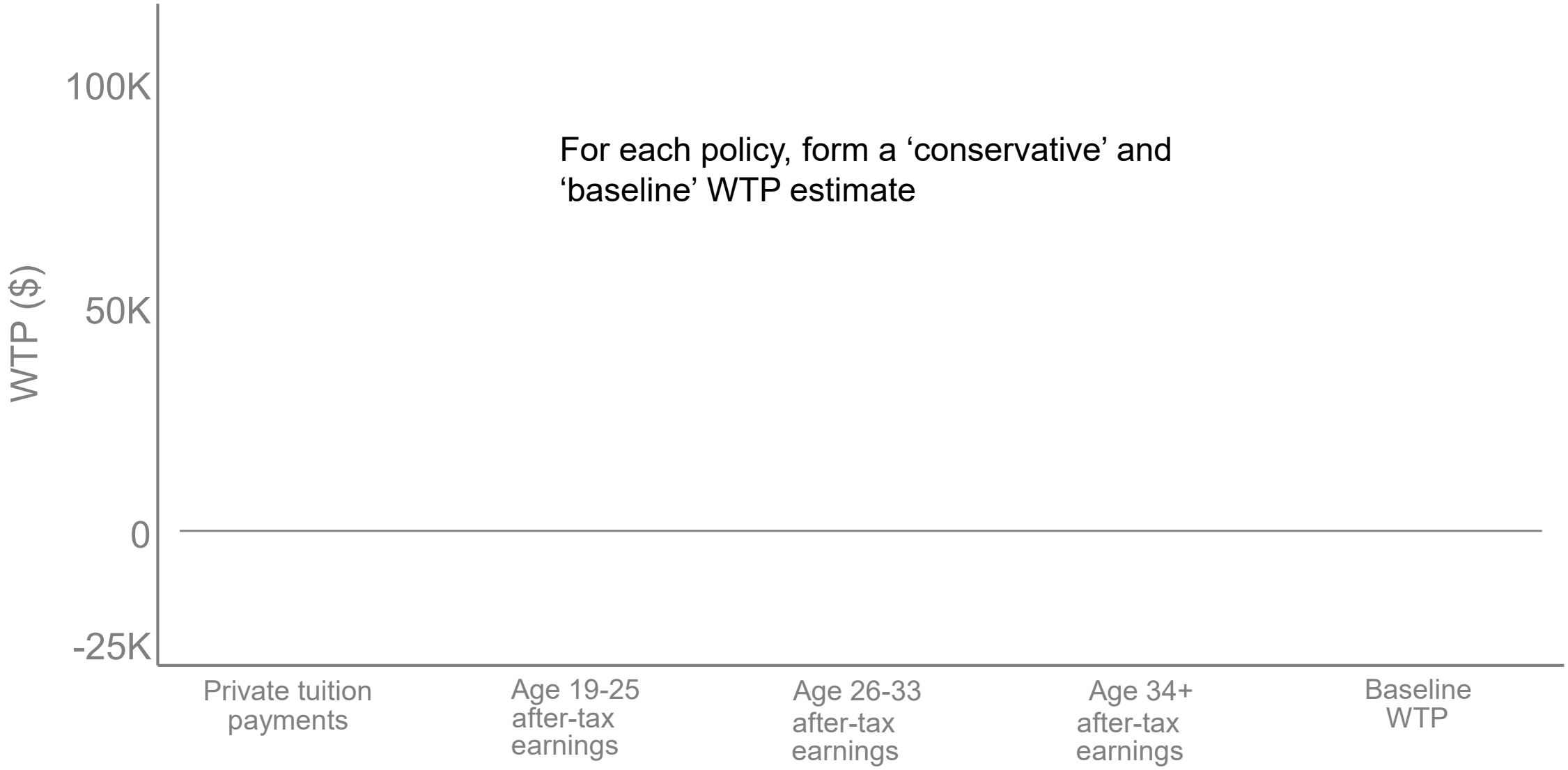
$$MVPF = \infty$$

(Regardless of WTP)



Willingness to Pay for Admission into Florida International University

Baseline WTP



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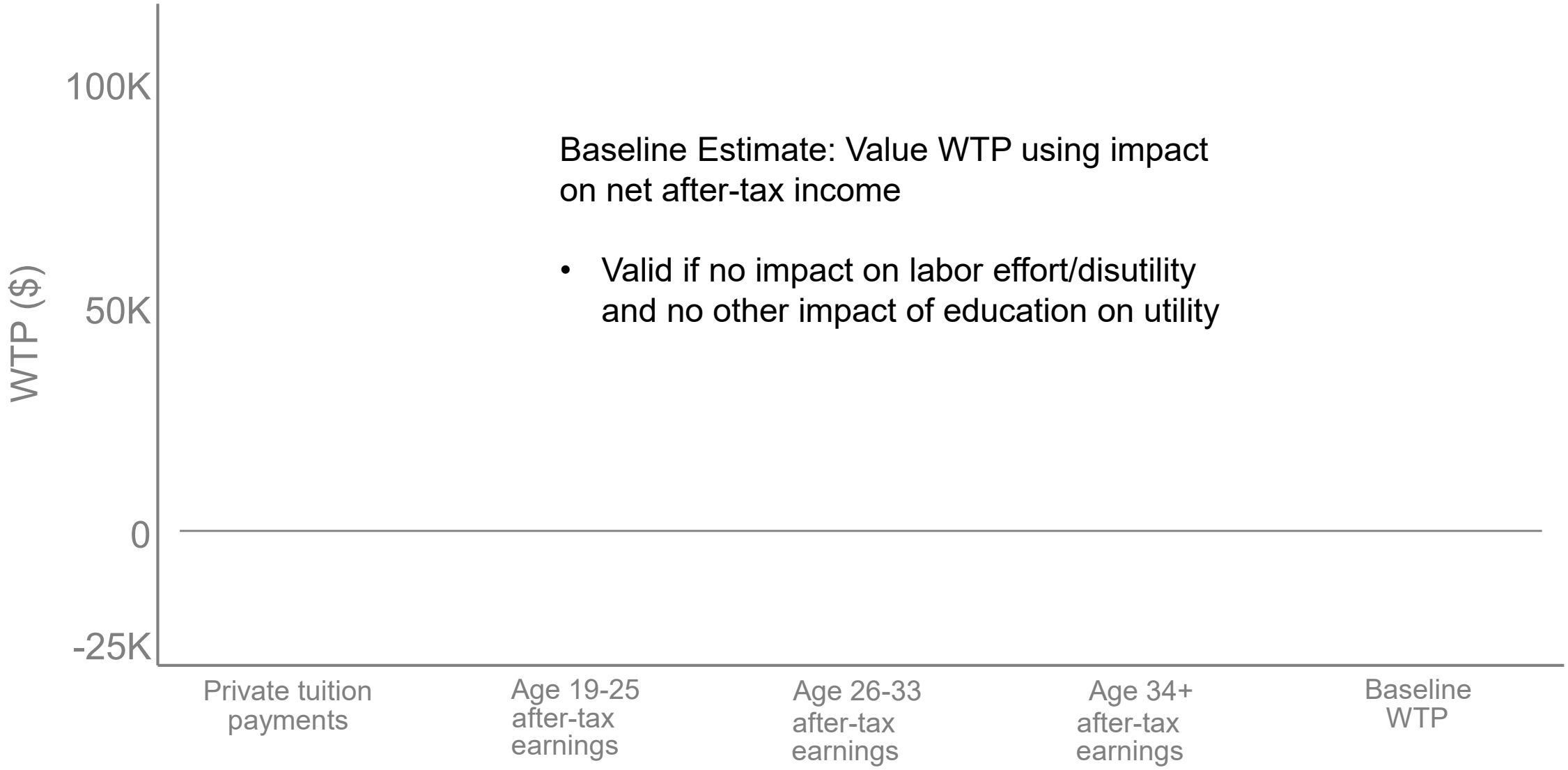

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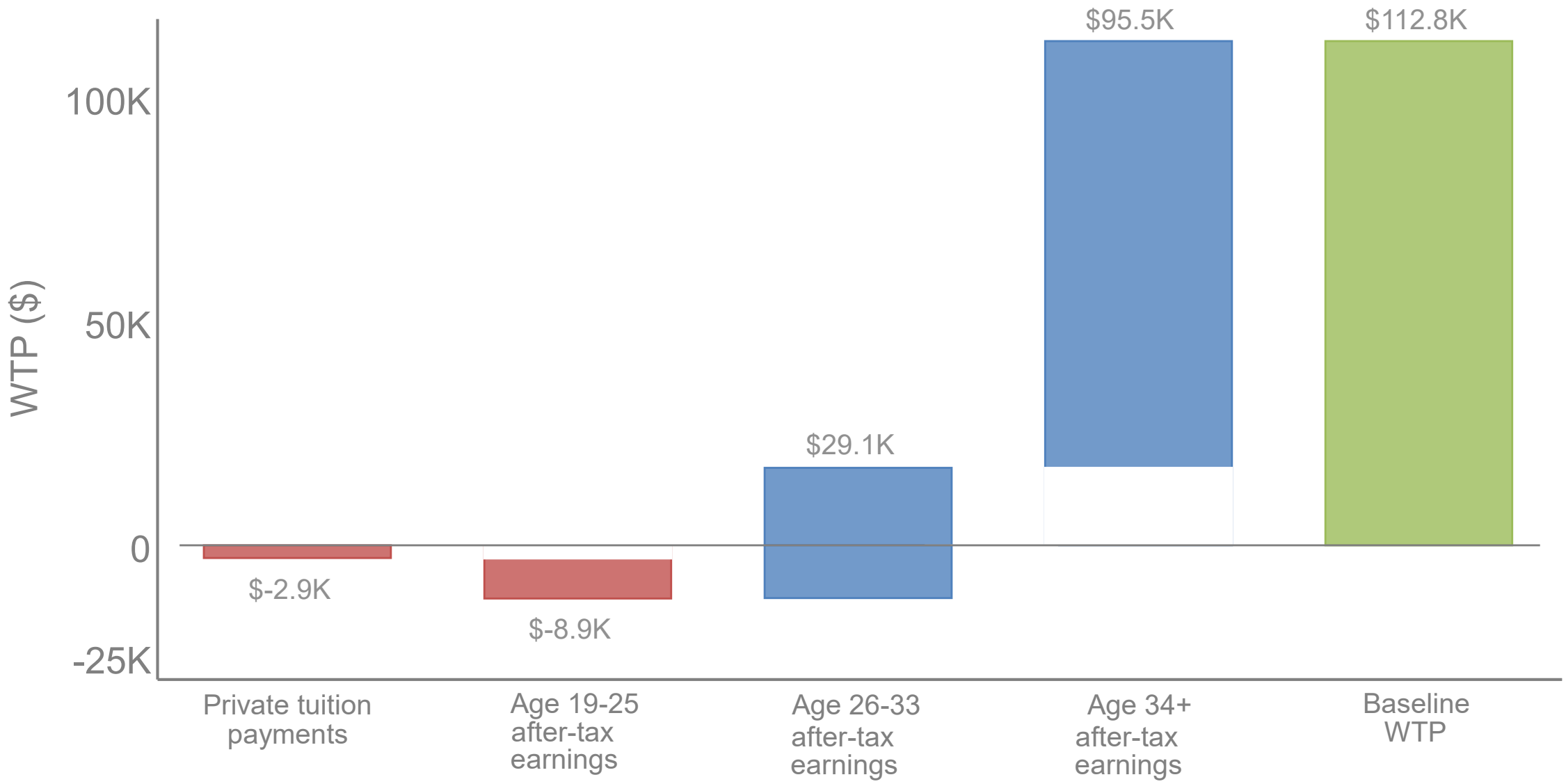

Outline

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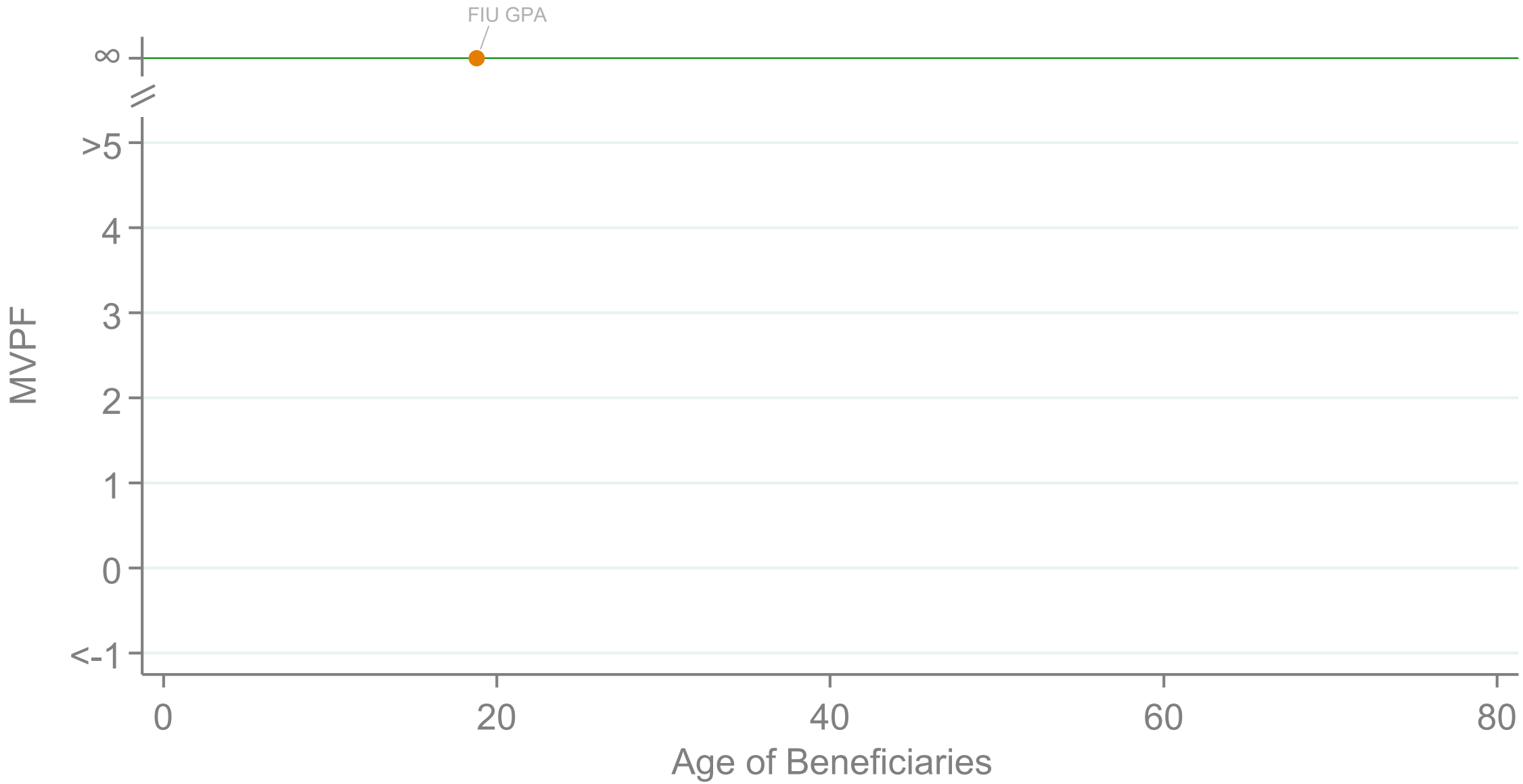
Medicaid Example from Miller and Wherry (2018)

Direct Investments in Children Historically Had Highest MVPFs



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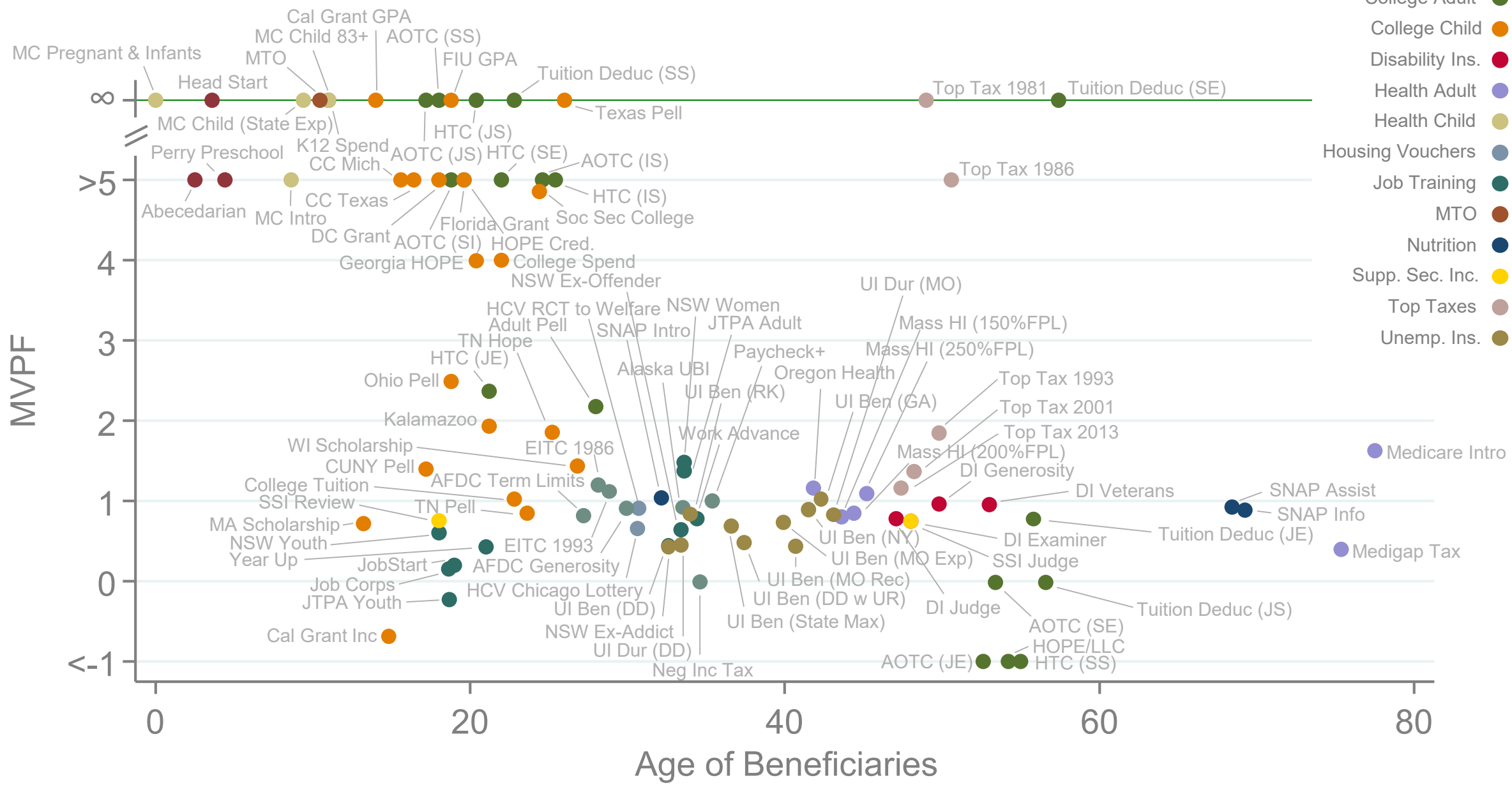

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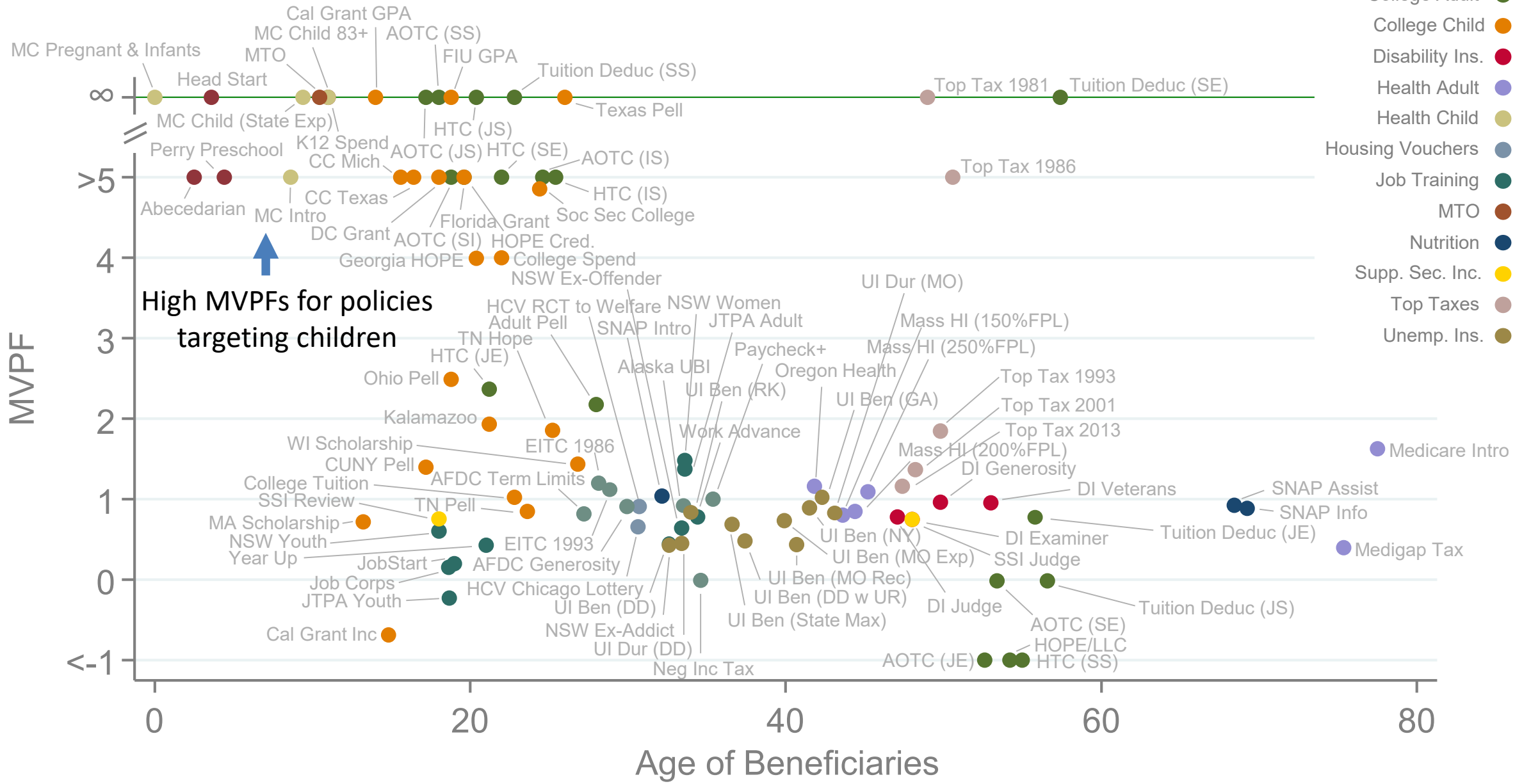

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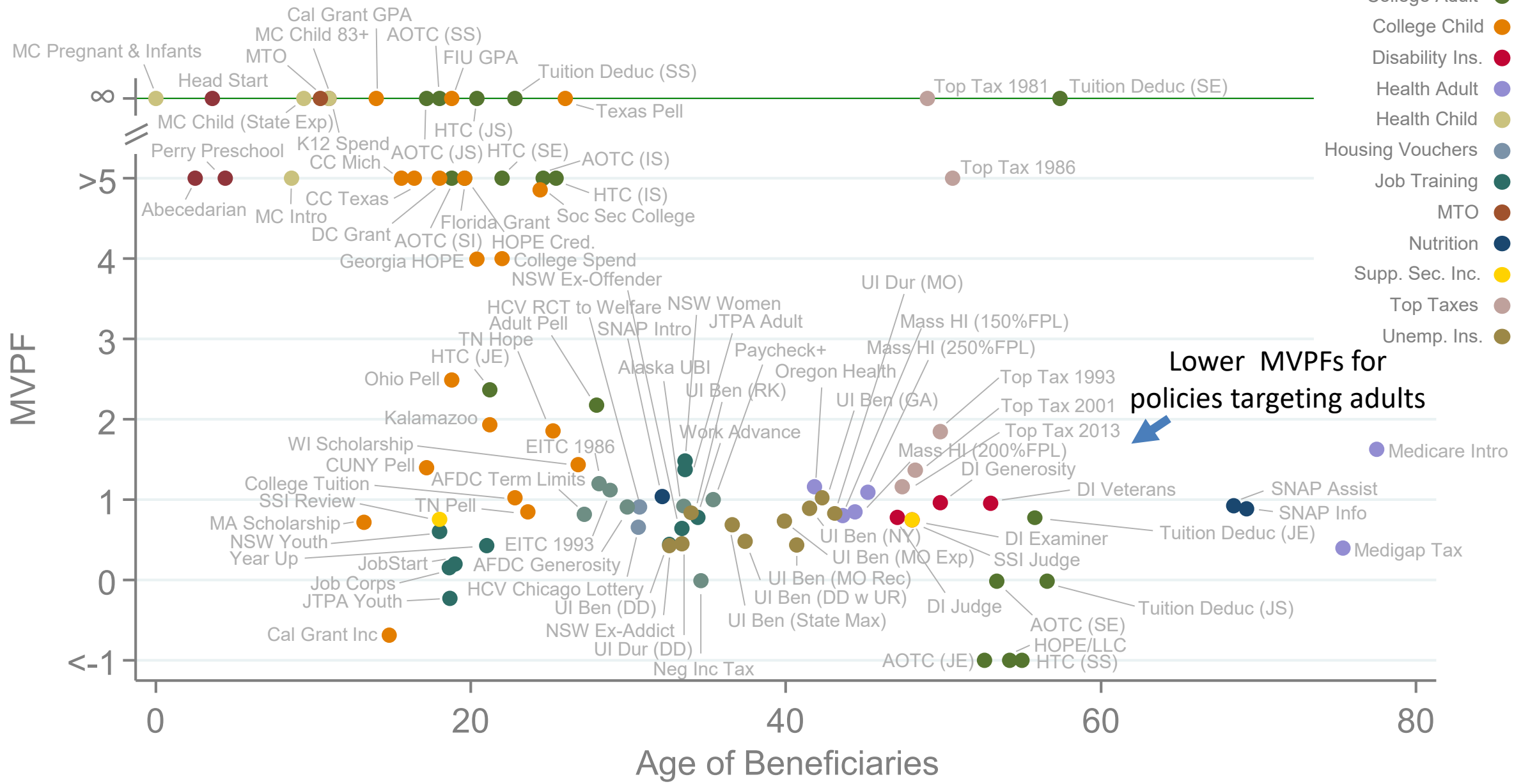
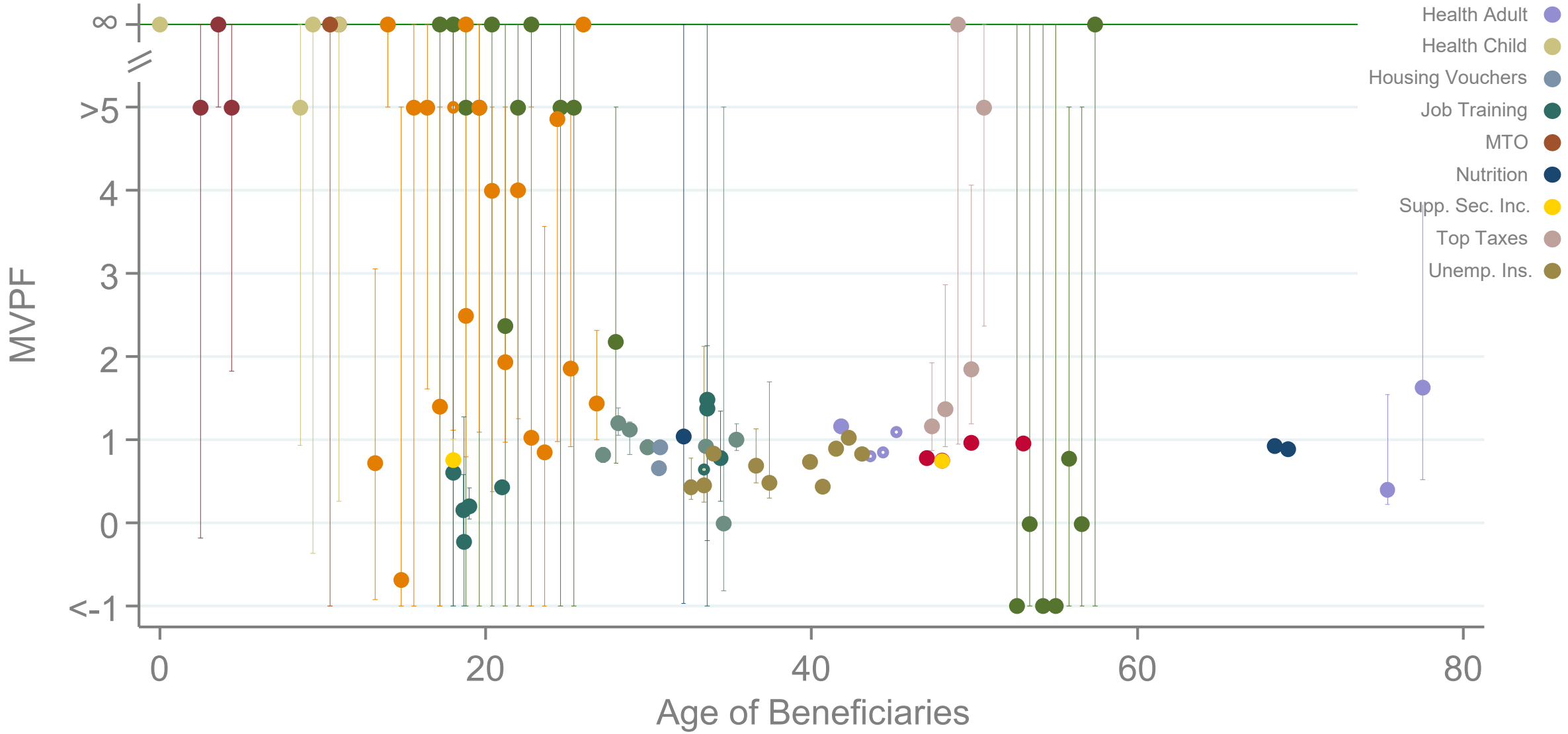
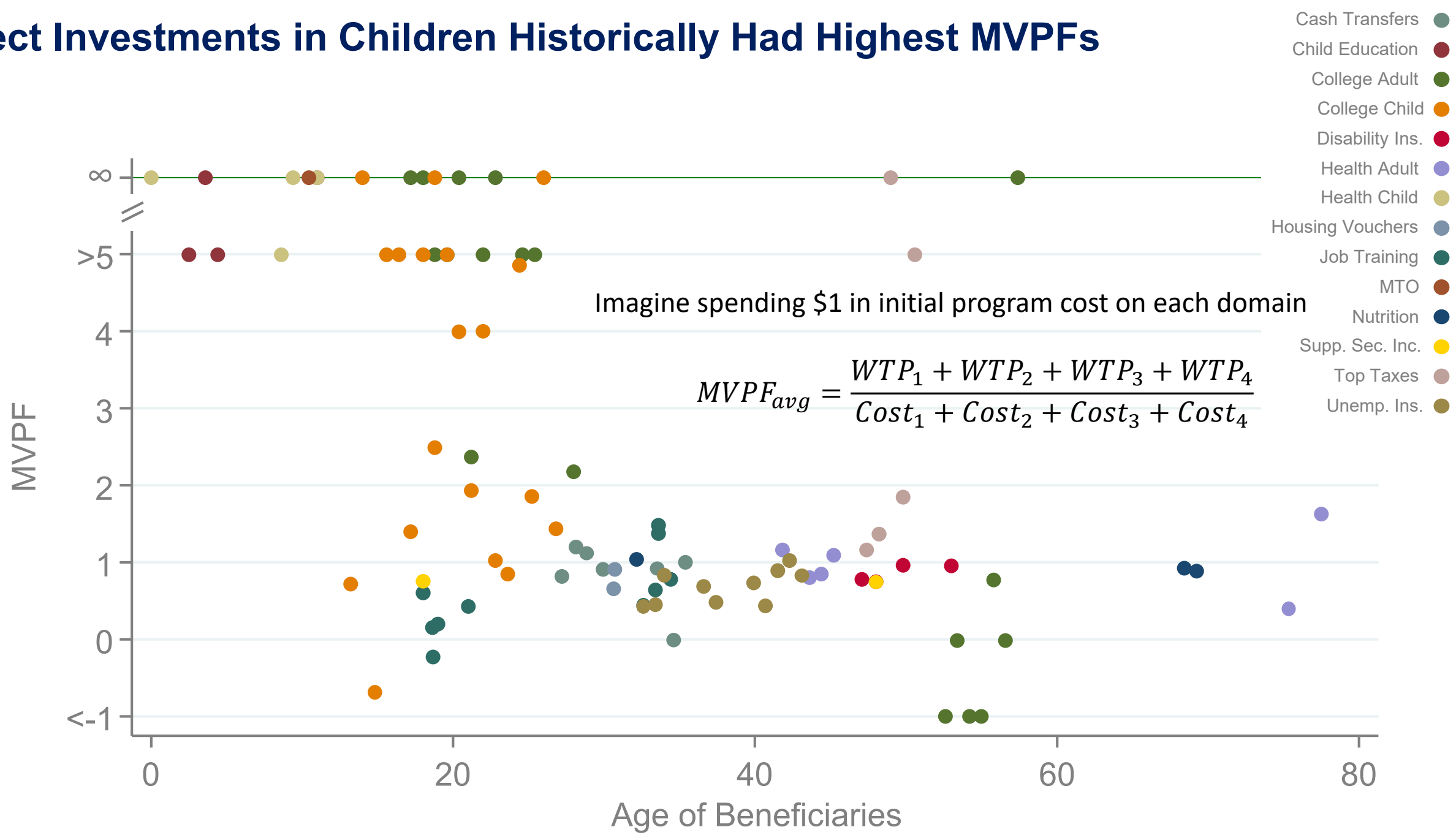


Direct Investments in Children Historically Had Highest MVPFs

With 95% Confidence Intervals Computed via Modified Bootstrap

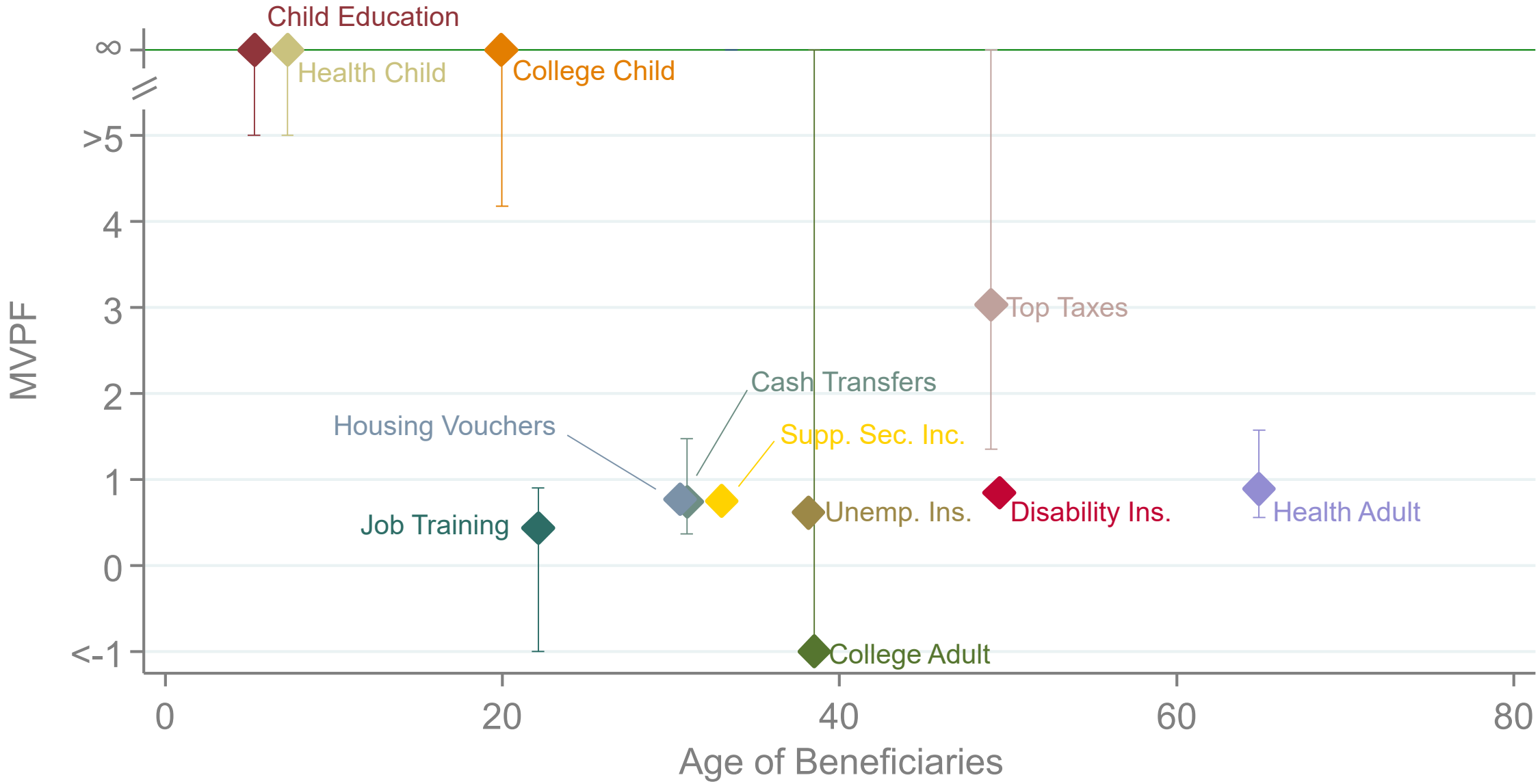


Direct Investments in Children Historically Had Highest MVPFs



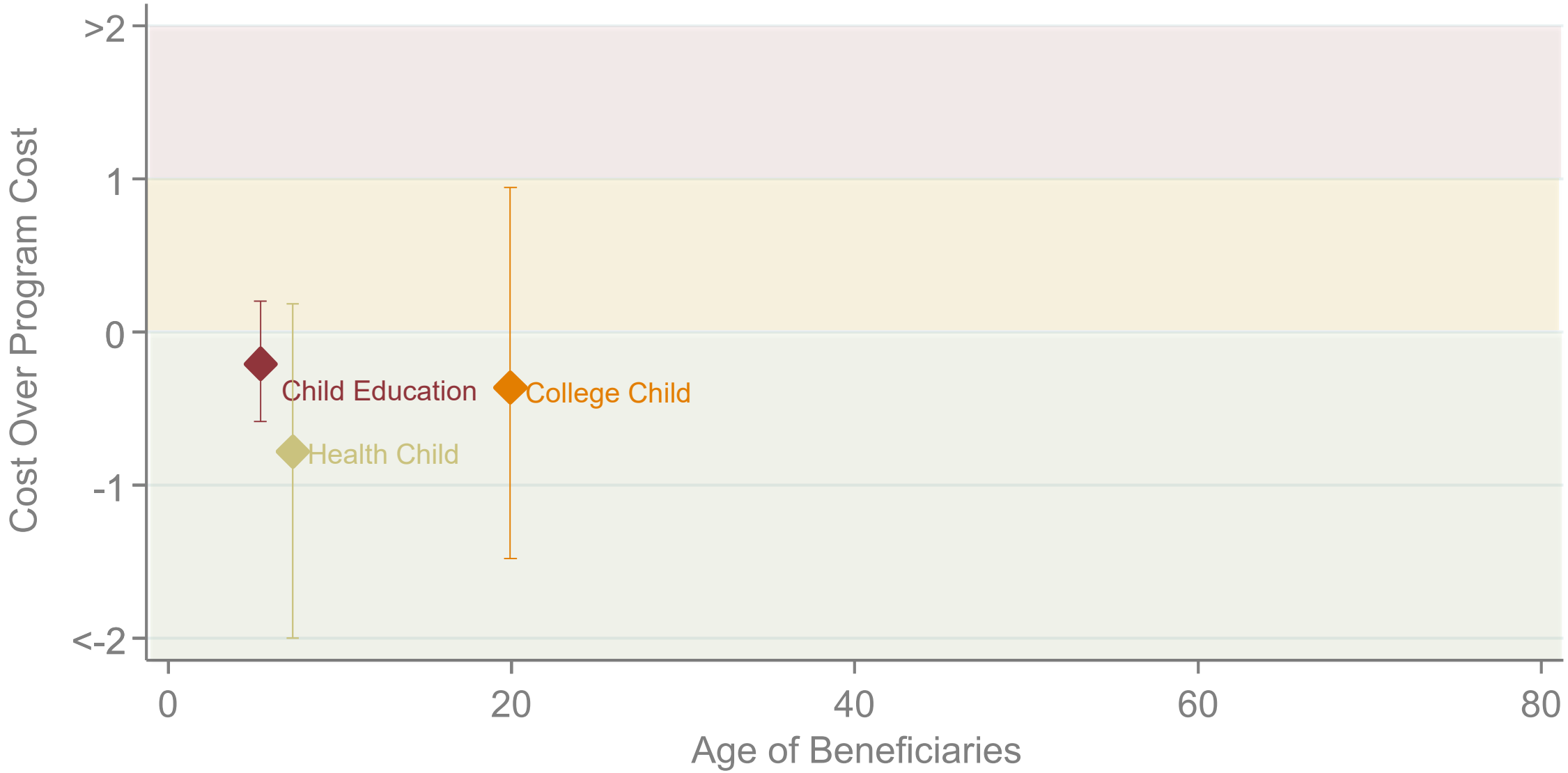
Direct Investments in Children Historically Had Highest MVPFs

Category Averages



Net Costs to Government per $1 of Initial Expenditure

Category Averages



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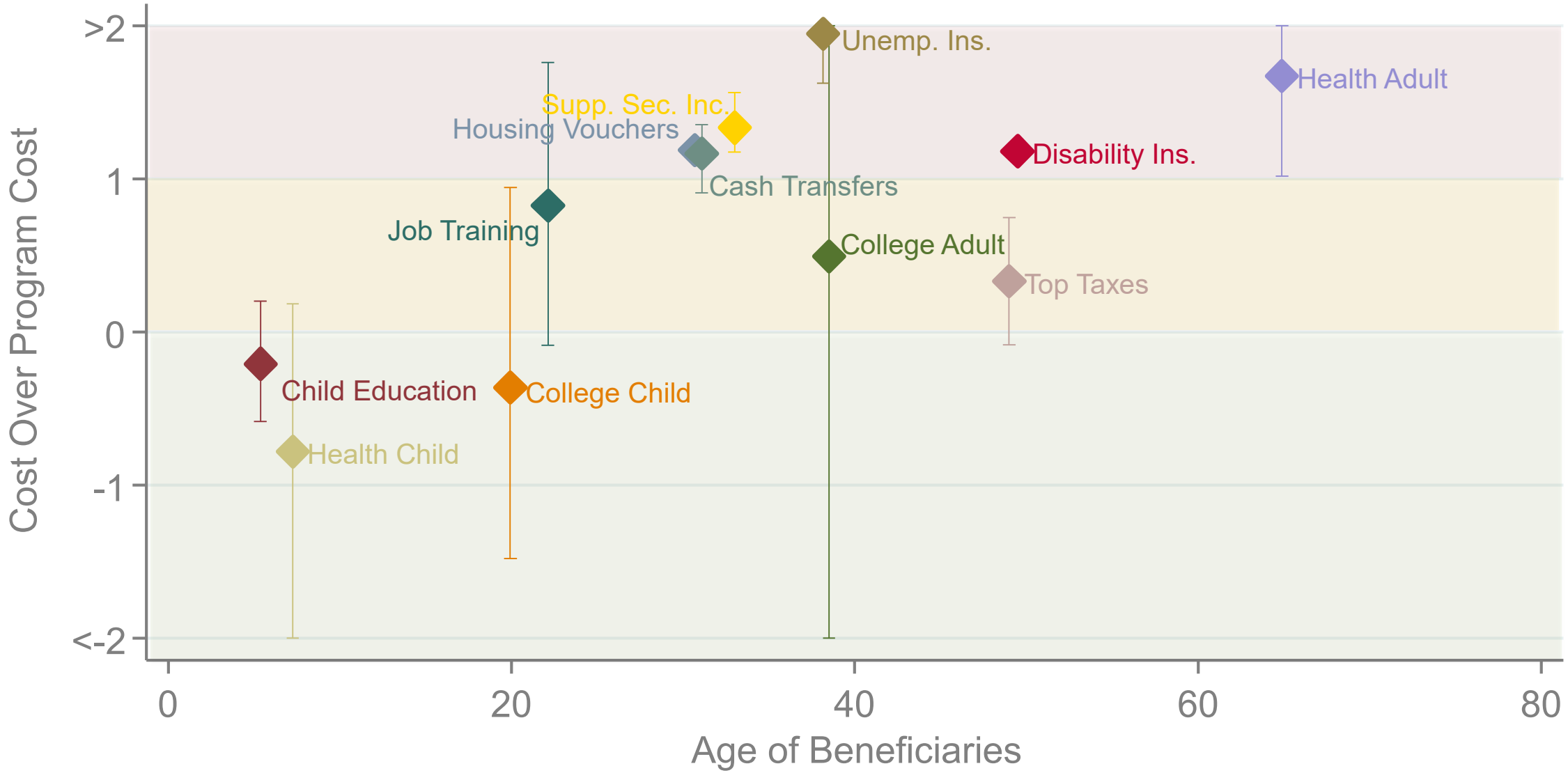
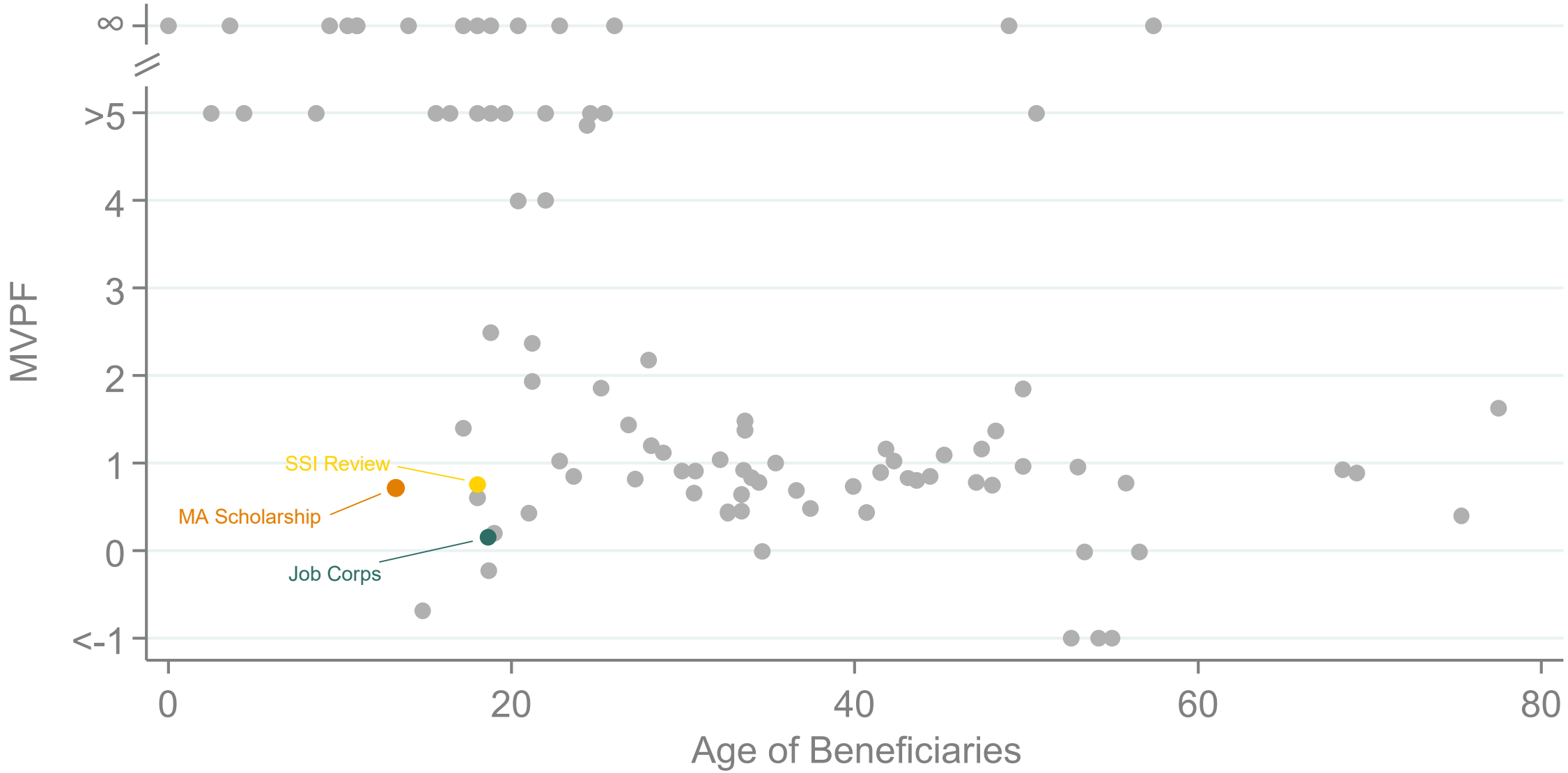
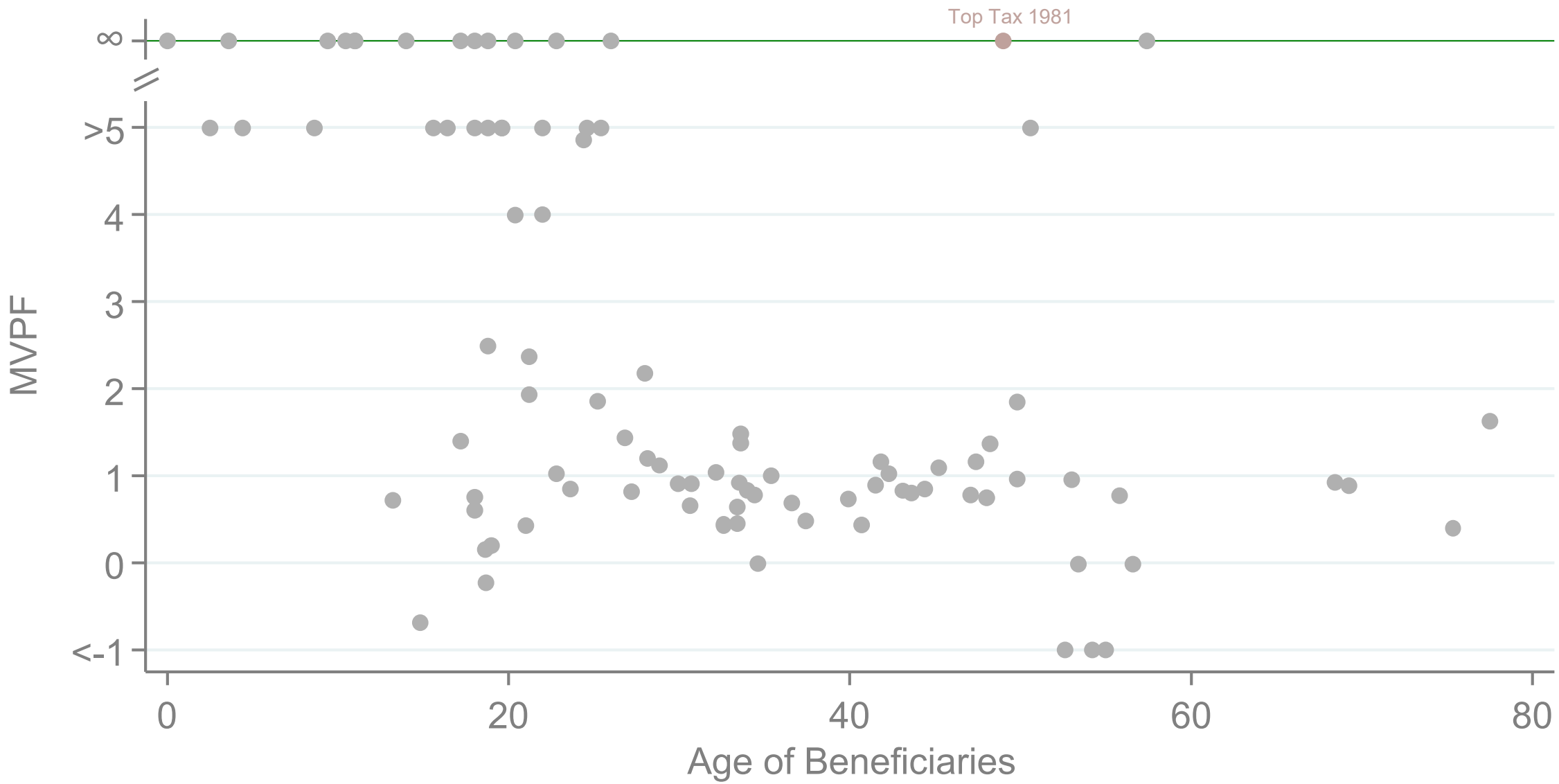


Not All Child-Targeted Policies Have High MVPFs



Infinite MVPF for 1981 Top Tax Rate…



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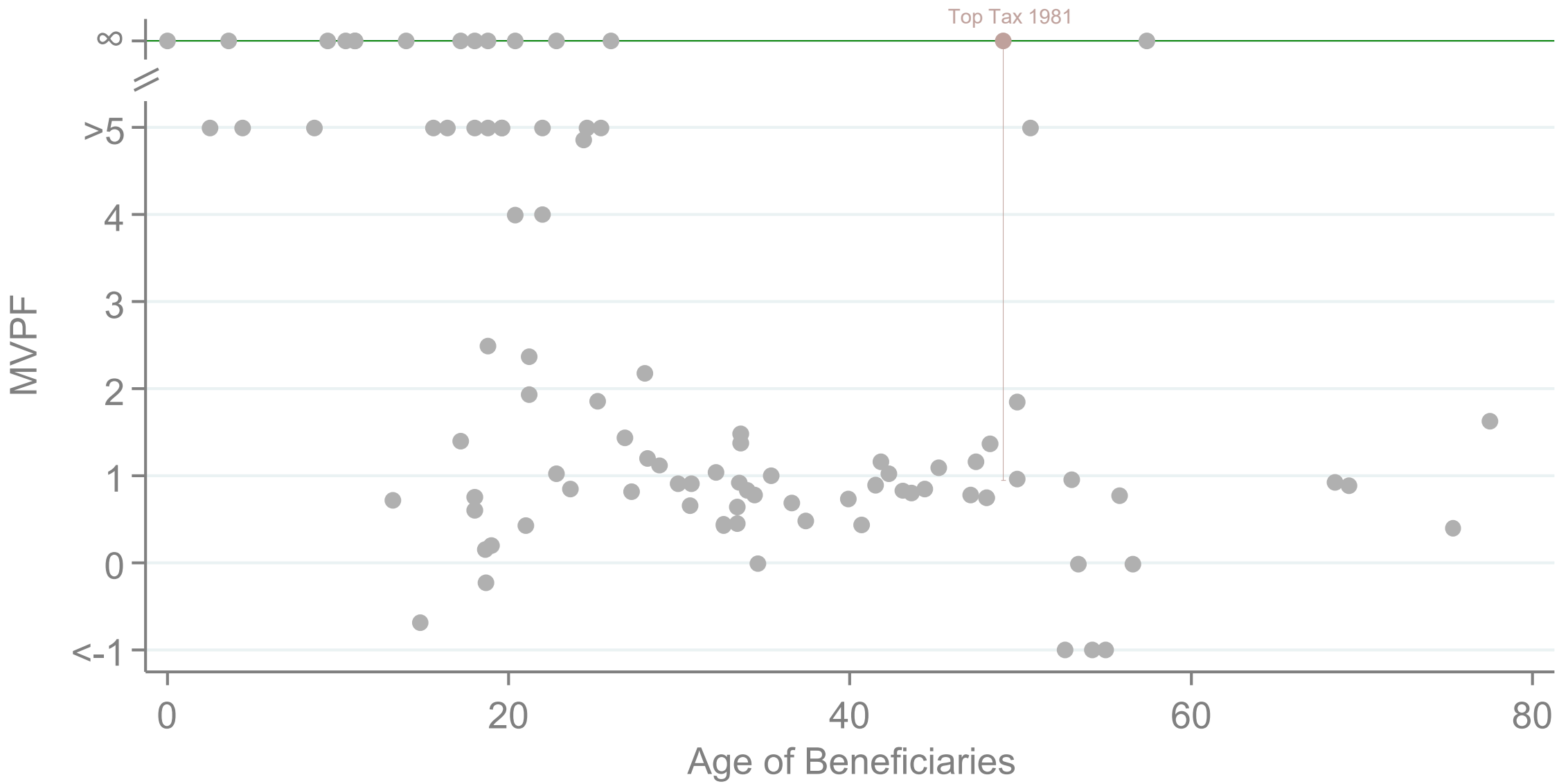
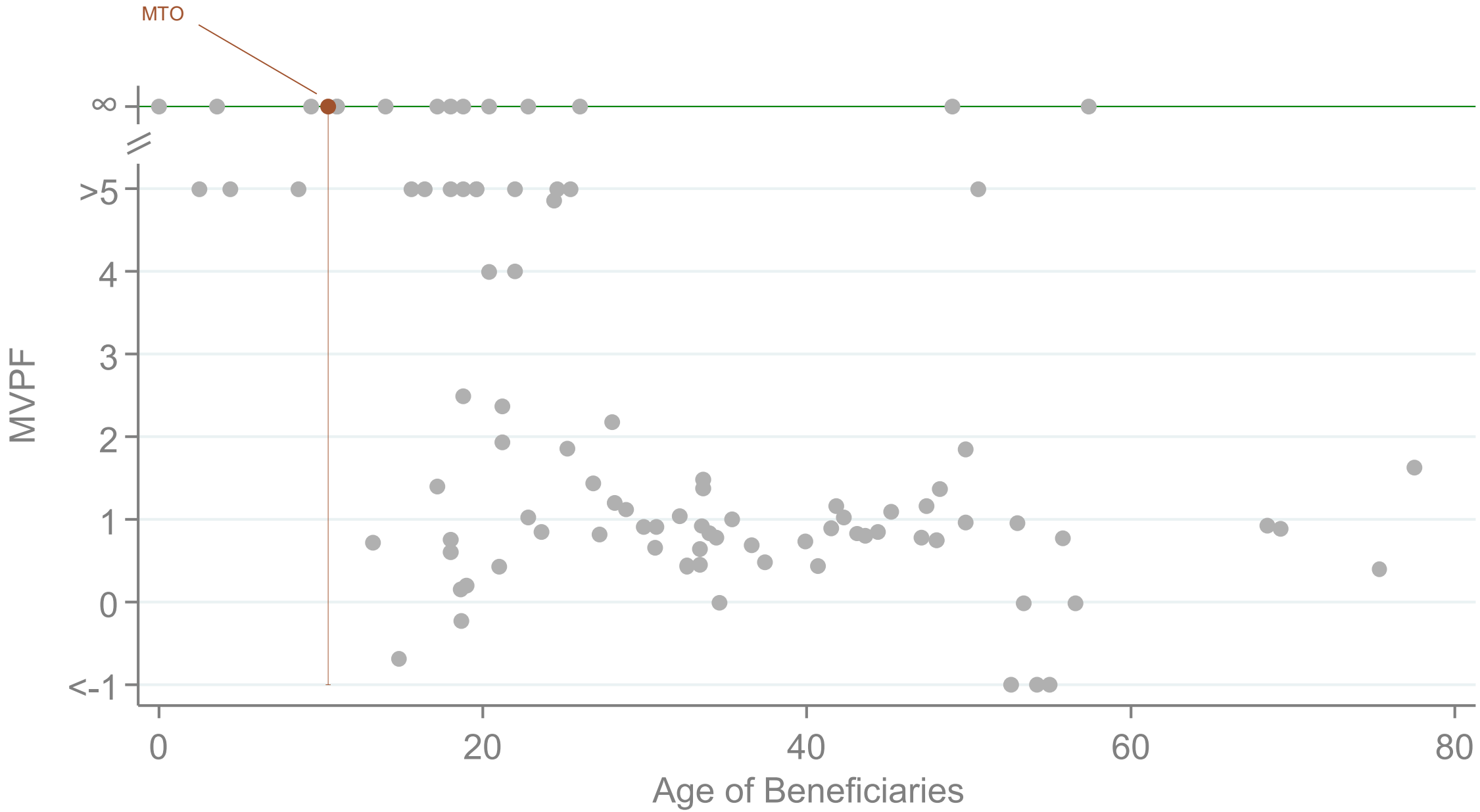


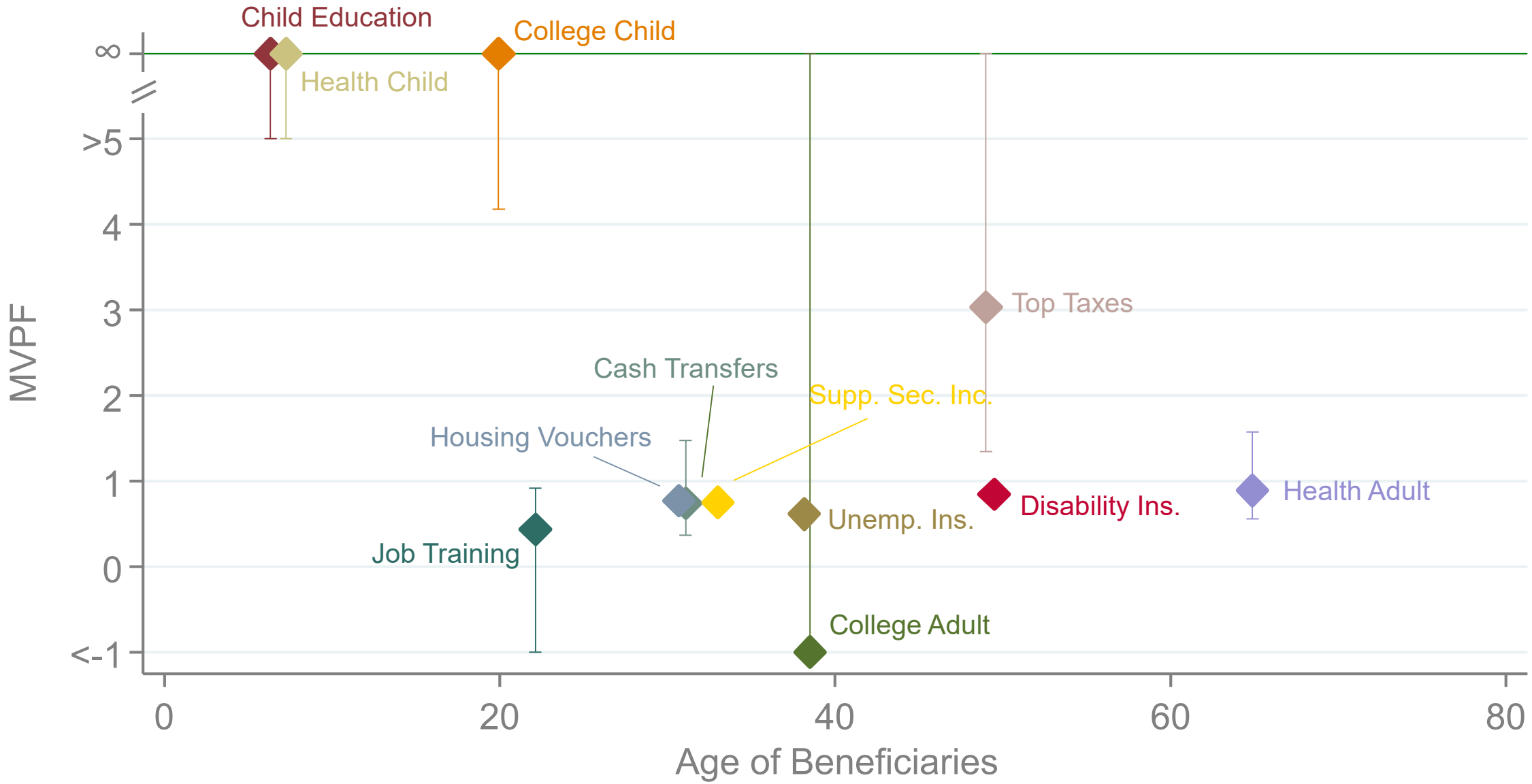
Policies with Spillovers onto Children Have High MVPFs (e.g. MTO)



Robustness

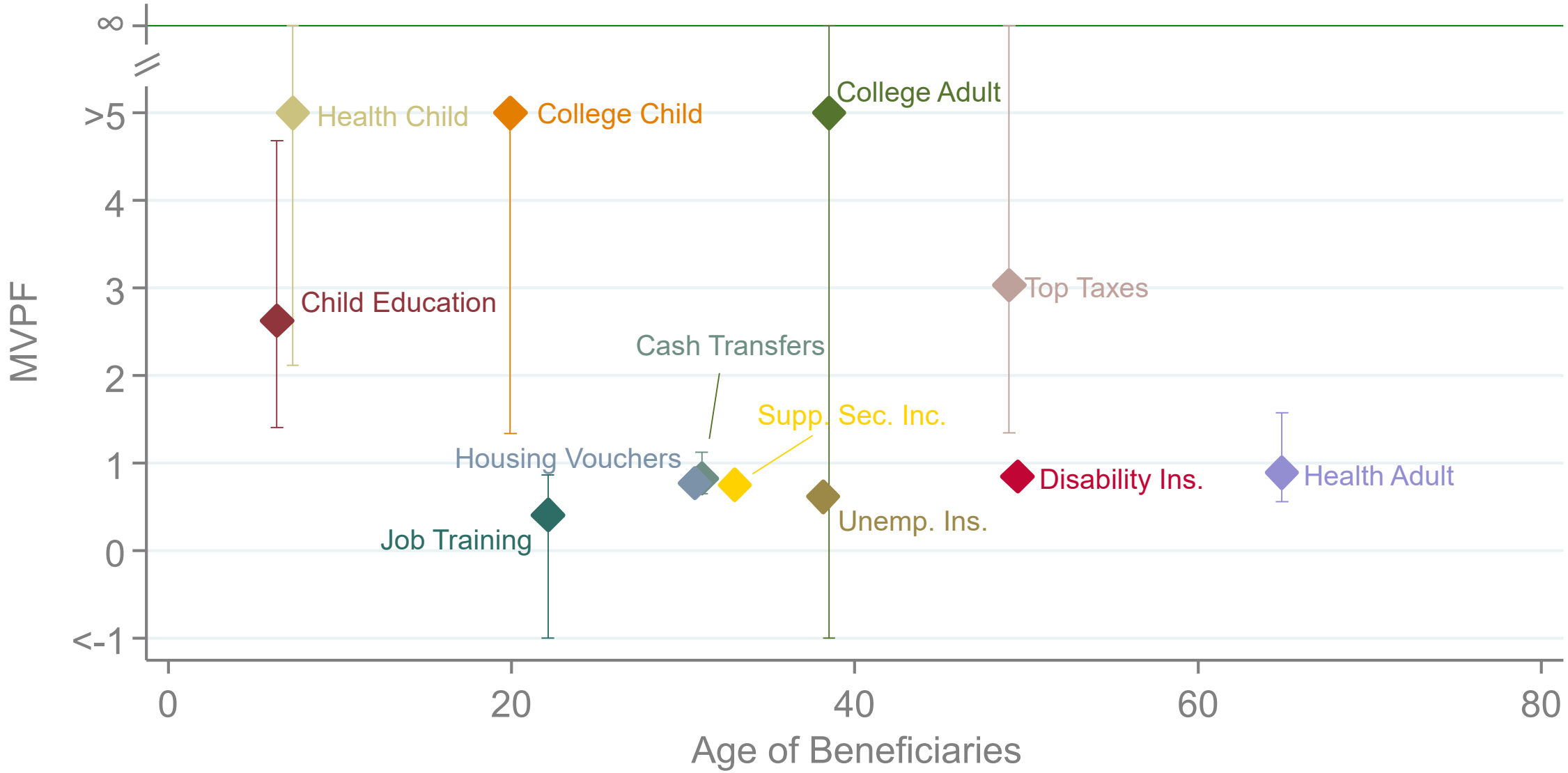
MVPF Robustness to Alternative Discount Rates

3% discount rate



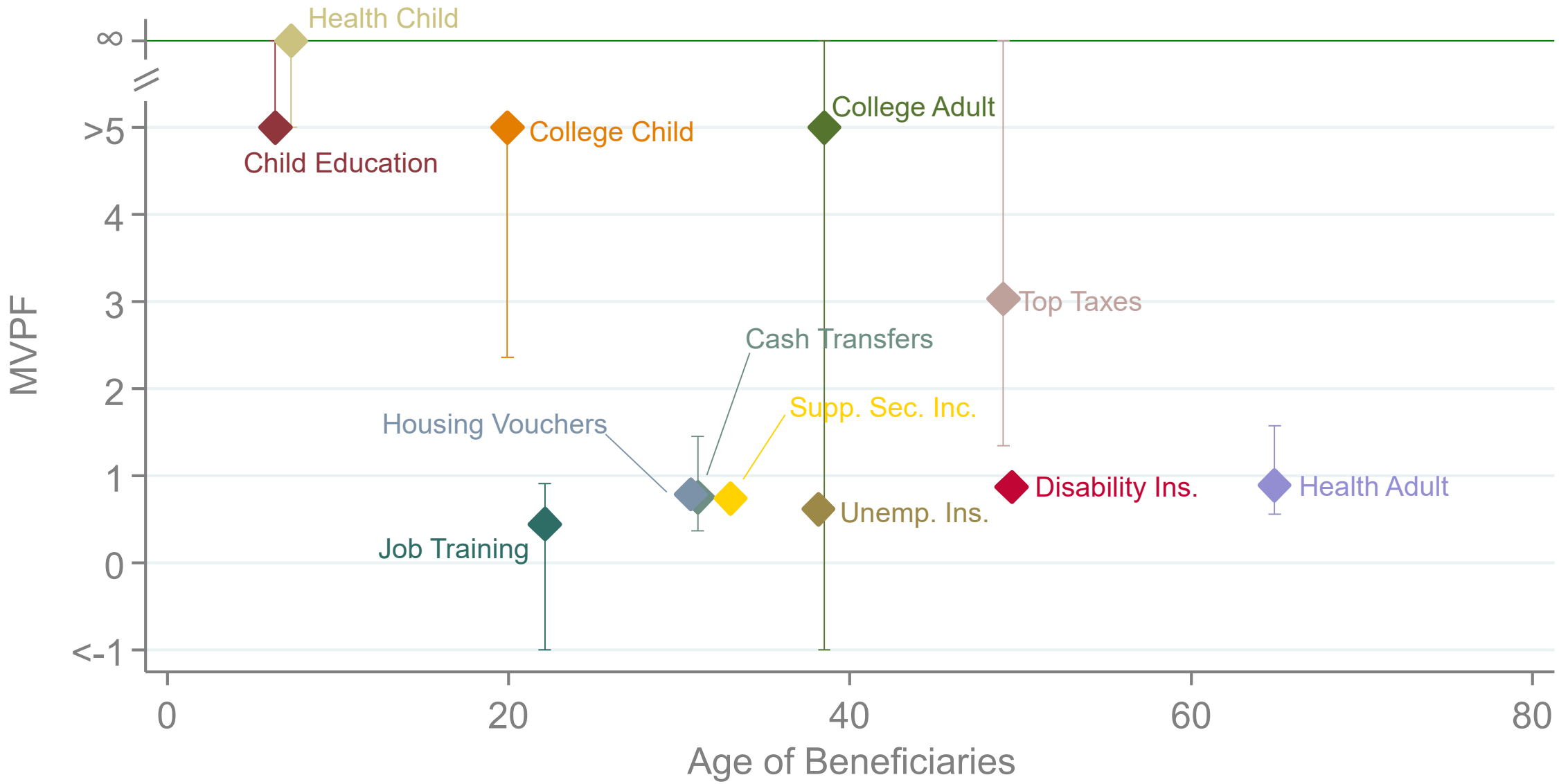
MVPF Robustness to Alternative Discount Rates

7% discount rate



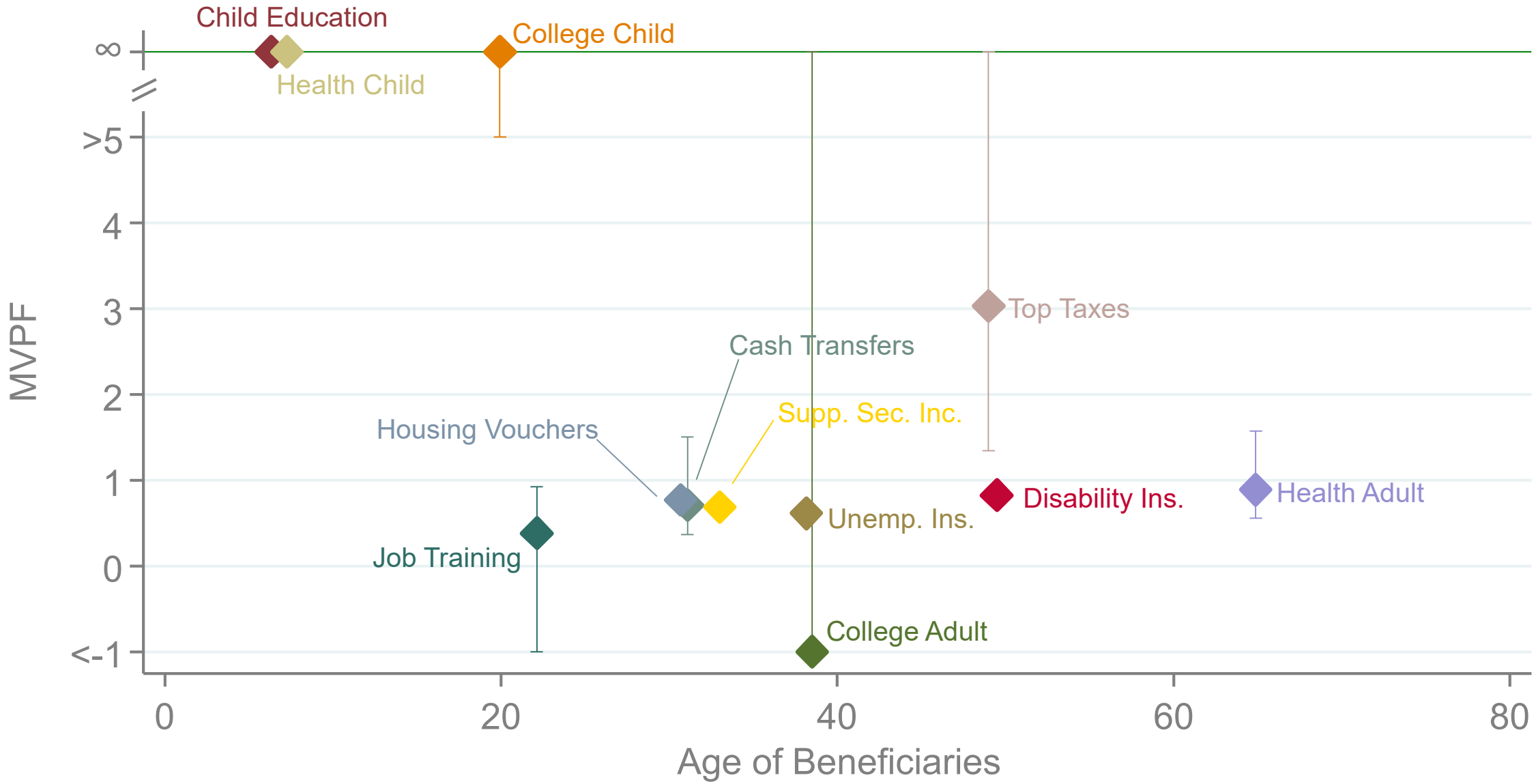
MVPF Robustness to Alternative Tax and Transfer Rates

10% Tax and Transfer Rate



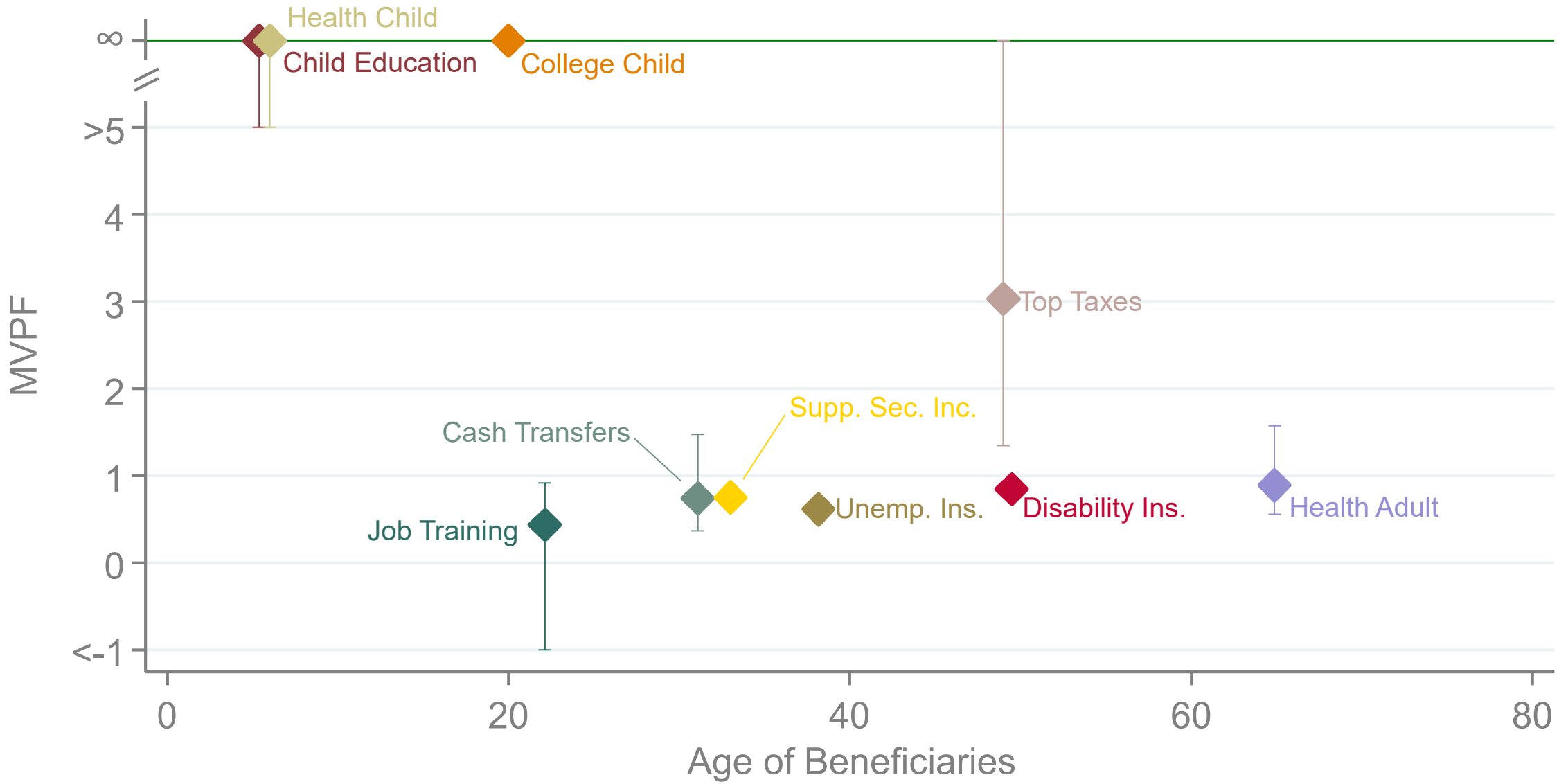
MVPF Robustness to Alternative Tax and Transfer Rates

30% Tax and Transfer Rate



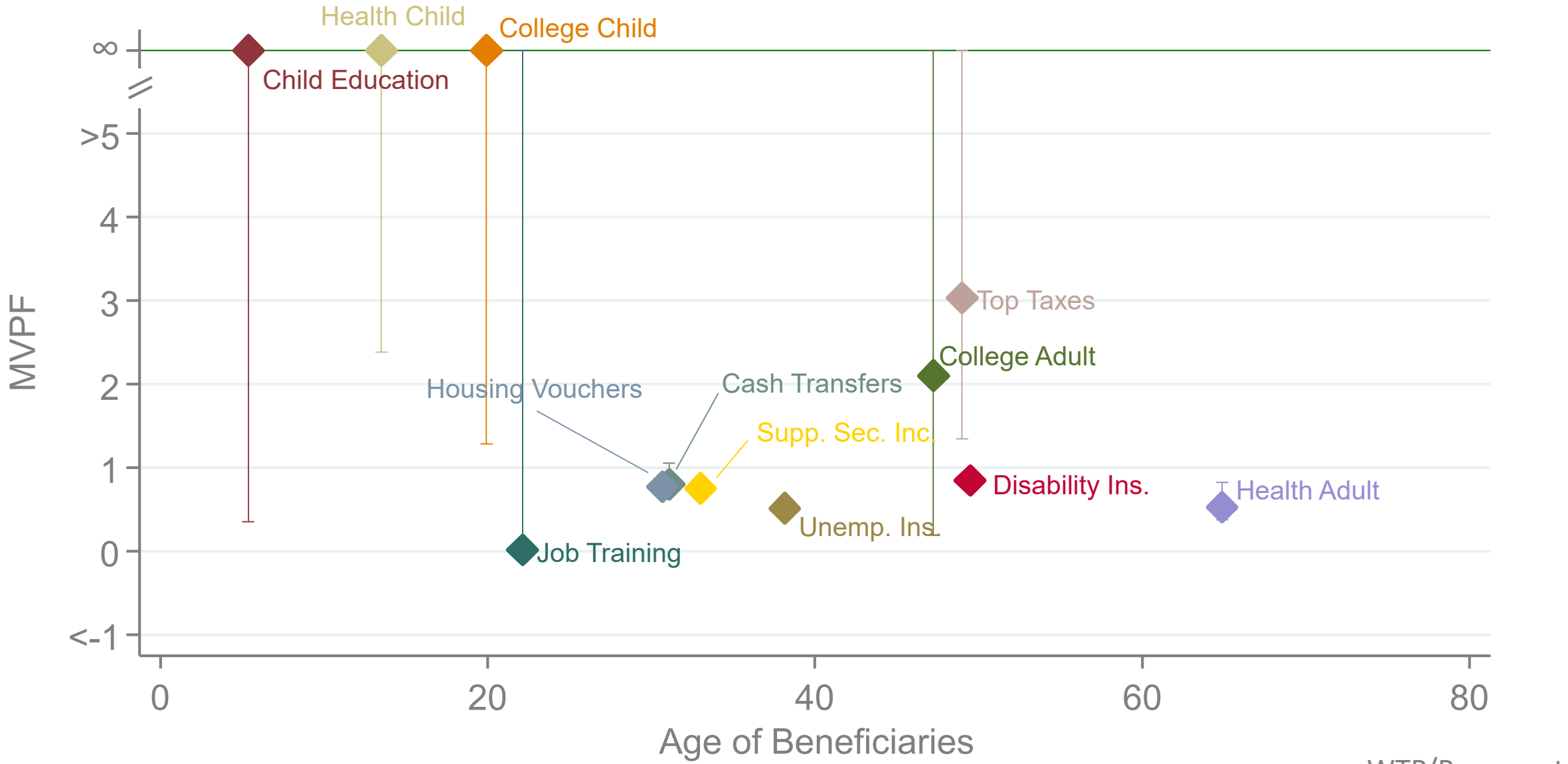
MVPFs for Restricted Sample

Excluding College-Based Extrapolations



MVPF Robustness to WTP

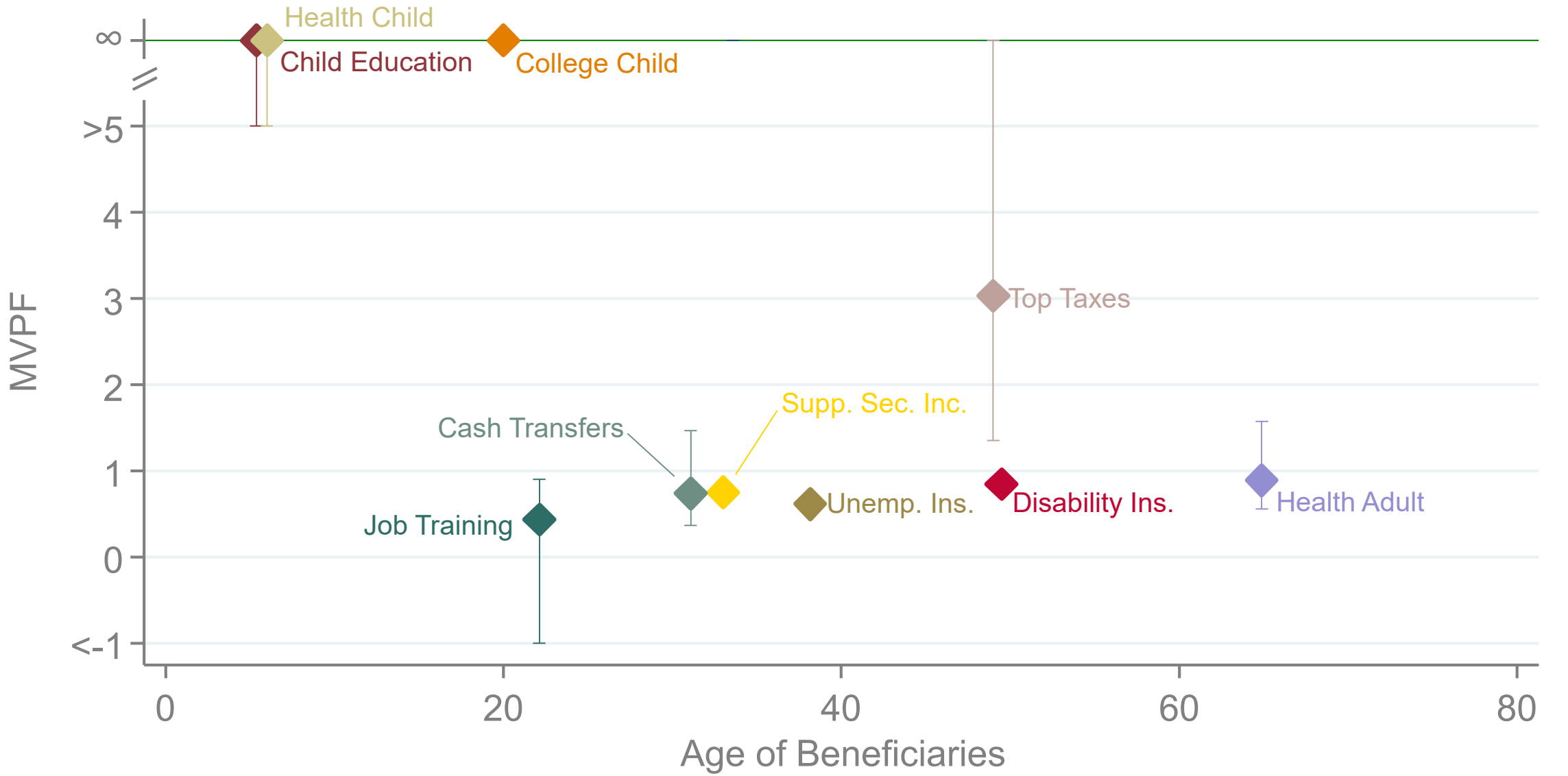
Conservative Willingness to Pay



WTP/Prog. cost

MVPF Robustness to Forecasting

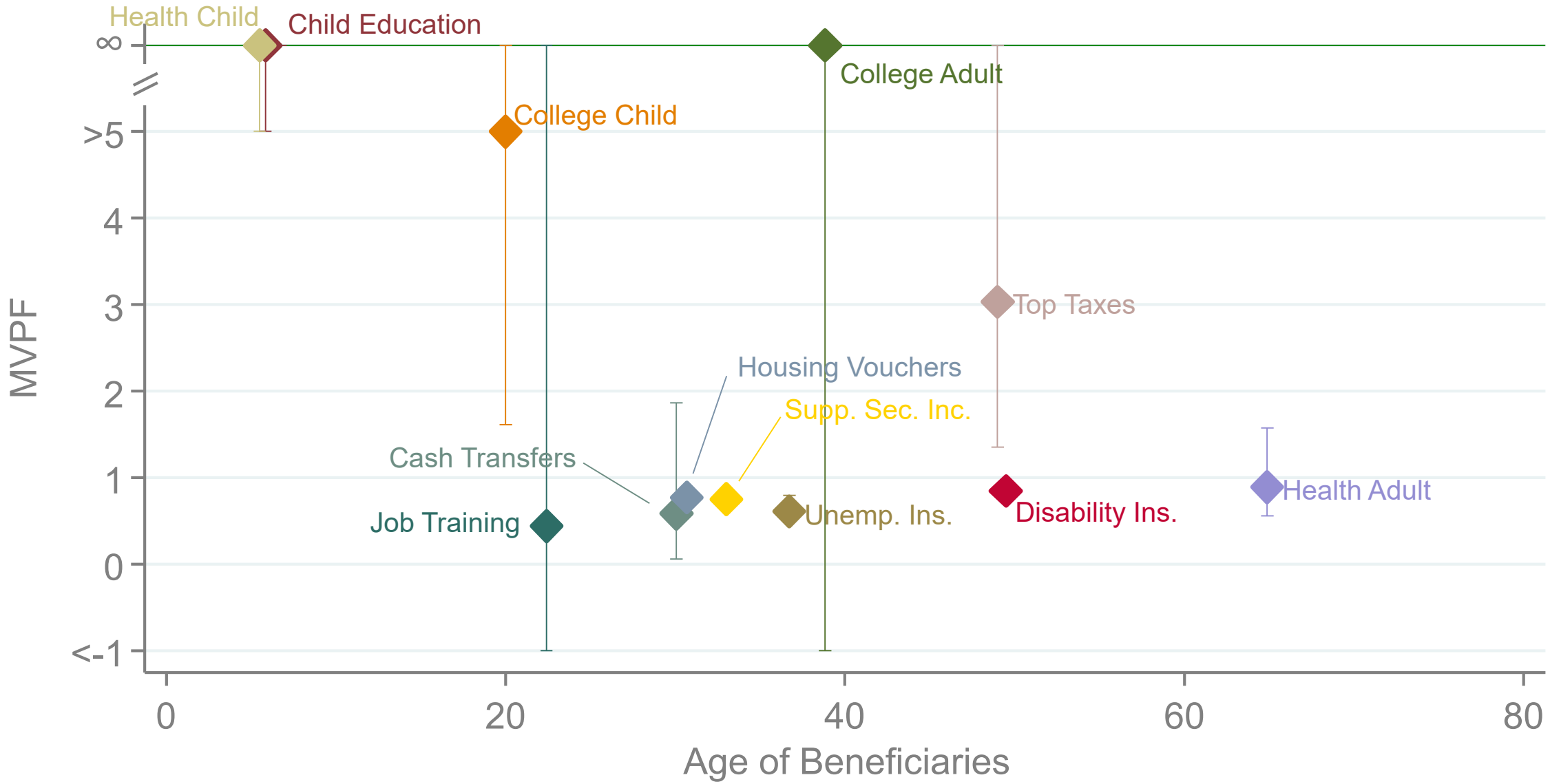
Assuming Fixed Income over Life Cycle (No Income Growth, Restricted Sample)



Child Spillovers No Forecast

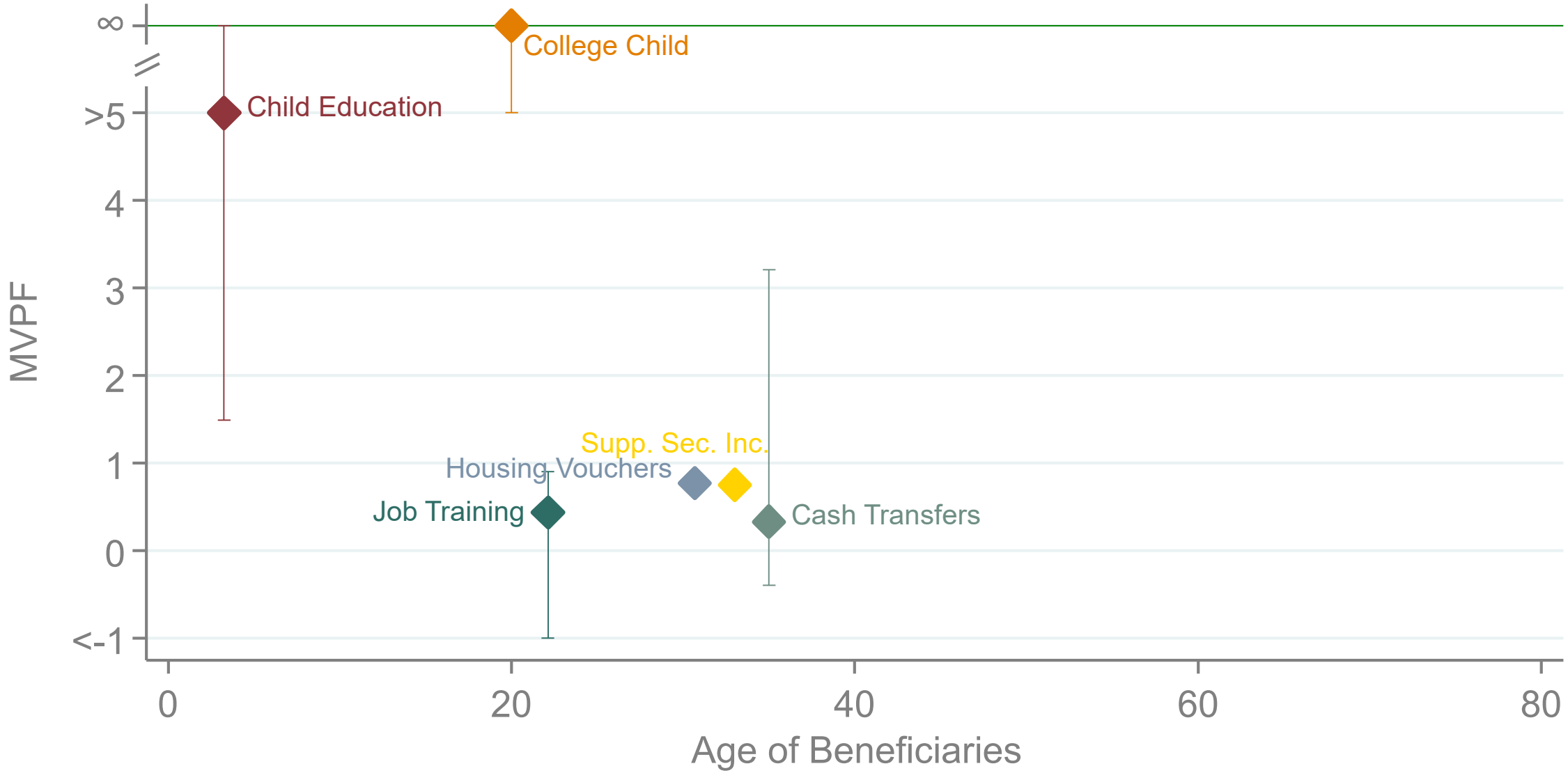
MVPF Robustness to Sample/Specification Quality

Peer-Reviewed Studies

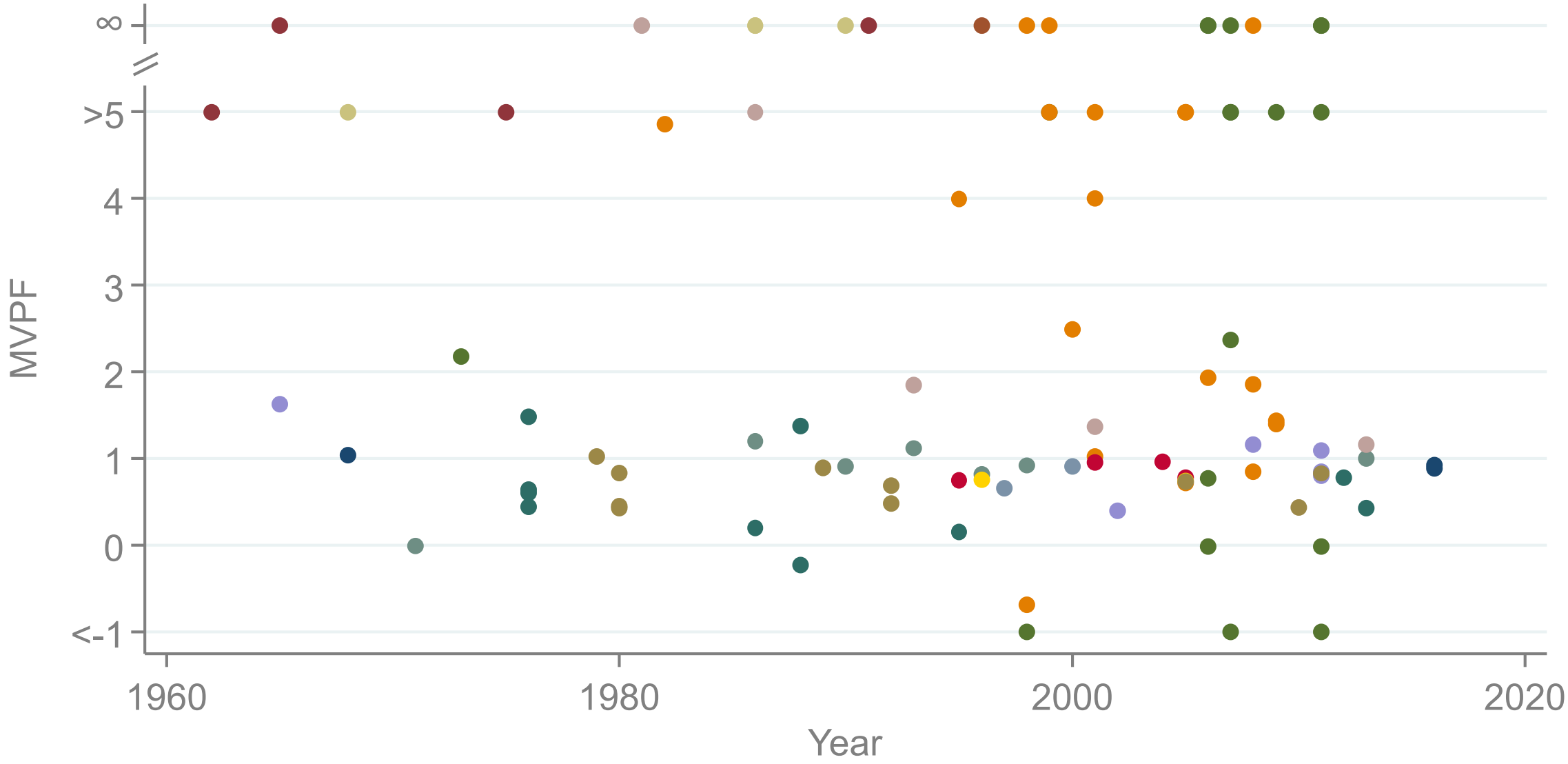


MVPF Robustness to Sample/Specification Quality

RCTs, RDs, and Lotteries

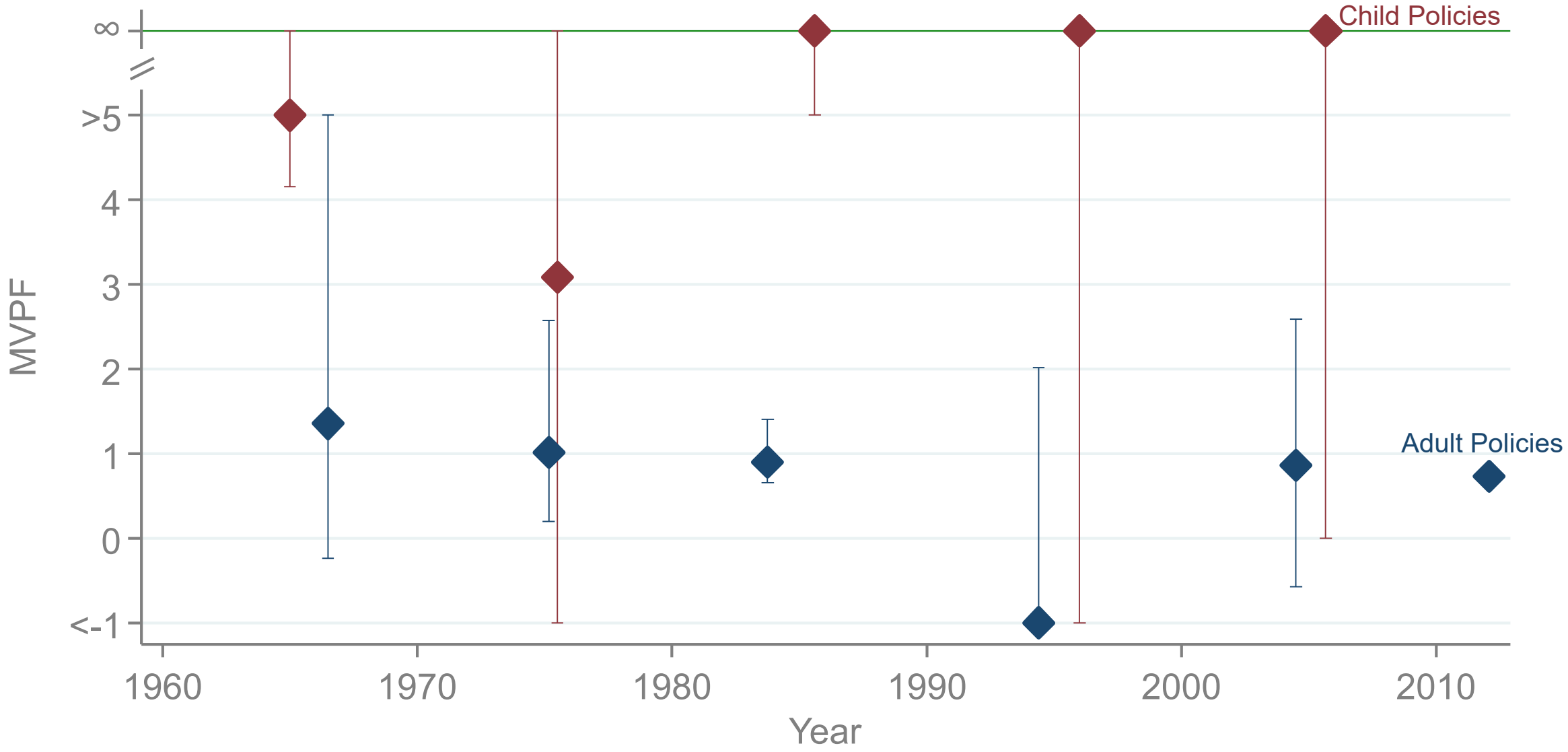


MVPF by Year of Policy



MVPF by Year of Policy

Averages by Decade



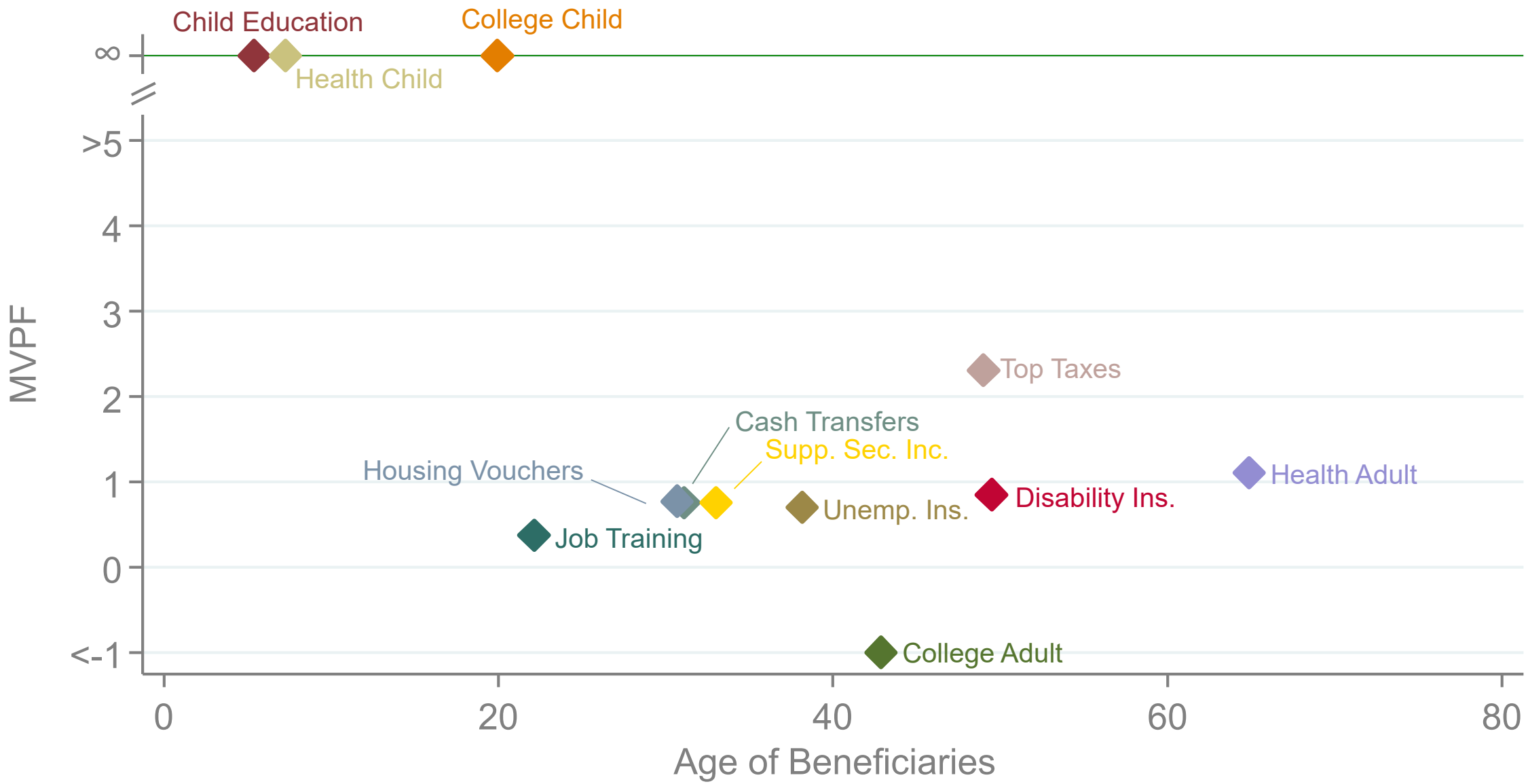
Publication Bias

- Our estimates are constrained by the existence of previous literature
- Would Perry Preschool have been published if the effects were an (imprecise) zero?
- Andrews and Kasy (2018) provide a method to test for and correct publication bias
- **Child Policies: 3-4 times** more likely to be published if they find a repayment effect
- **Adult Policies: up to 12 times** more likely to be published if they find a distortionary effect

Table

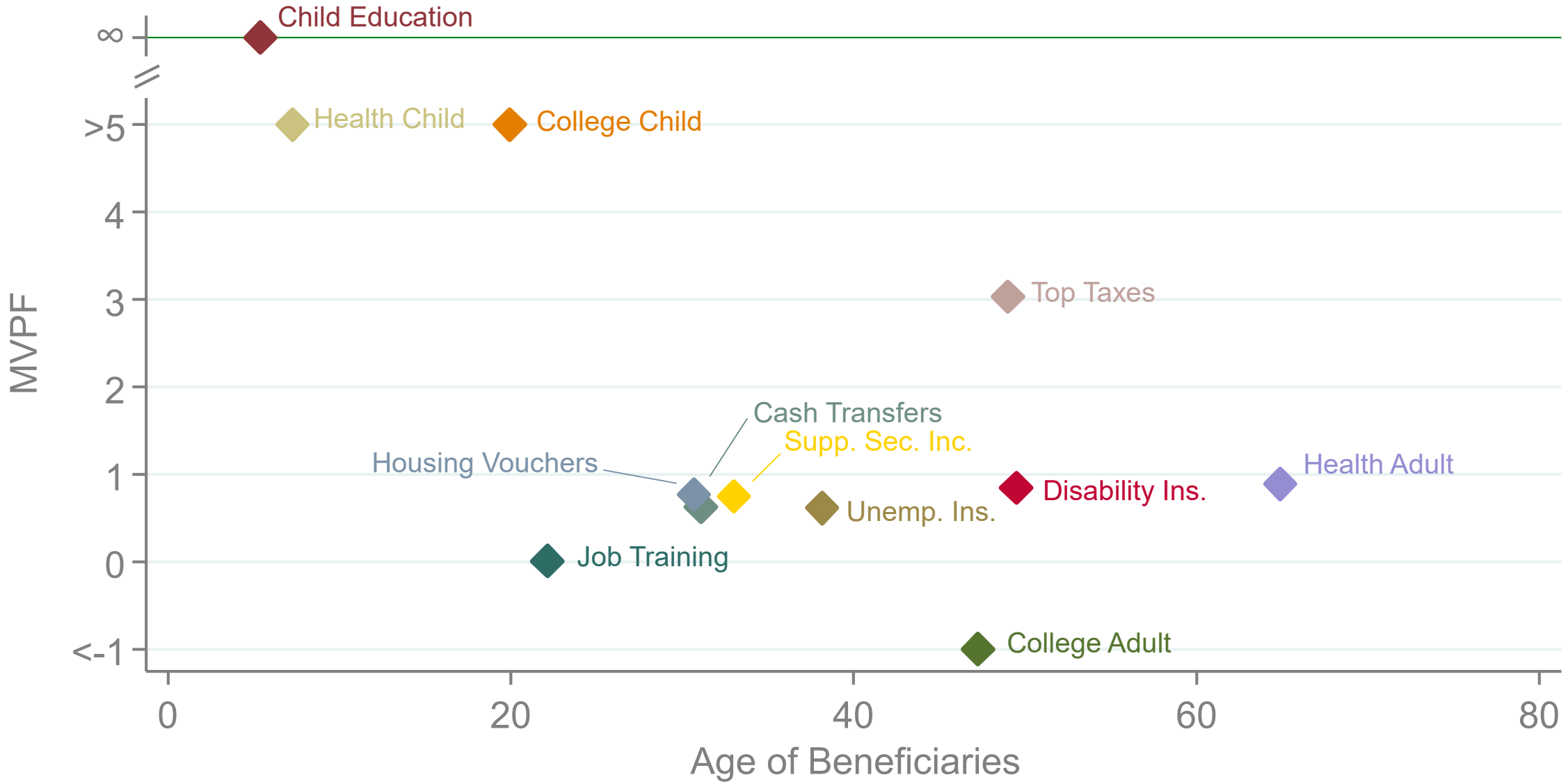
MVPF Robustness to Publication Bias

Adjusting for Observed Publication Bias



MVPF Robustness to Publication Bias

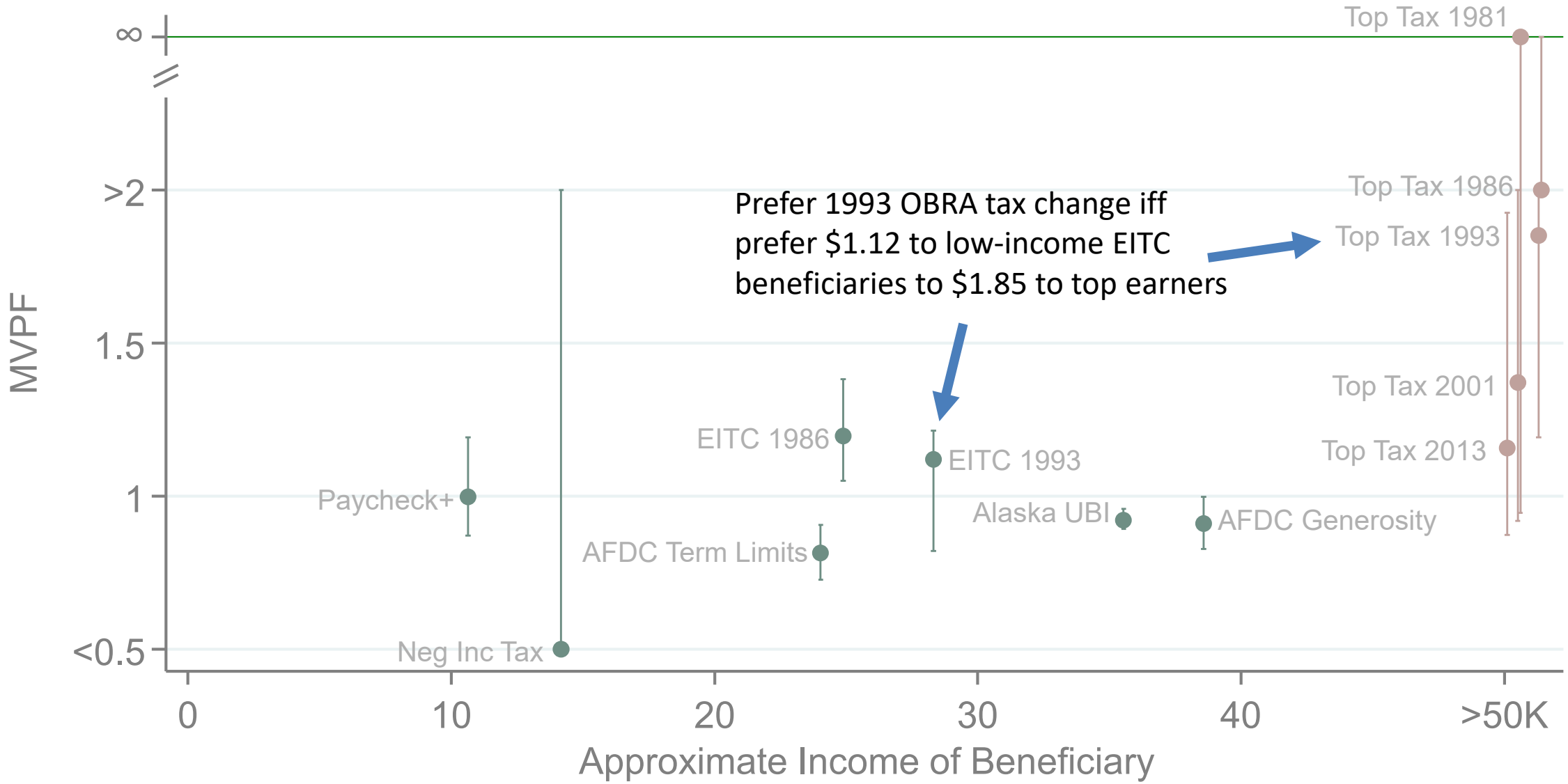
Adjusting for 35X Bias in Experimental Economics Studies [Camerer (2016)]



Outline

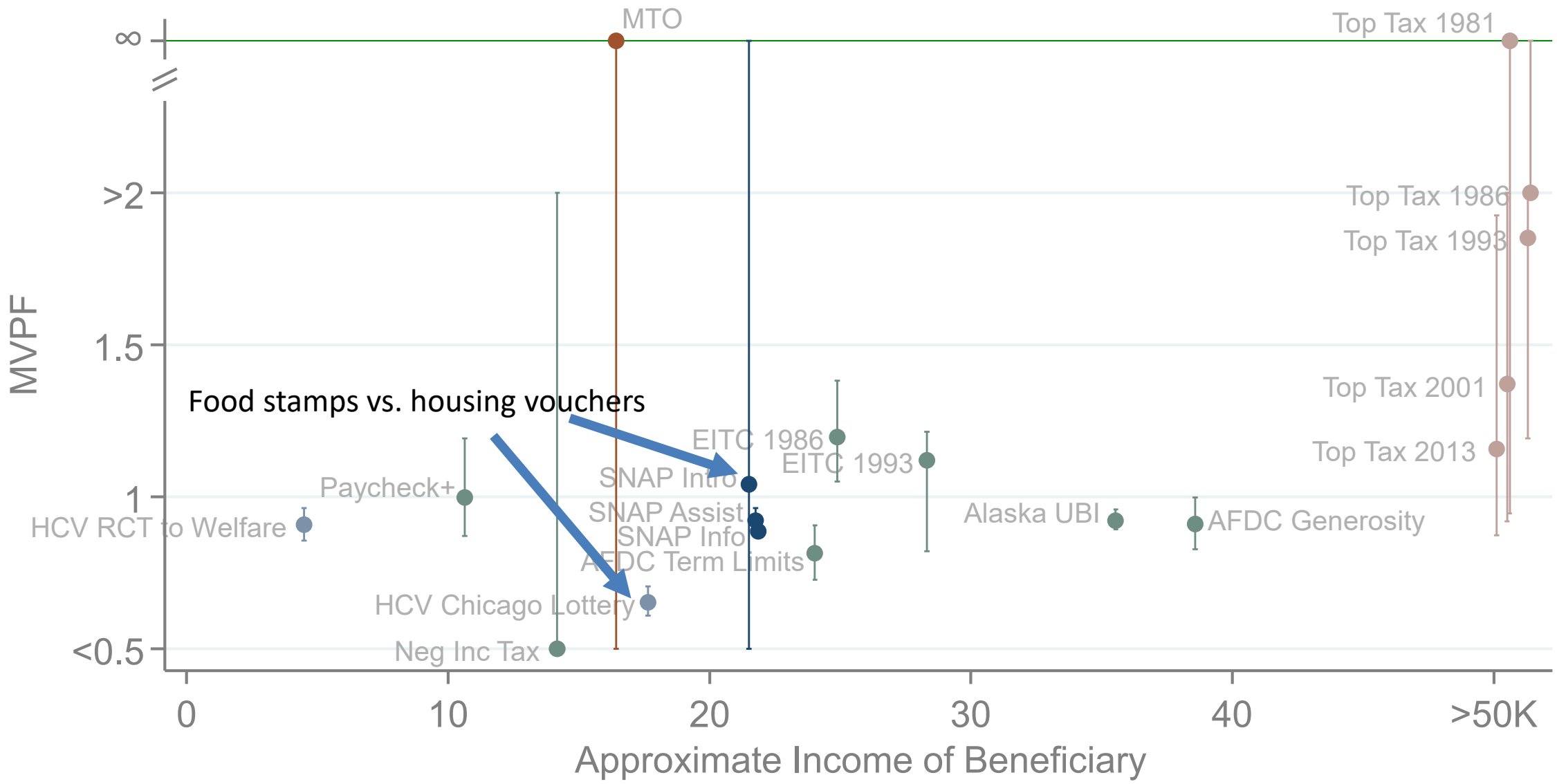
1. What We Do: Our Method and An Example
2. What We Find: MVPF Estimates and Robustness
3. Relation to Previous Theory
4. Lessons for Future Welfare Analyses

Quantifying the Tradeoffs of Redistribution through the Tax Schedule
(Mirrlees 1976)

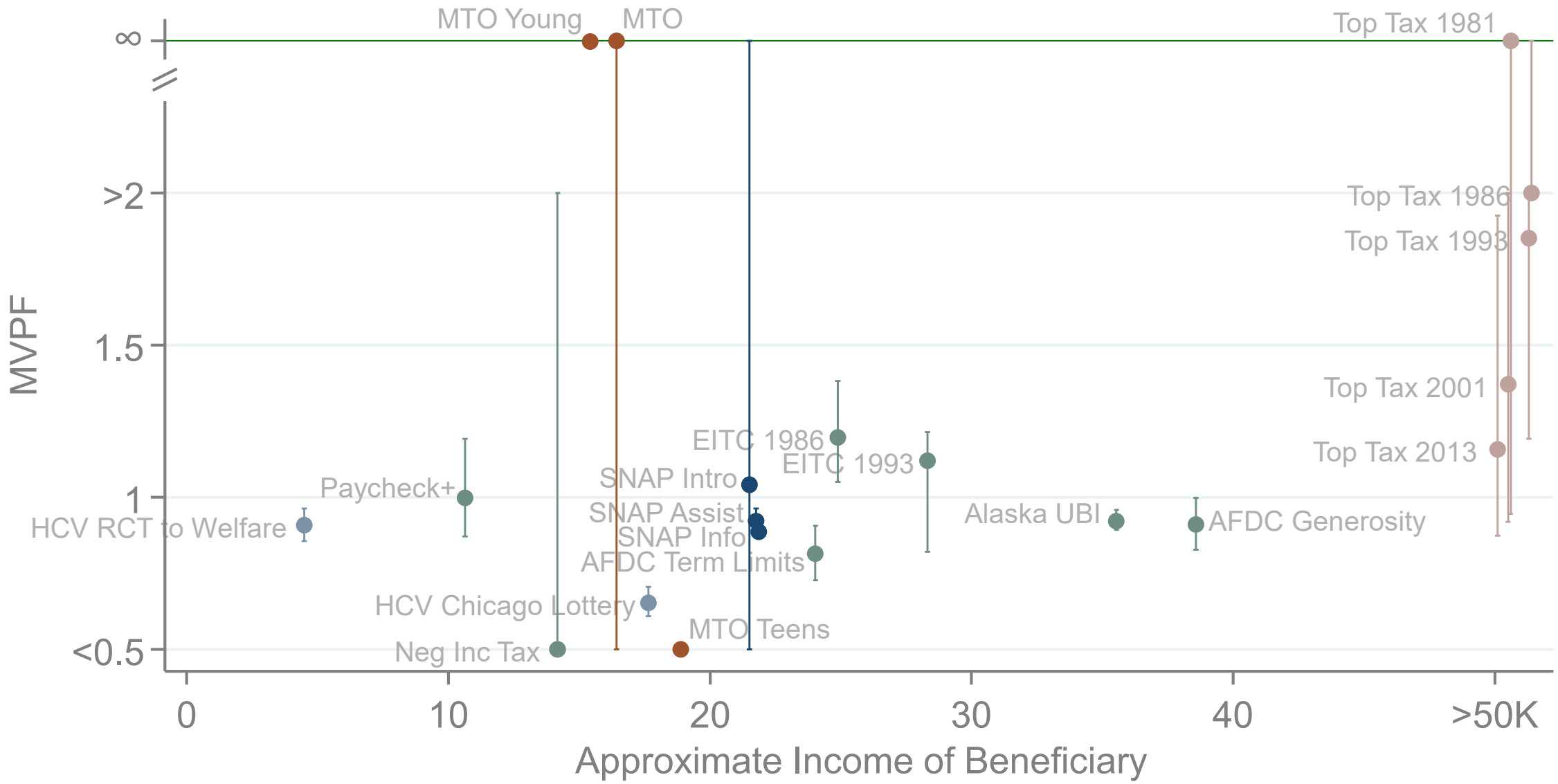


Spillovers on Children

In-Kind versus Cash Transfers ("Atkinson-Stiglitz" Theorem)

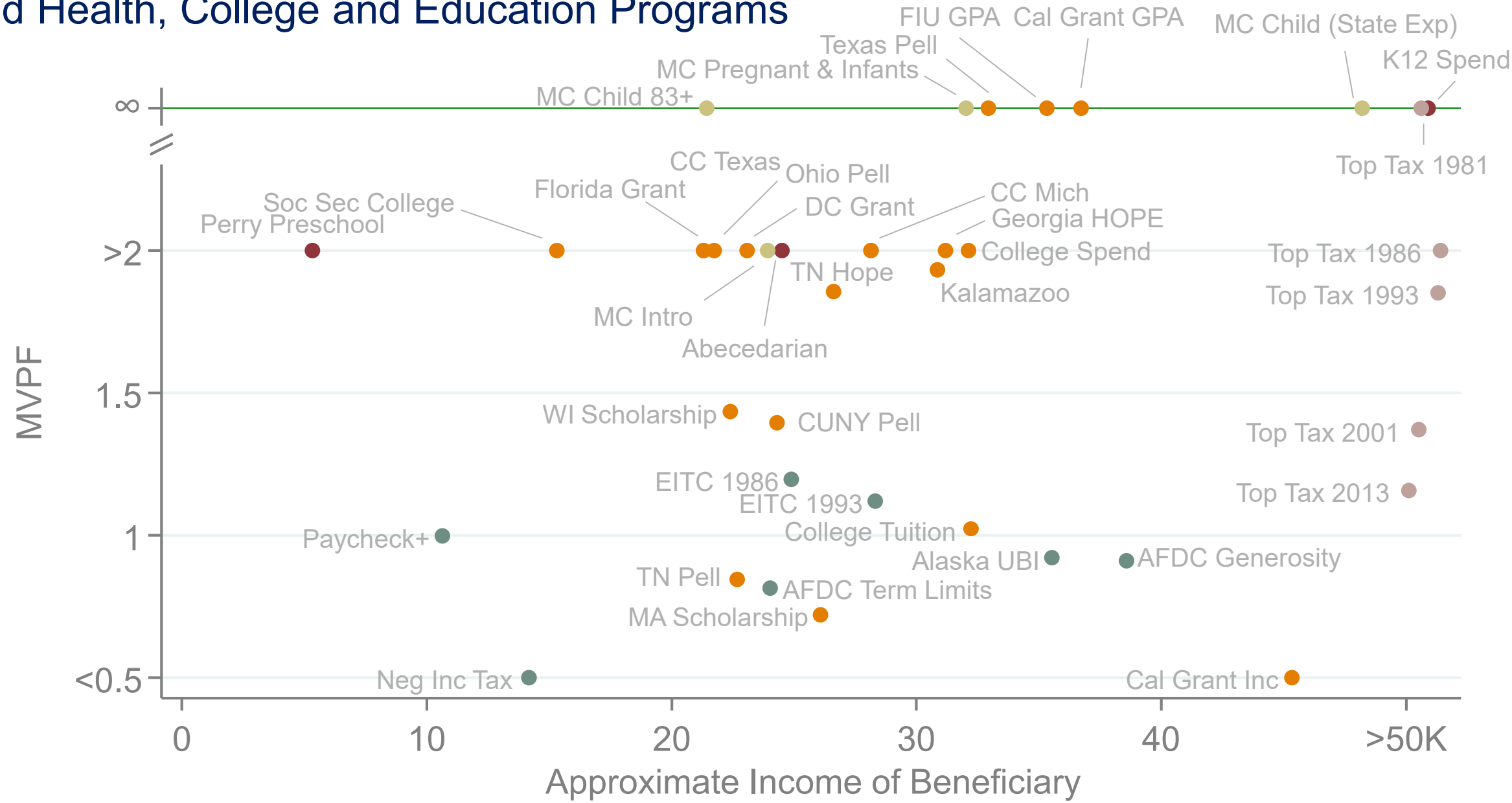


“Tagging” Based on Age in MTO



Efficient Redistribution through Investments in Low-Income Children

Child Health, College and Education Programs



Outline

1. What We Do: Our Method and An Example
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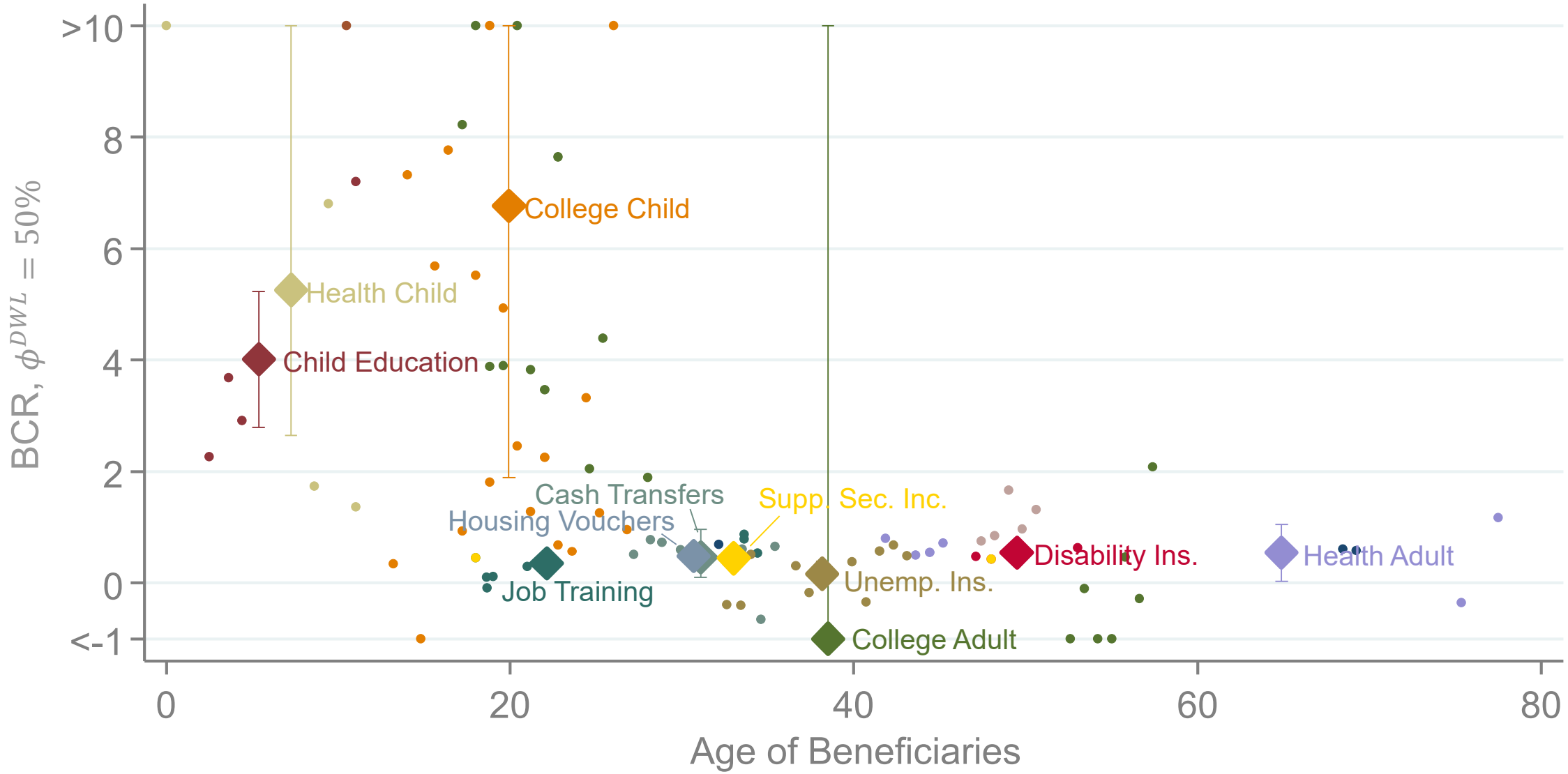
4. Lessons for Future Welfare Analyses

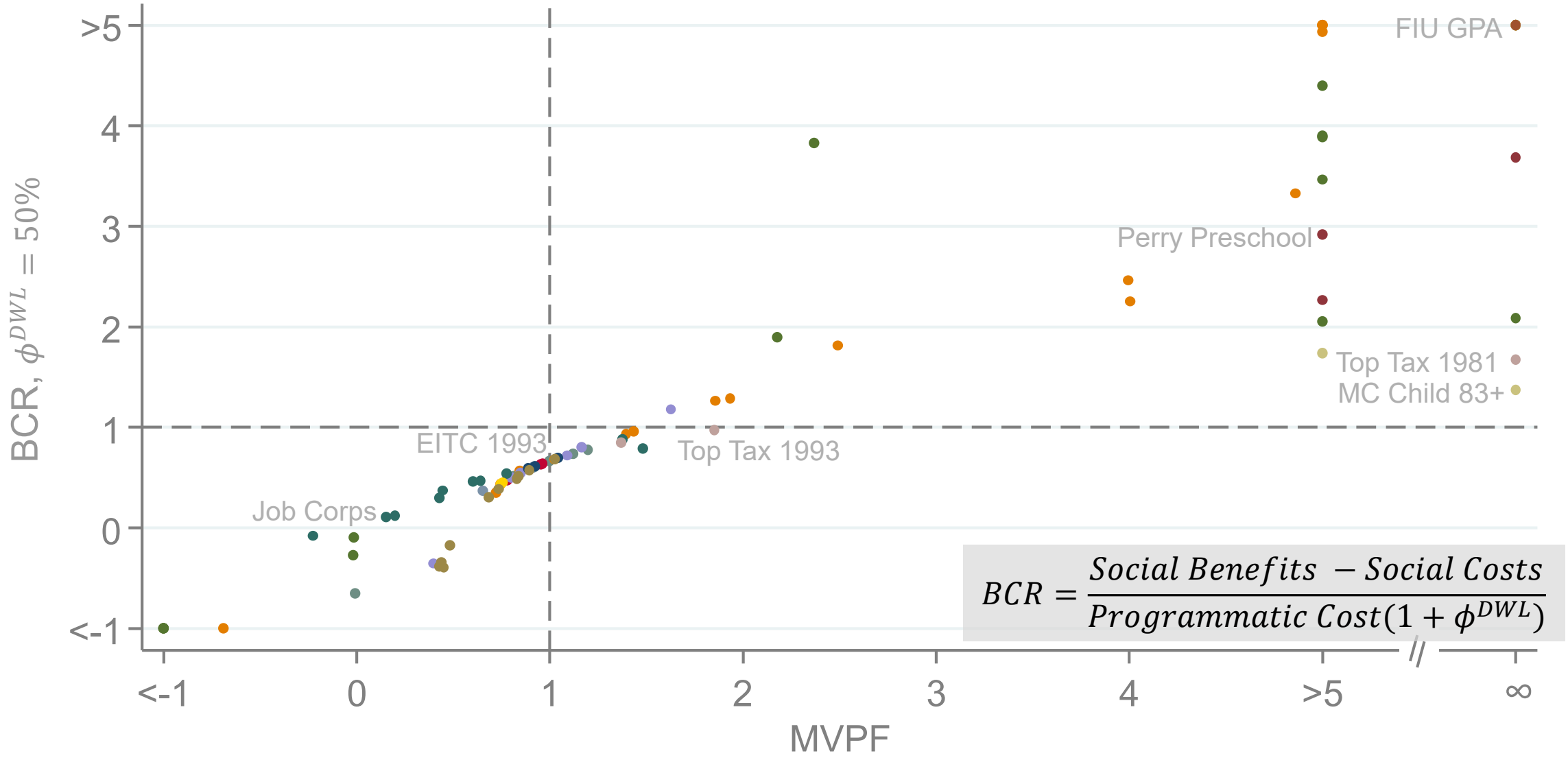
Lesson #1: MVPF vs Benefit/Cost Ratio [Heckman et al., 2012; Zimmerman 2014]

Benefit Cost Ratio by Age of Beneficiaries



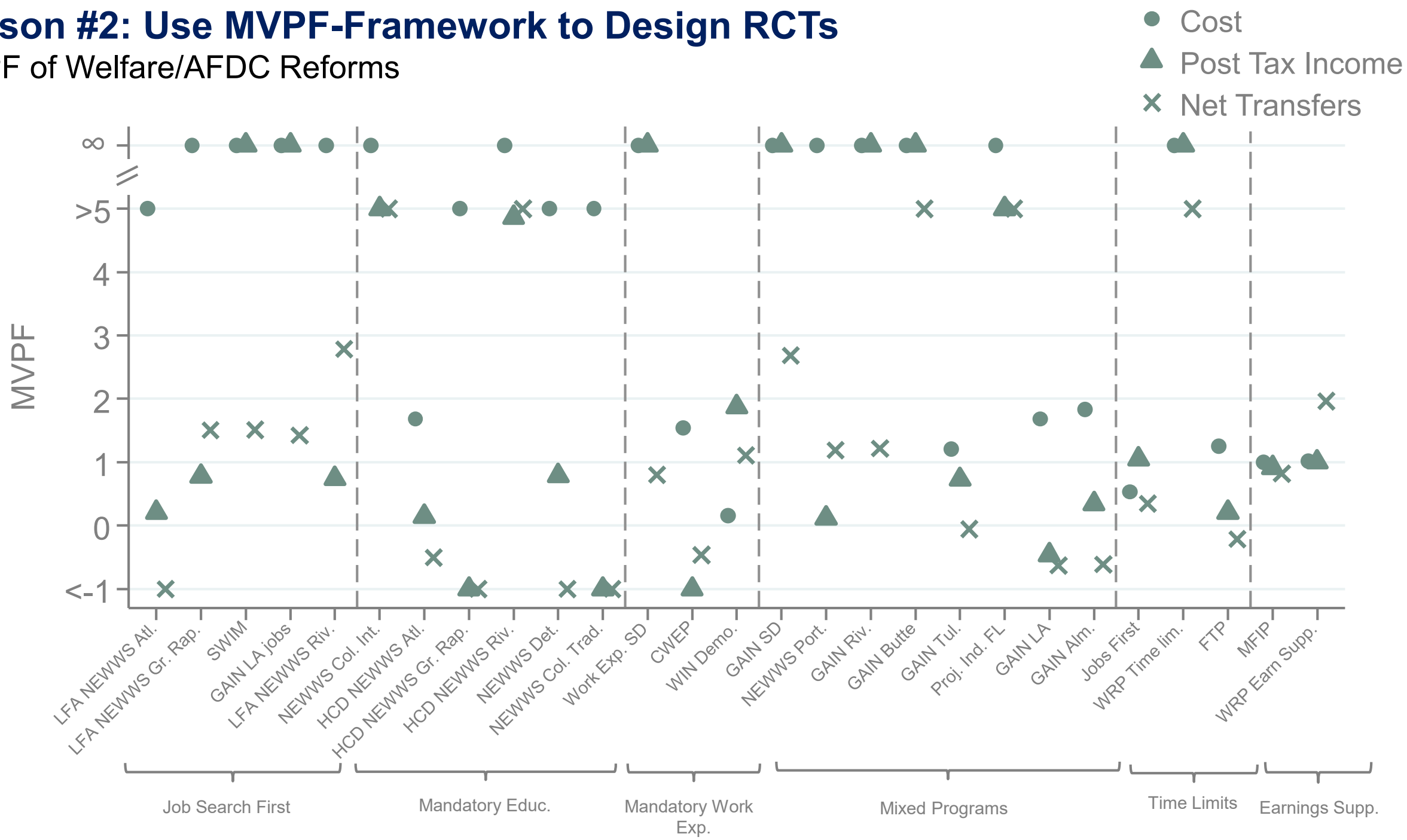
Lesson #1: MVPF vs Benefit/Cost Ratio [Heckman et al., 2012; Zimmerman 2014]

Tax Revenue Impacts Counted as Social Benefits, not Government Cost Reductions



Lesson #2: Use MVPF-Framework to Design RCTs

MVPF of Welfare/AFDC Reforms



Lesson #3: Use MVPF-Framework to Quantify Value of Future Research

- MVPF estimates contain considerable (model + sampling) uncertainty
- The MVPF is a shadow price → value to reducing uncertainty
- Should govt raise $1 of revenue from known MVPF of 1 to spend on policy j?
- Can spend v_j to reduce sampling uncertainty before investing
  - E.g. reduce sampling uncertainty from PSID -> Admin data estimates of food stamp intro
- Solve for v_j that makes government indifferent to learning
  - E.g. food stamps: government WTP $0.24 for every $1 spent on SNAP to learn census vs PSID estimate before deciding to spend

Conclusion

- *Direct* investment in *low-income children* have had highest, often infinite, MVPFs
  - Policies often pay for themselves

- Lower MVPFs for policies targeting adults
  - Costly to redistribute from rich to poor adults
  - Investment in children has historically been efficient method of redistribution

- Lessons for future welfare analyses
  - Incidence on the government matters (difference relative to CBA)
  - Design RCTs where WTP can be measured, not just costs
  - High value to identifying long-run earnings effects, especially child spillovers

- All code + data is available on github and at www.policyinsights.org

Results + Tutorial at www.policyinsights.org

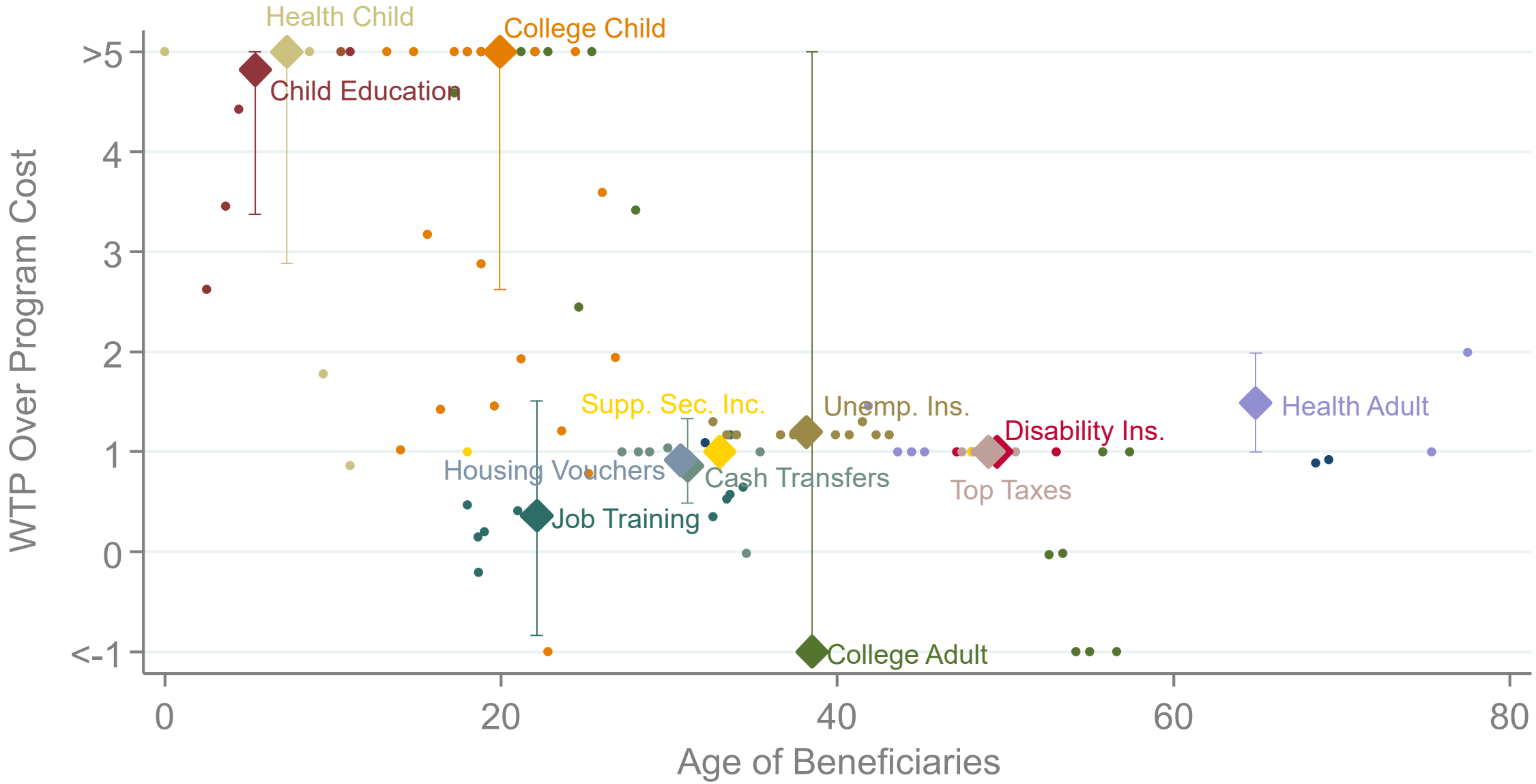
OPPORTUNITY INSIGHTS

Source: Hendren and Sprung-Keyser (2019)

Appendix

WTP over Program Cost

Baseline Specification



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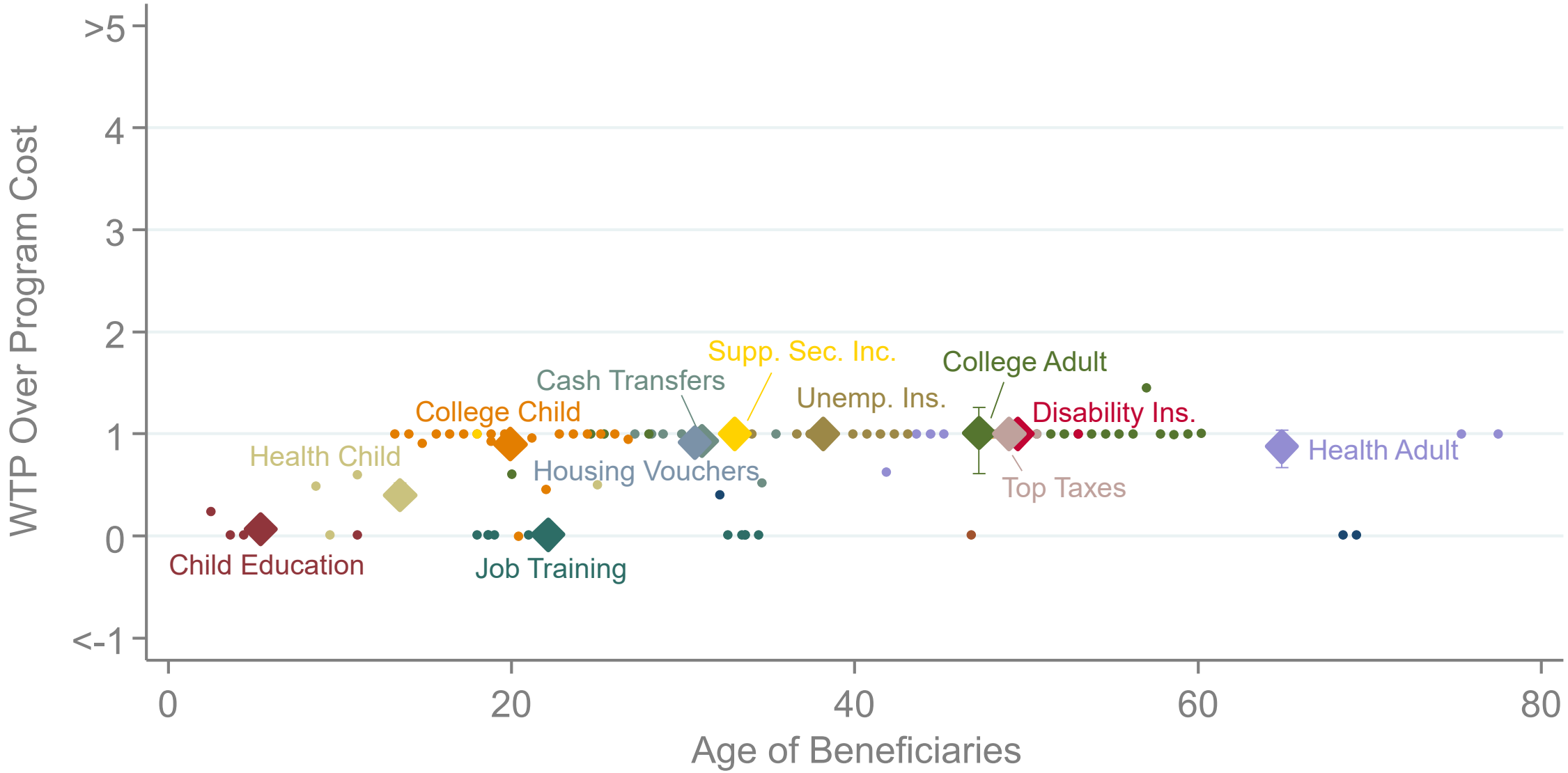
WTP over Program Cost

Lower Bound Specification



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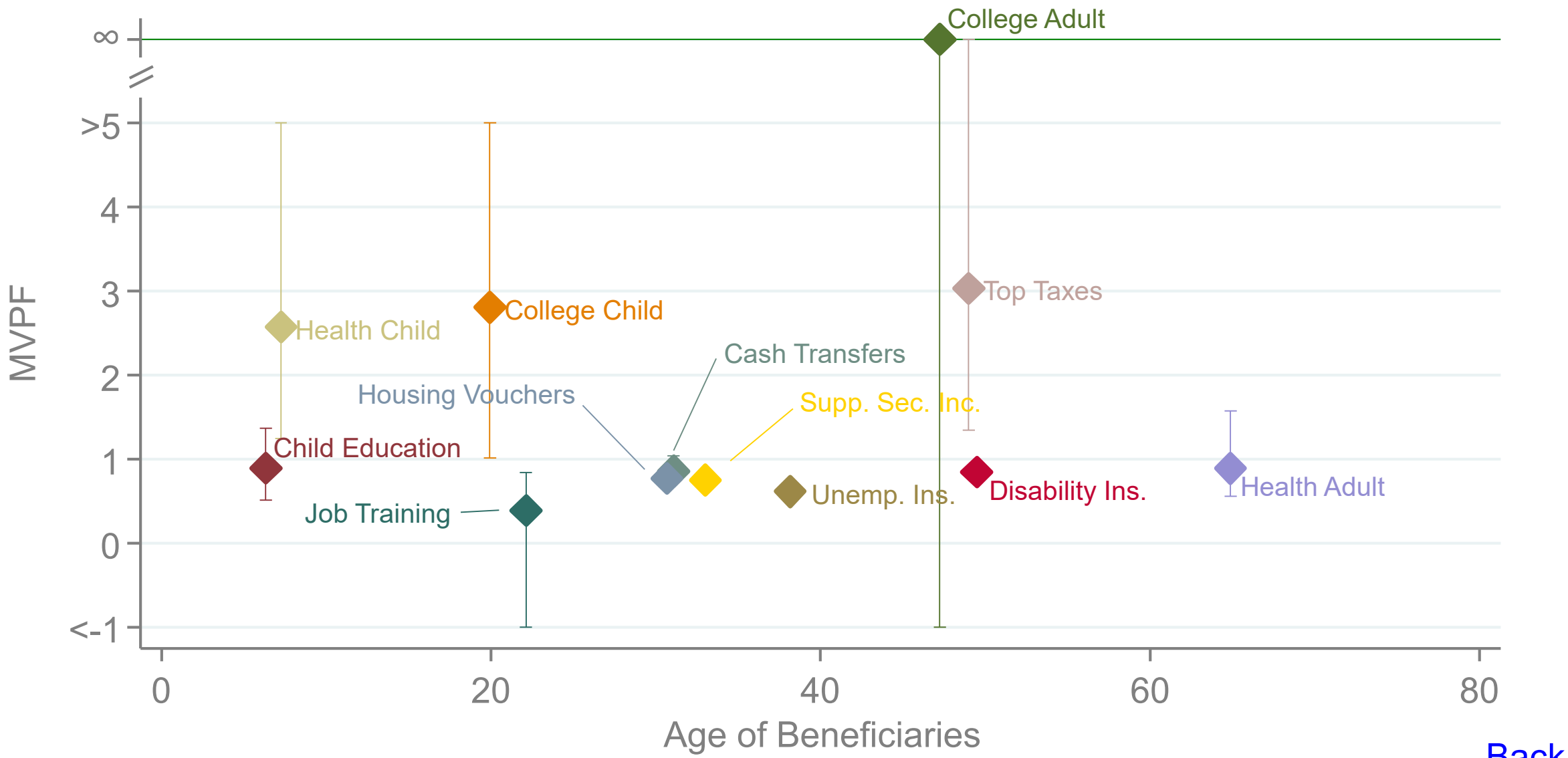
MVPF Robustness to Alternative Discount Rates

10% discount rate



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Publication Bias

Table III: Publication Bias Estimation

Z-Score	Children Estimates (1)	(2)	(3)	Adult Estimates (4)	(5)	(6)
Z > 1.64	3.717	-		2.52	-	
	(2.46)			(1.32)		
Z < -1.64	1.154	-		7.90	-	
	(0.44)			(1.48)		
Z [1.64,1.96]			3.65			1.36
			(3.46)			(1.14)
Z [-1.96, -1.64]			1.02			4.19
			(0.57)			(0.81)
Z > 1.96	-	3.09	3.78	-	3.27	3.59
		(1.09)	(2.17)		(1.50)	(1.21)
Z < -1.96	-	1.21	1.24	-	10.39	11.52
		(0.50)	(0.62)		(2.53)	(2.43)
N	237	237	237	150	150	150

Notes: The numbers shown are the estimated probability of publication relative to an insignificant result. Standard errors in parentheses.

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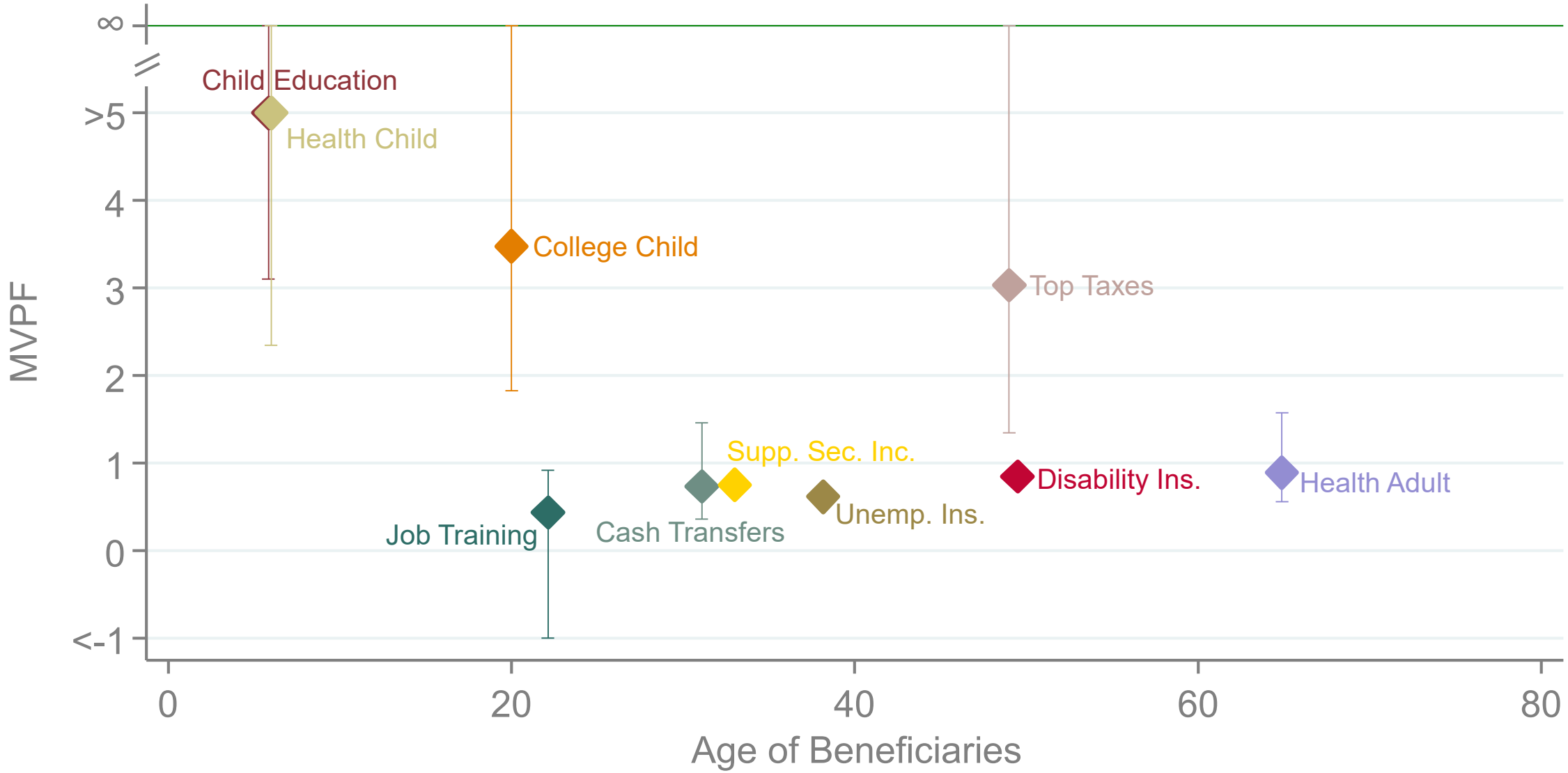
MVPF Robustness to Forecasting

No Projections for All Policies (Restricting to 5+ years Observed)



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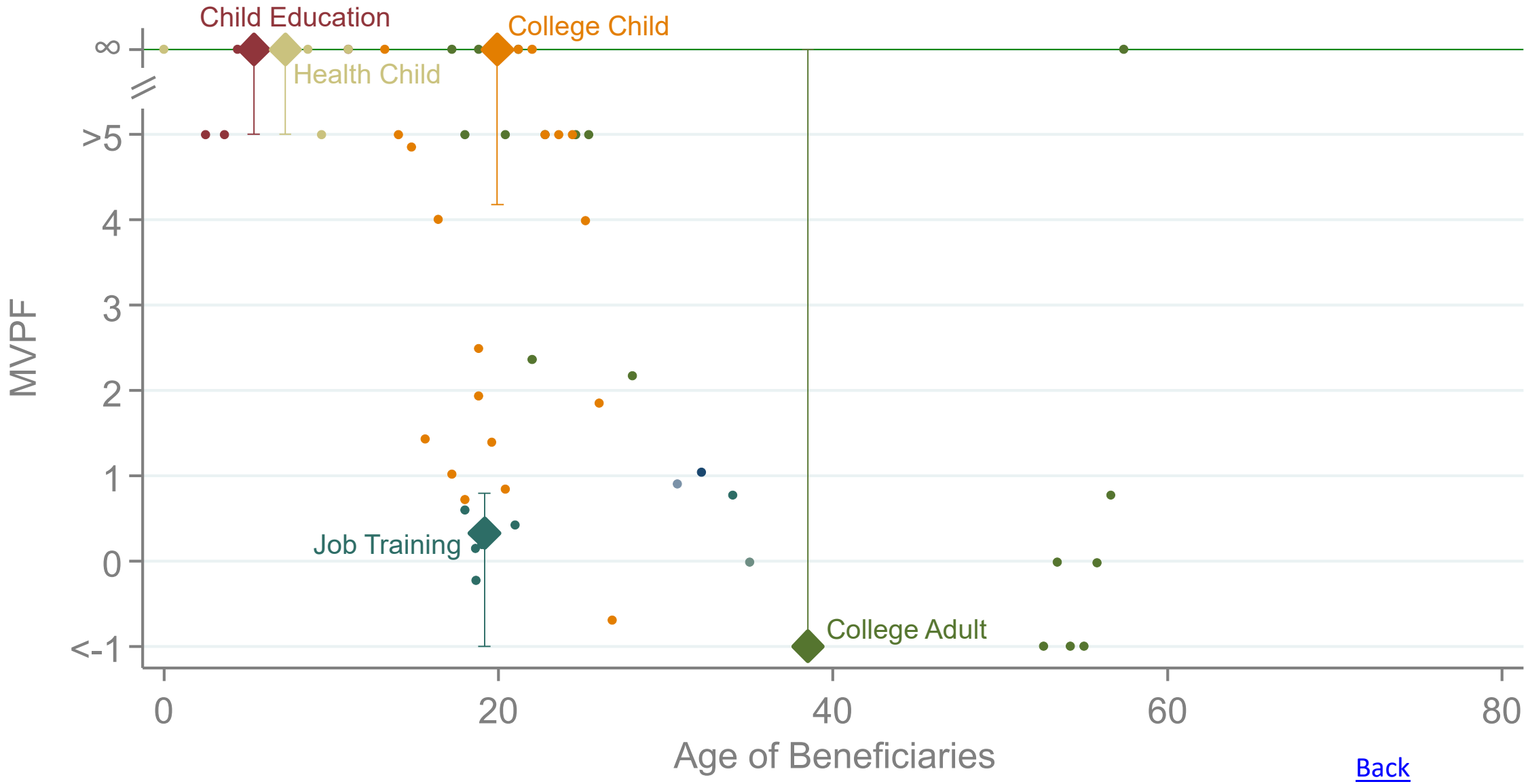
MVPF Robustness to Forecasting

Observed Impacts on Children



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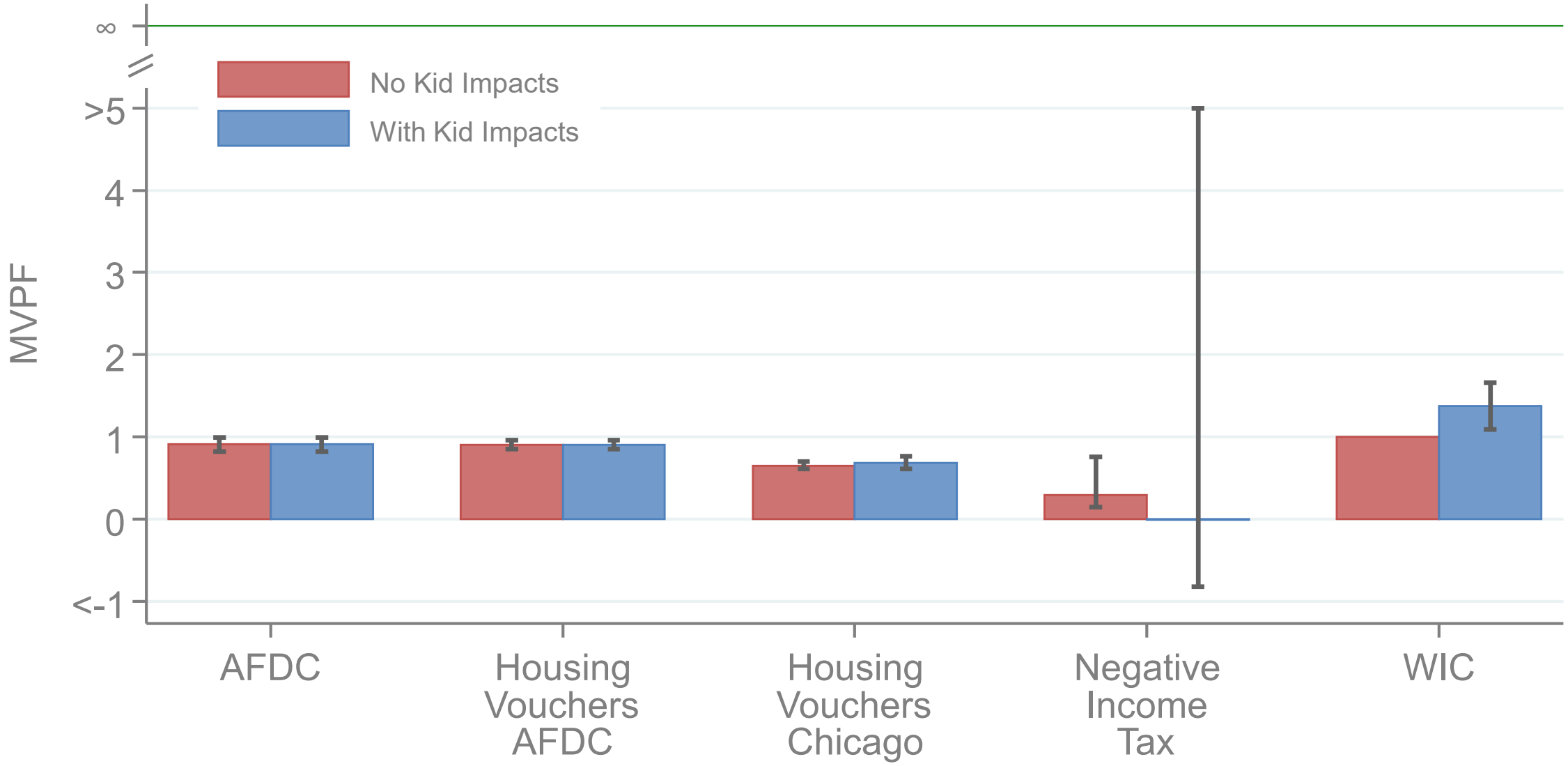
MVPF Estimates

With and Without Spillovers on Children



Theory Back

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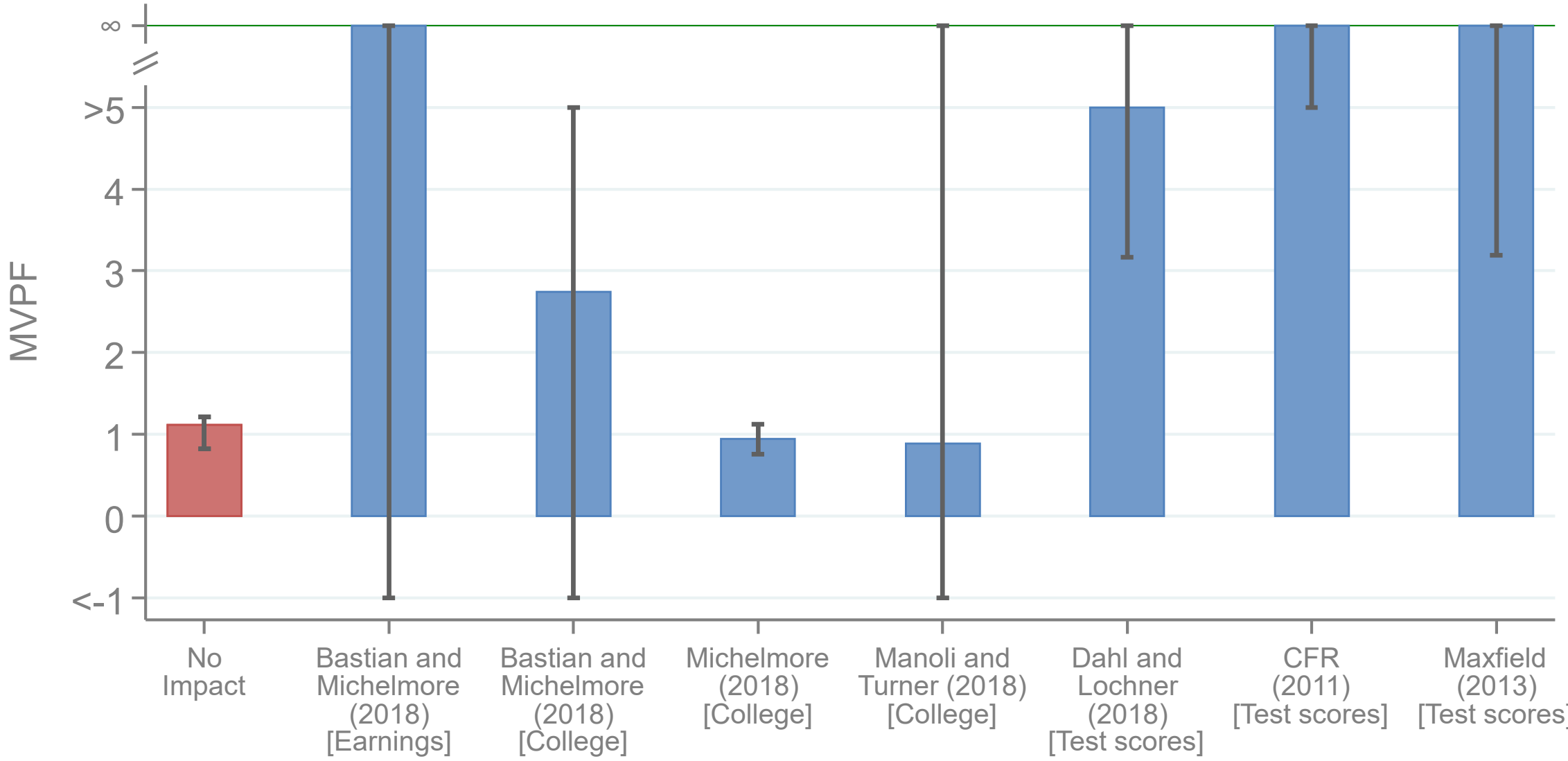
EITC OBRA 1993 MVPF Estimates

Incorporating Different Estimates of Spillovers on Children



Theory Back

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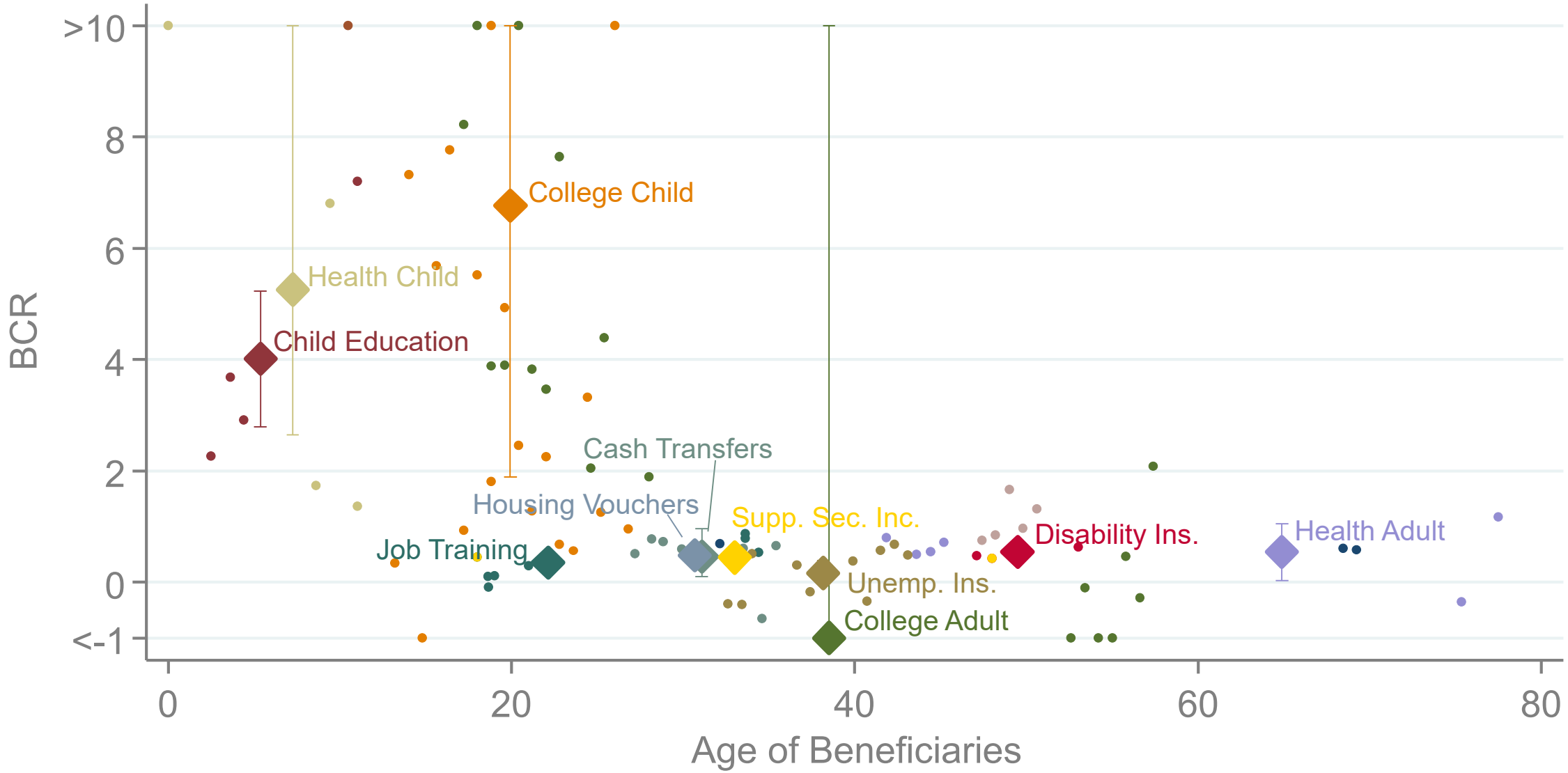
BCR by Age



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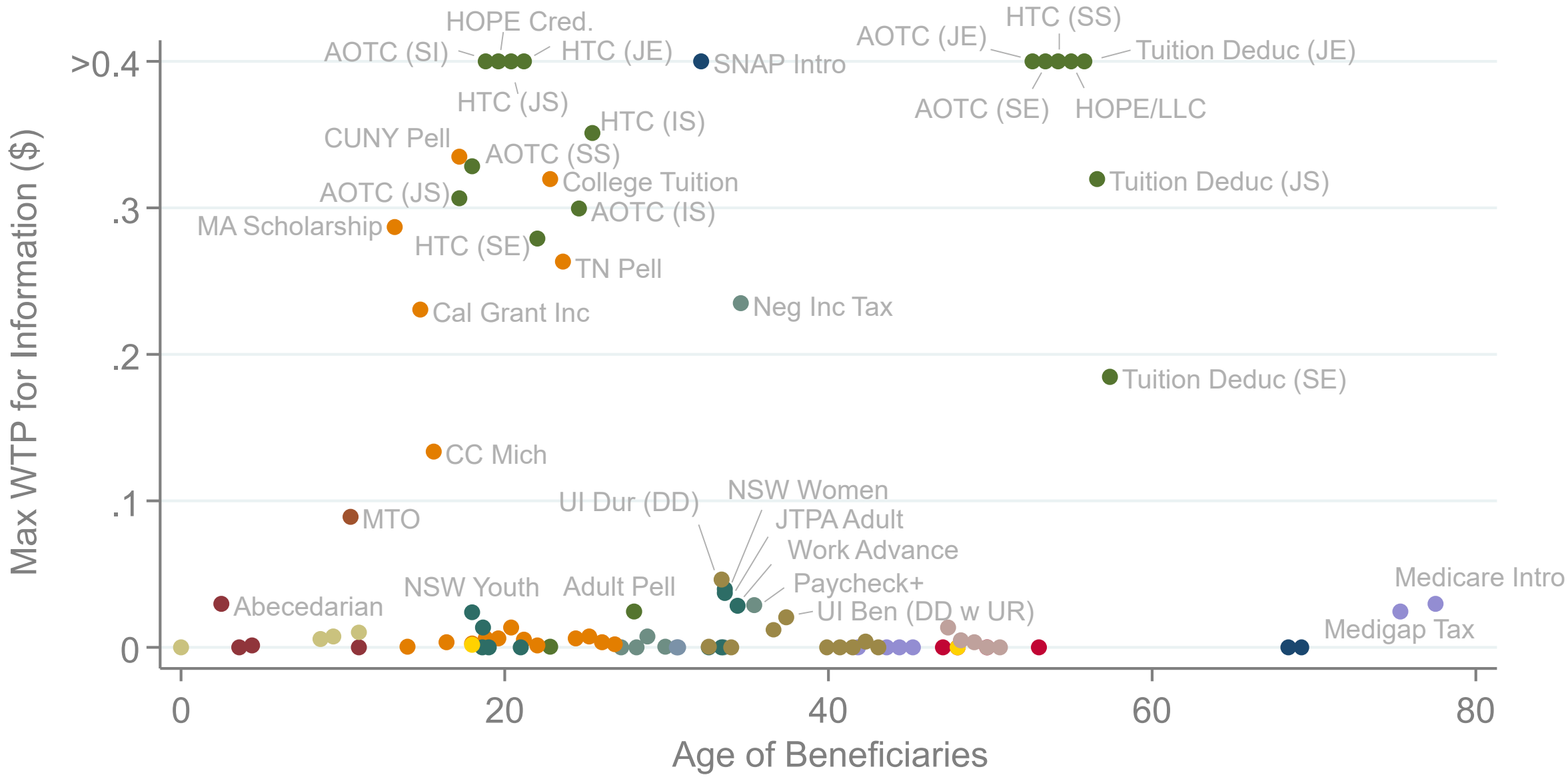
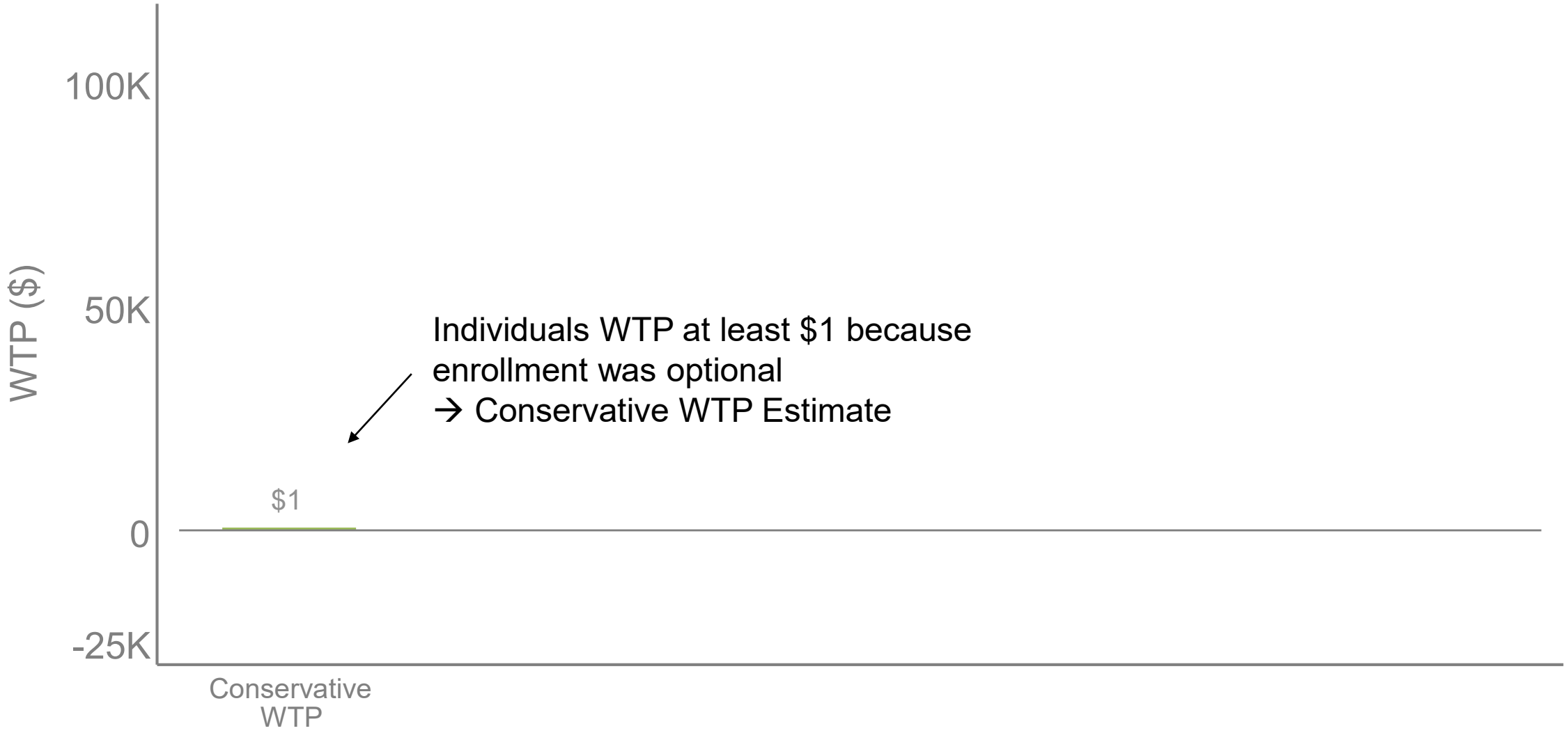
Lesson #3: Value of Removing Sampling Uncertainty



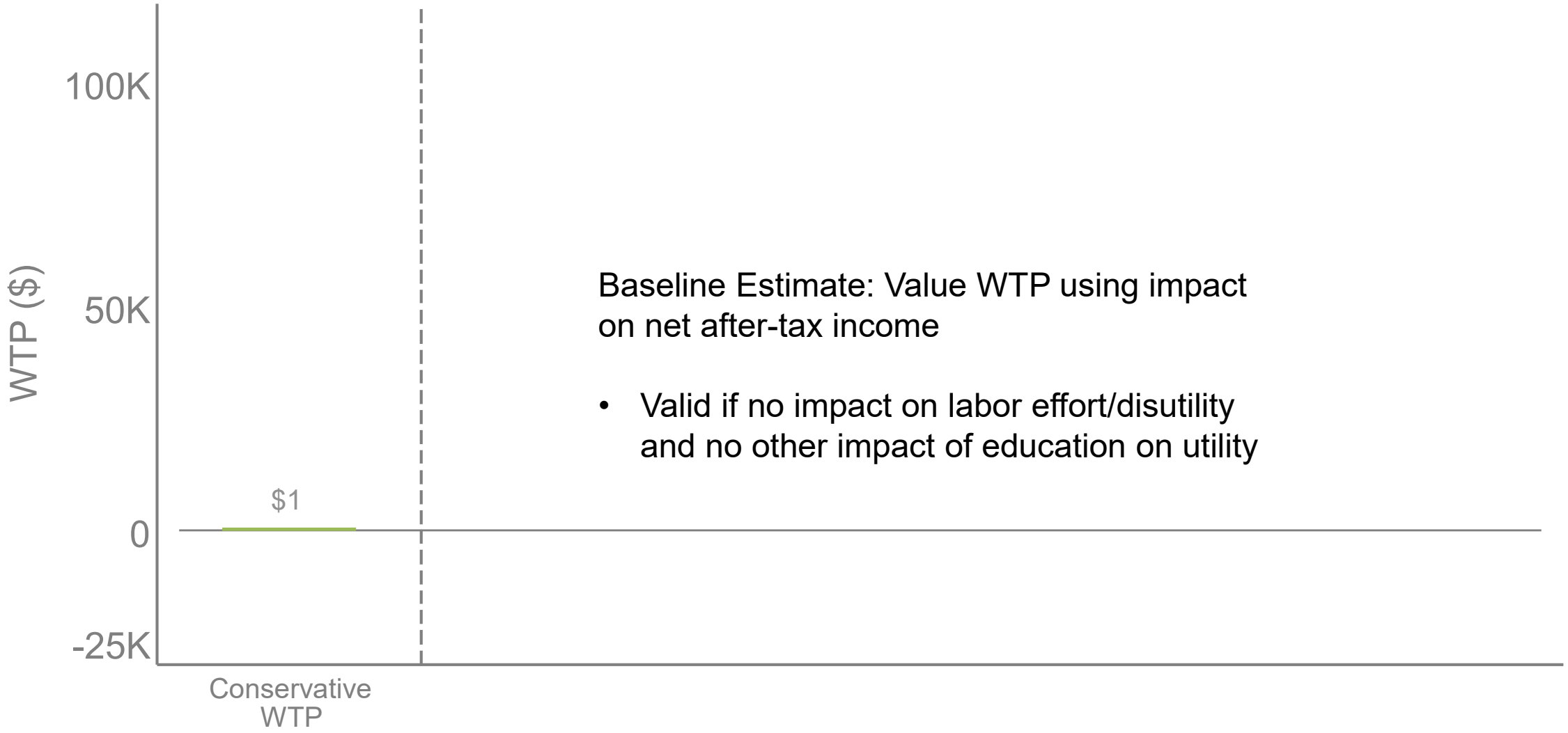
Willingness to Pay for Admission into Florida International University

Conservative WTP



Willingness to Pay for Admission into Florida International University

Baseline WTP



Baseline Estimate: Value WTP using impact on net after-tax income

- Valid if no impact on labor effort/disutility and no other impact of education on utility

Medicaid Expansion to Pregnant Women and Infants

- In the 1980s, states expanded Medicaid to pregnant women and children < 1
- A series of papers, beginning with Currie and Gruber (1996), use state variation over time in these expansions
- We combine these impacts across papers to form the implied MVPF
- Begin with government costs

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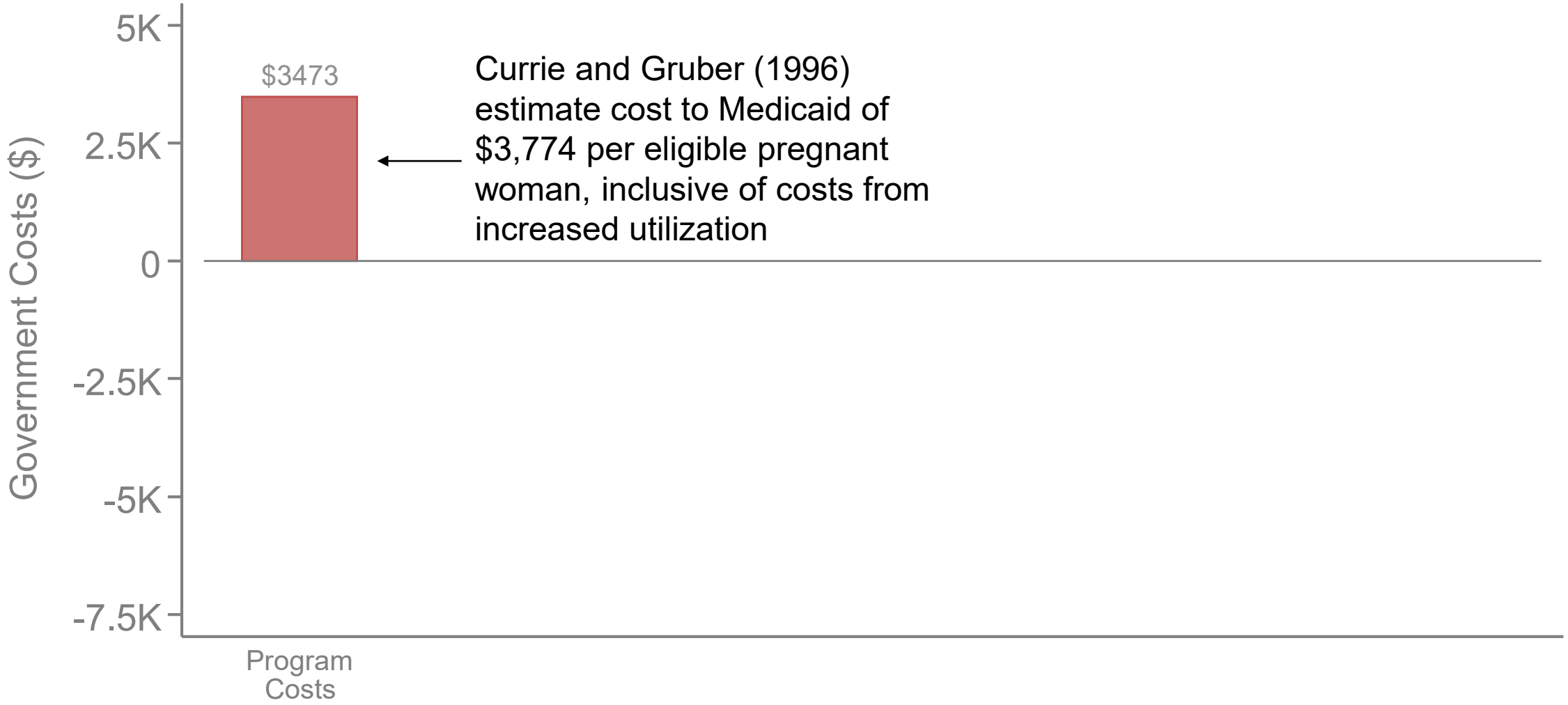
Medicaid Expansion to Pregnant Women and Infants: Costs



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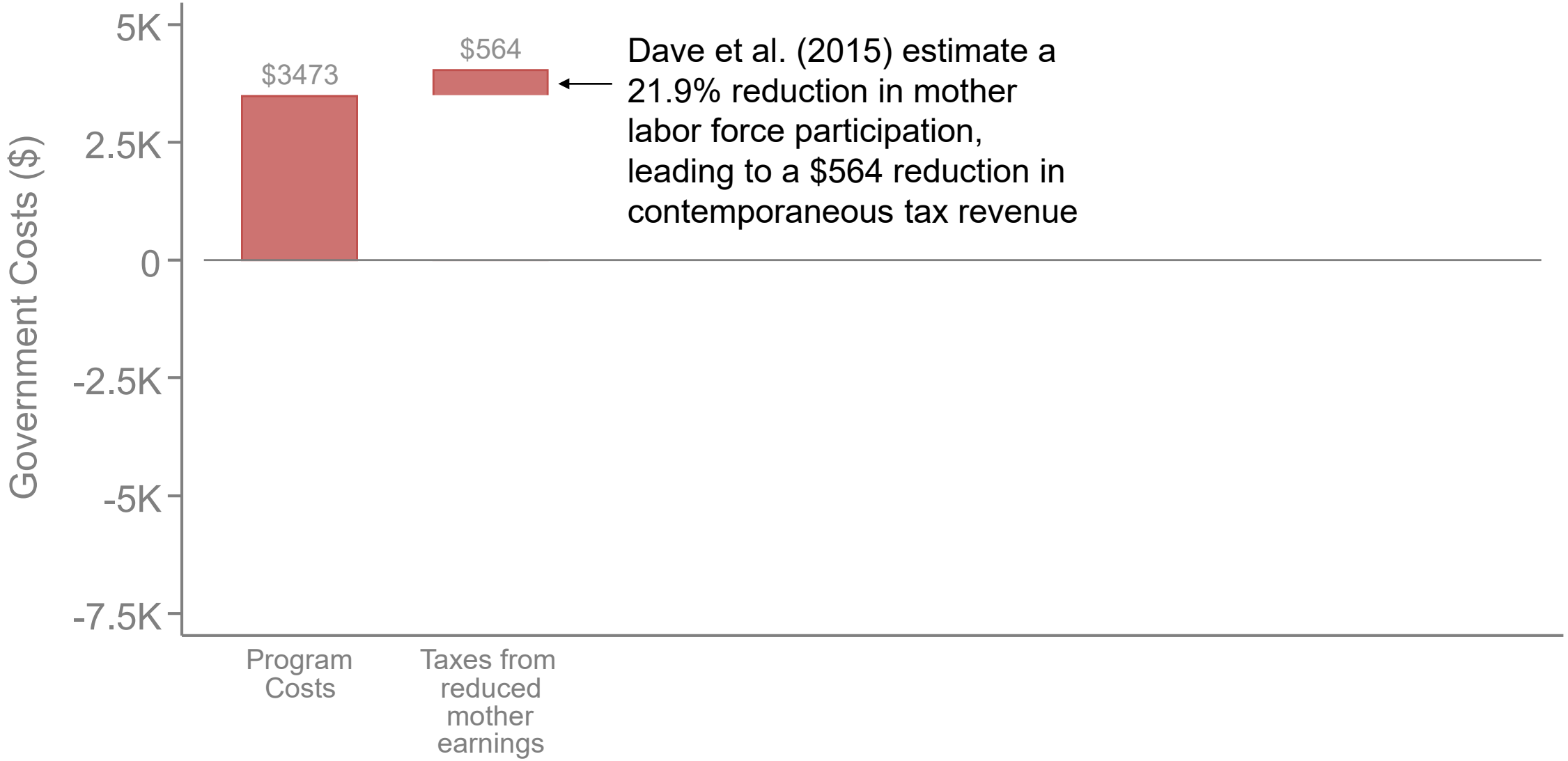

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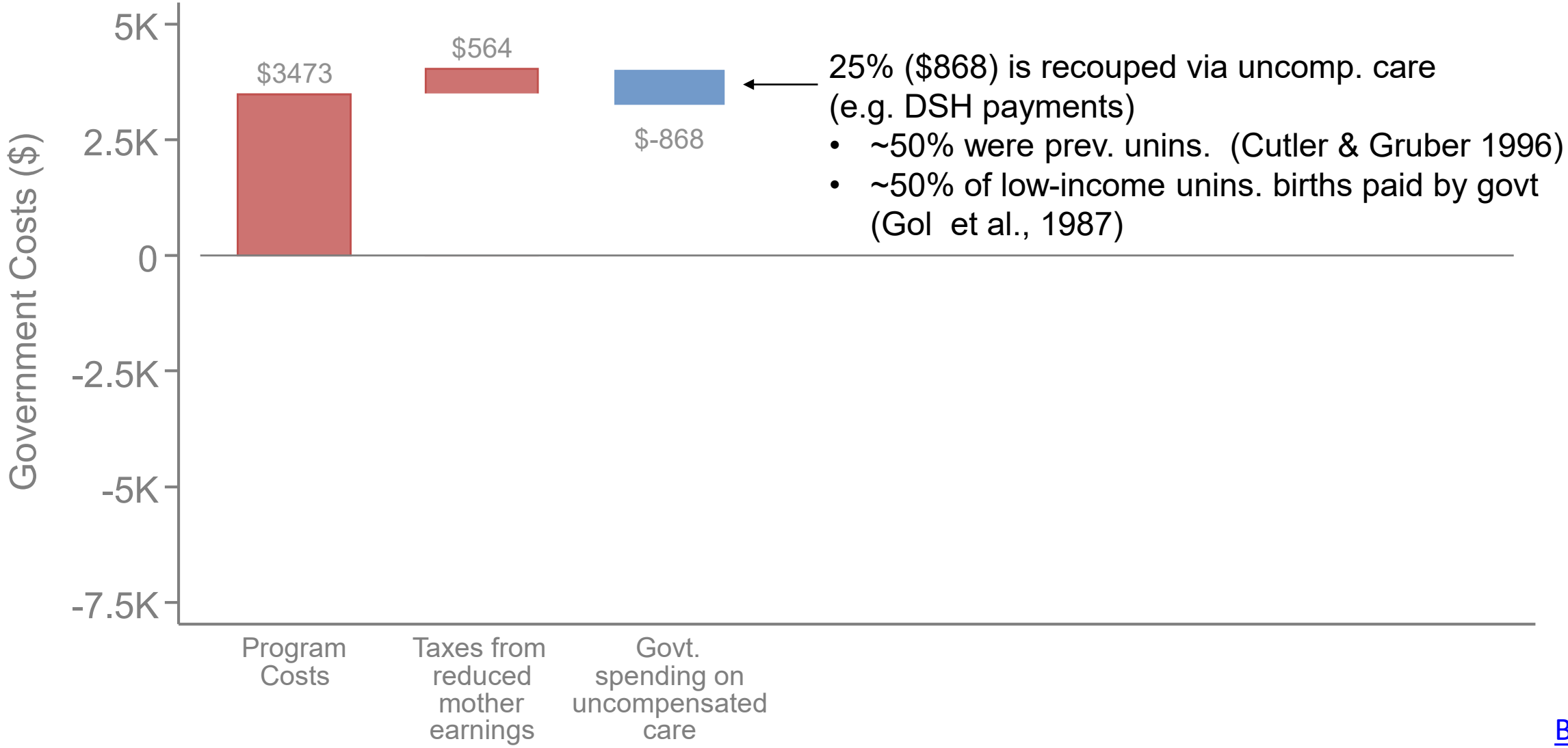
Medicaid Expansion to Pregnant Women and Infants: Costs



25% ($868) is recouped via uncomp. care (e.g. DSH payments)

- ~50% were prev. unins. (Cutler & Gruber 1996)
- ~50% of low-income unins. births paid by govt (Gol et al., 1987)

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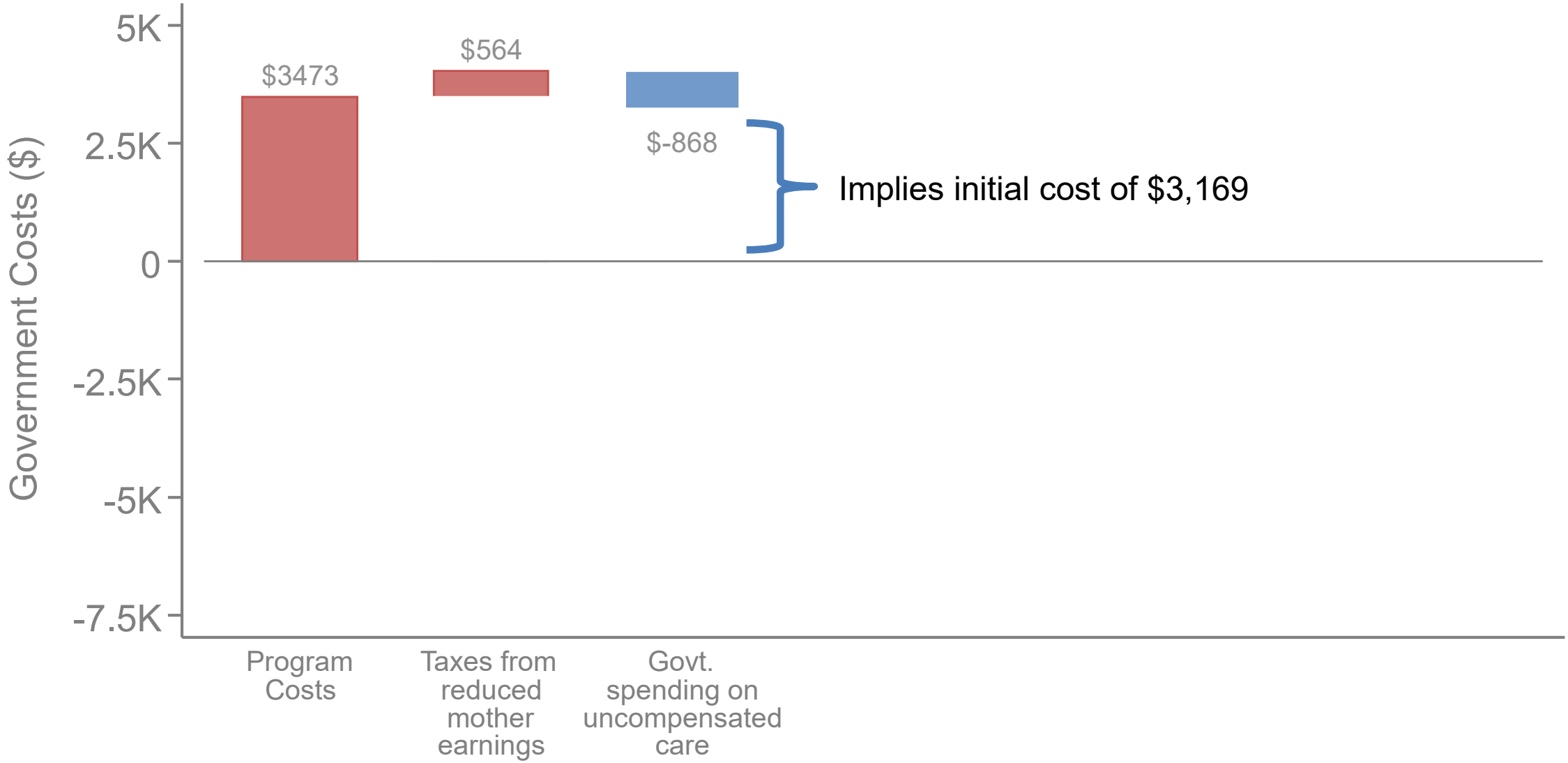
Medicaid Expansion to Pregnant Women and Infants: Costs



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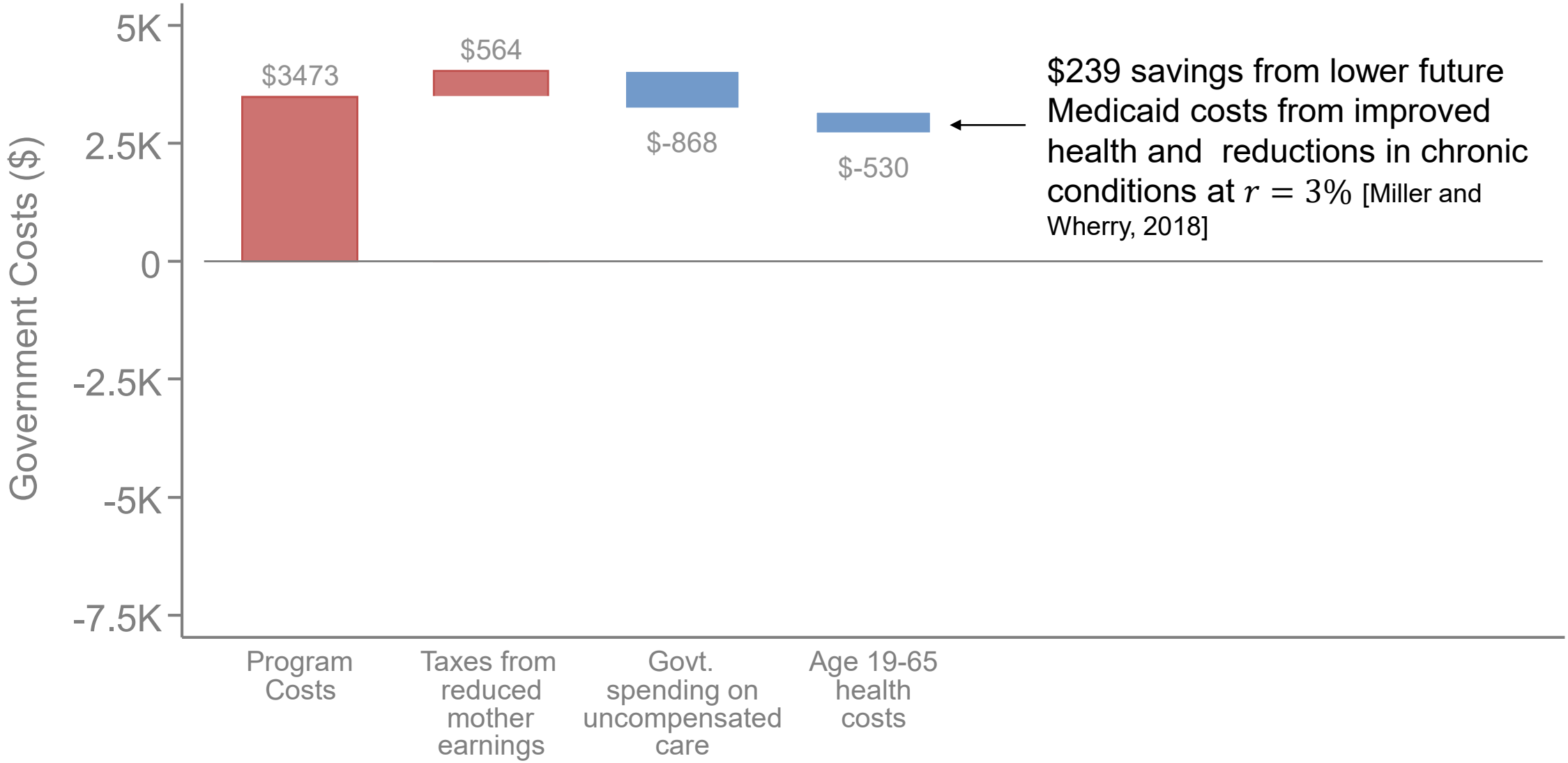
Medicaid Expansion to Pregnant Women and Infants: Costs



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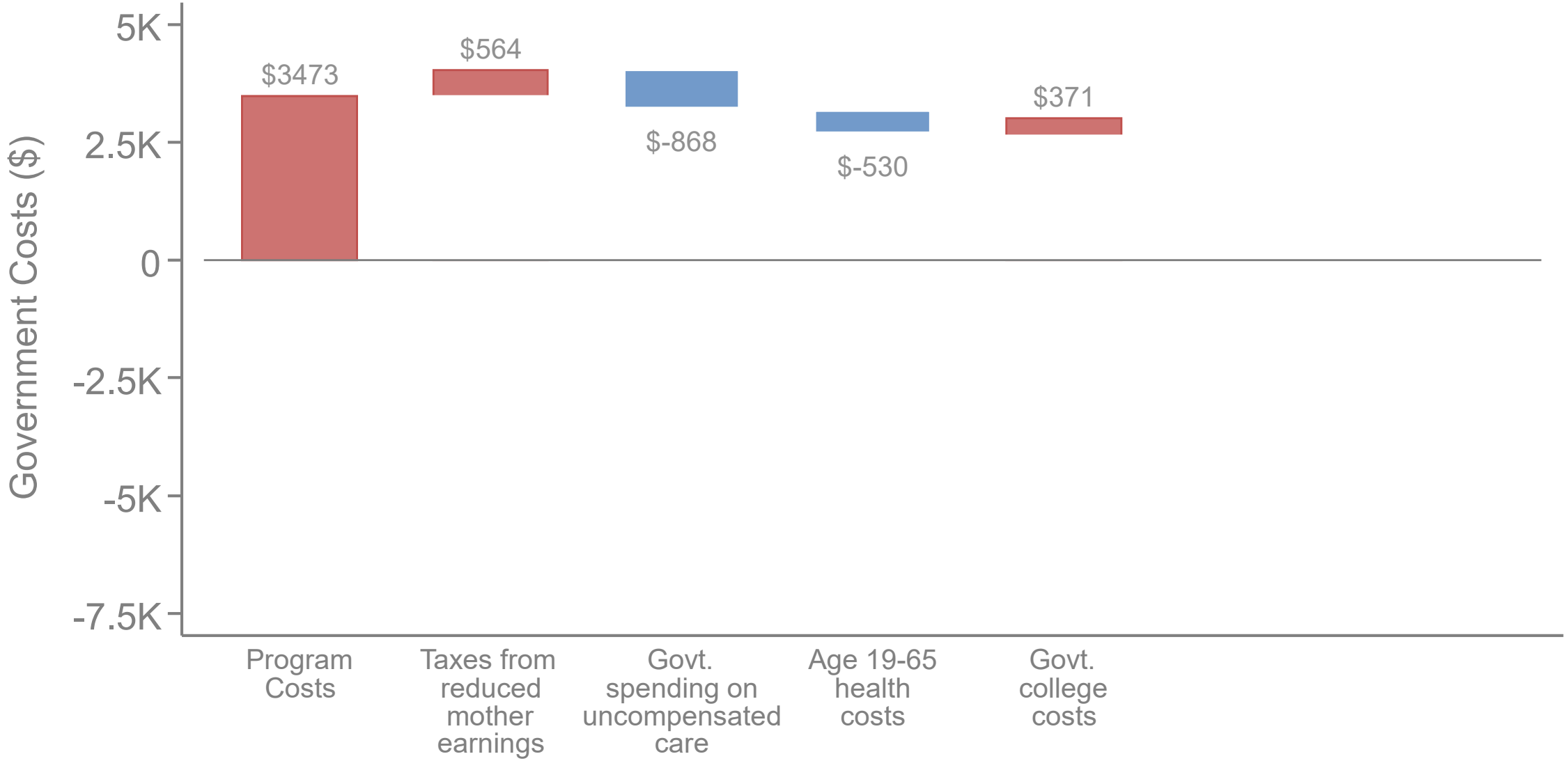
Medicaid Expansion to Pregnant Women and Infants: Costs



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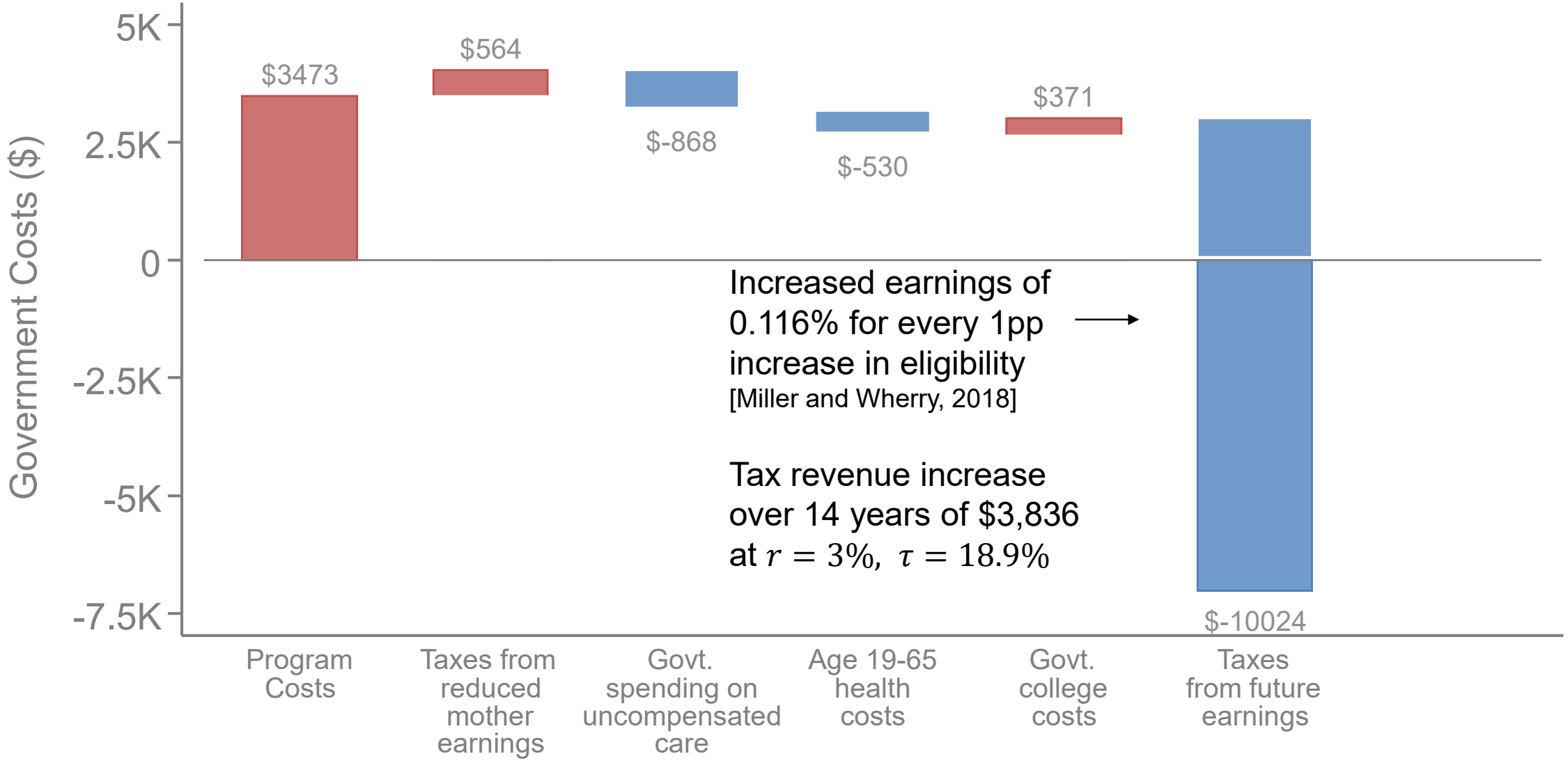
Medicaid Expansion to Pregnant Women and Infants: Costs



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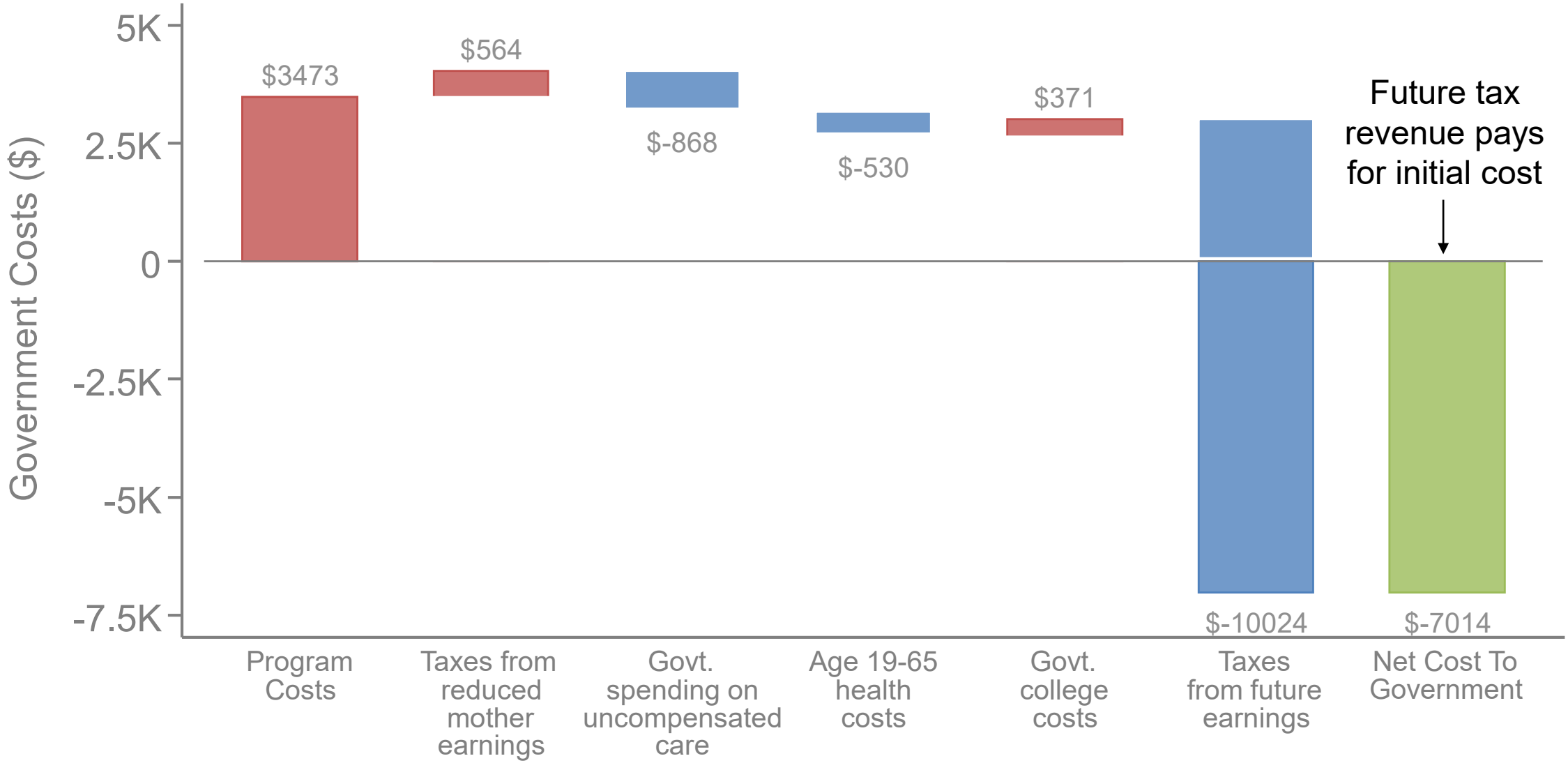
Medicaid Expansion to Pregnant Women and Infants: Costs



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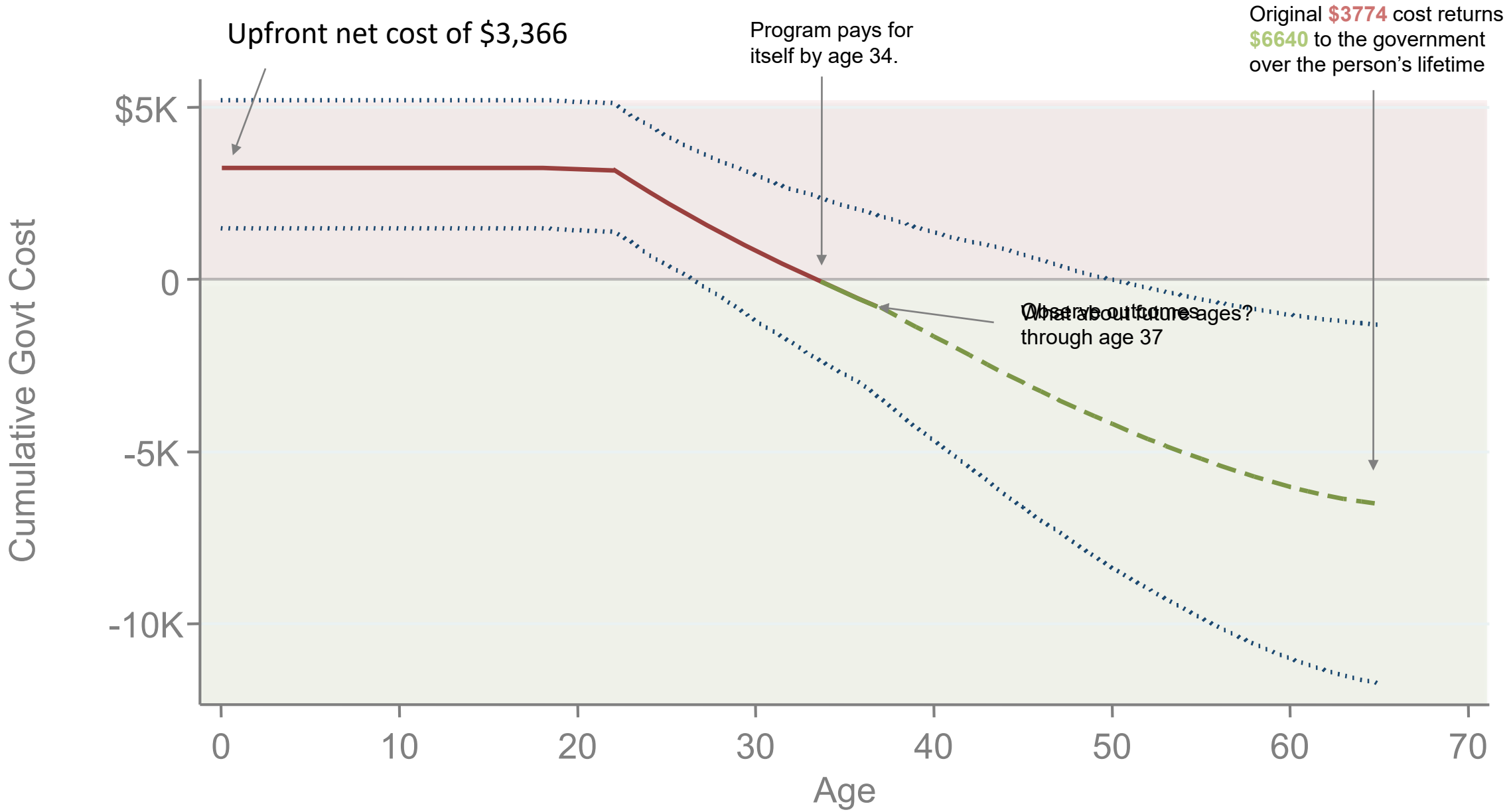
Medicaid Expansion to Pregnant Women and Infants: Costs Recouped by Age 34



Note: Costs discounted to age 0 using 3% interest rate

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Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay

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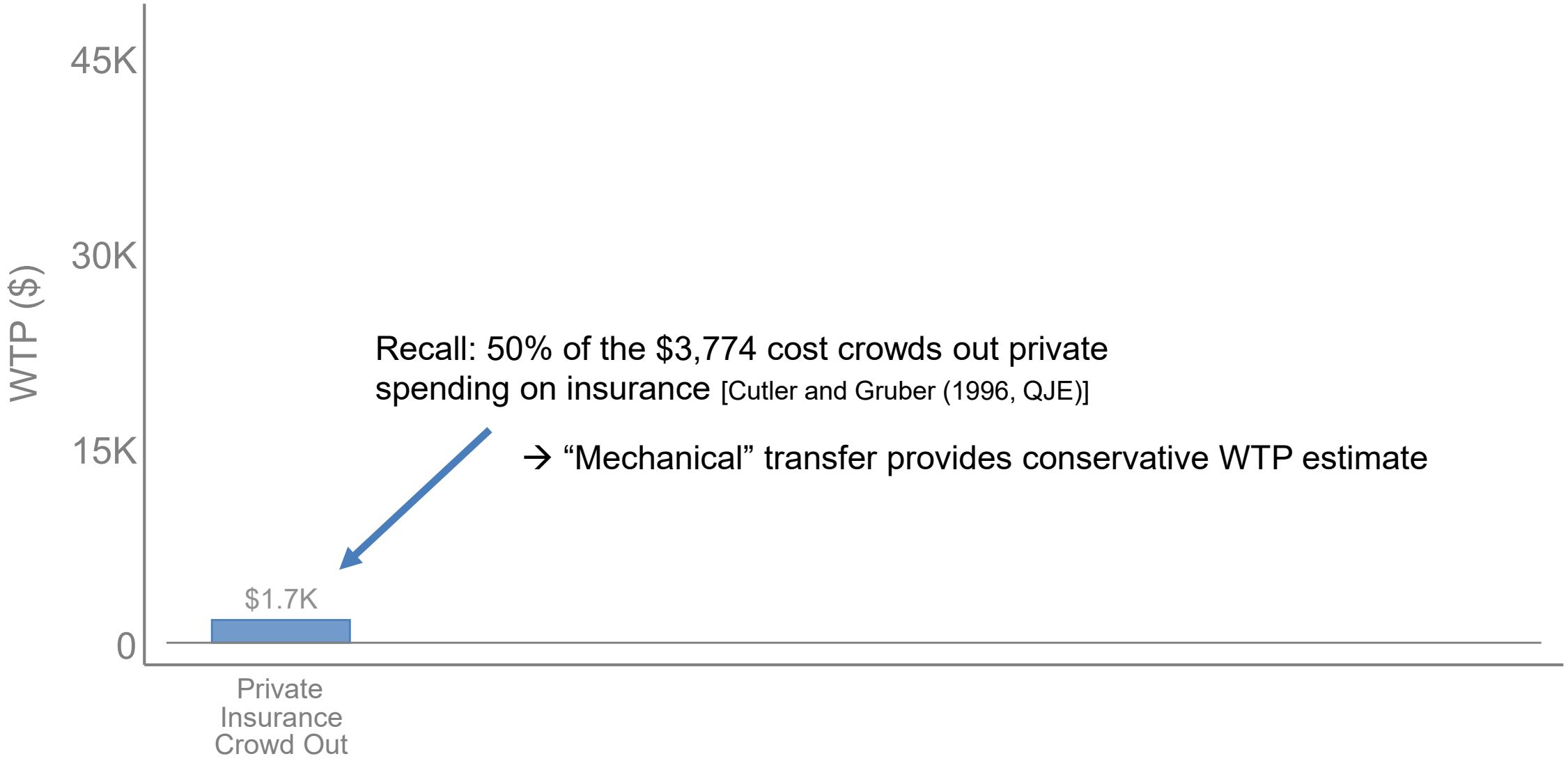
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



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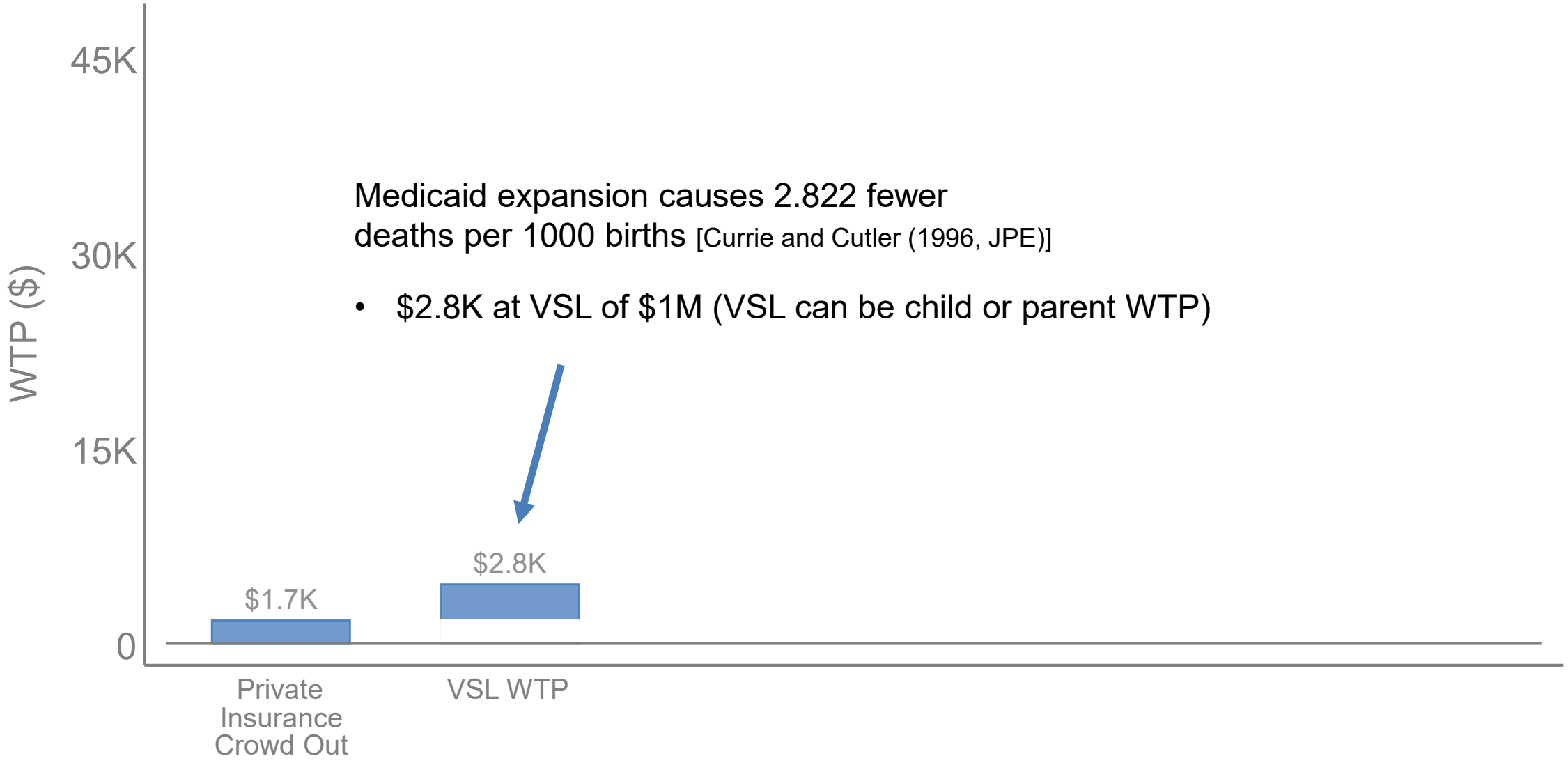
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



Medicaid expansion causes 2.822 fewer deaths per 1000 births [Currie and Cutler (1996, JPE)]

- $2.8K at VSL of $1M (VSL can be child or parent WTP)

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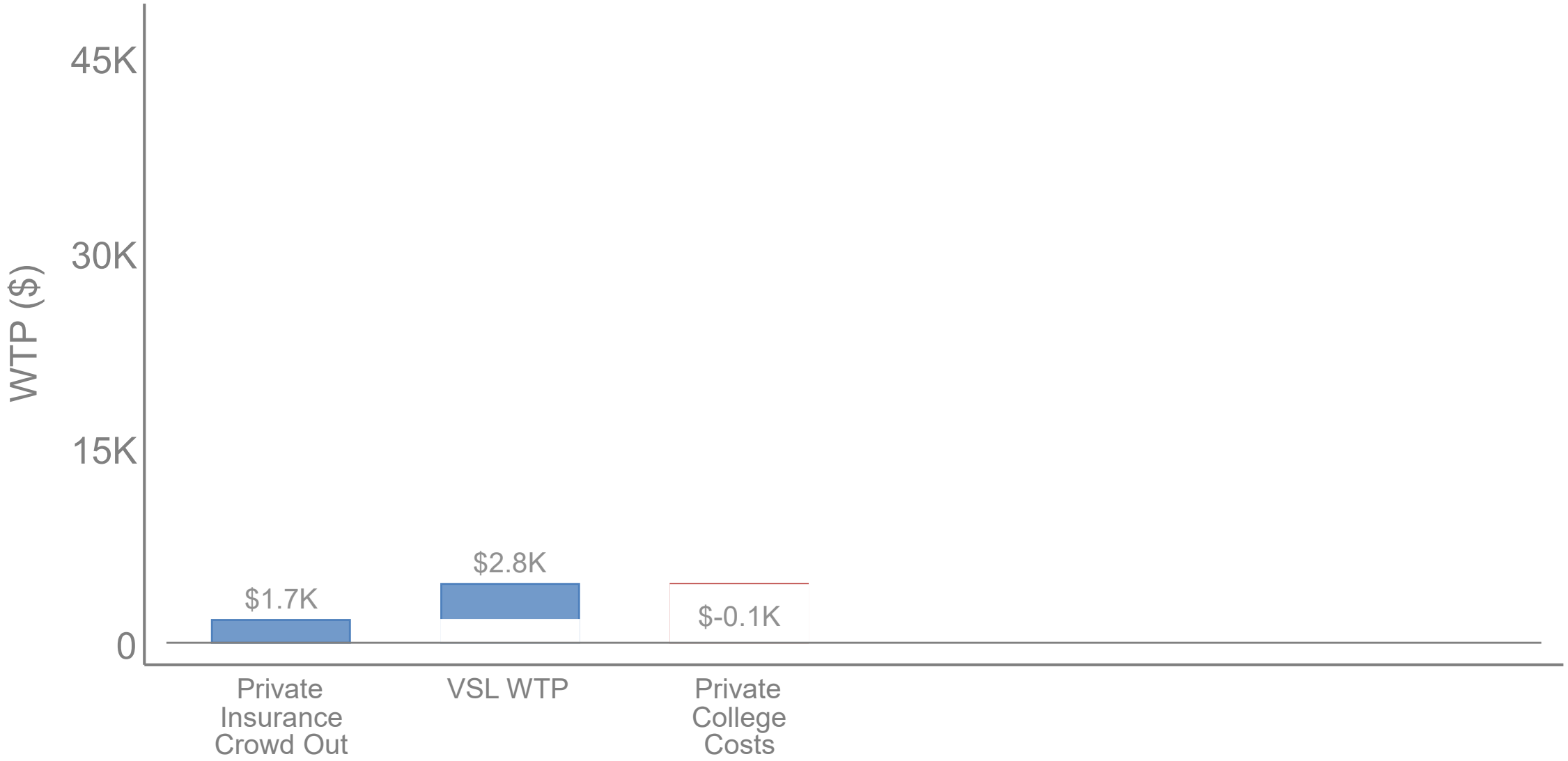
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



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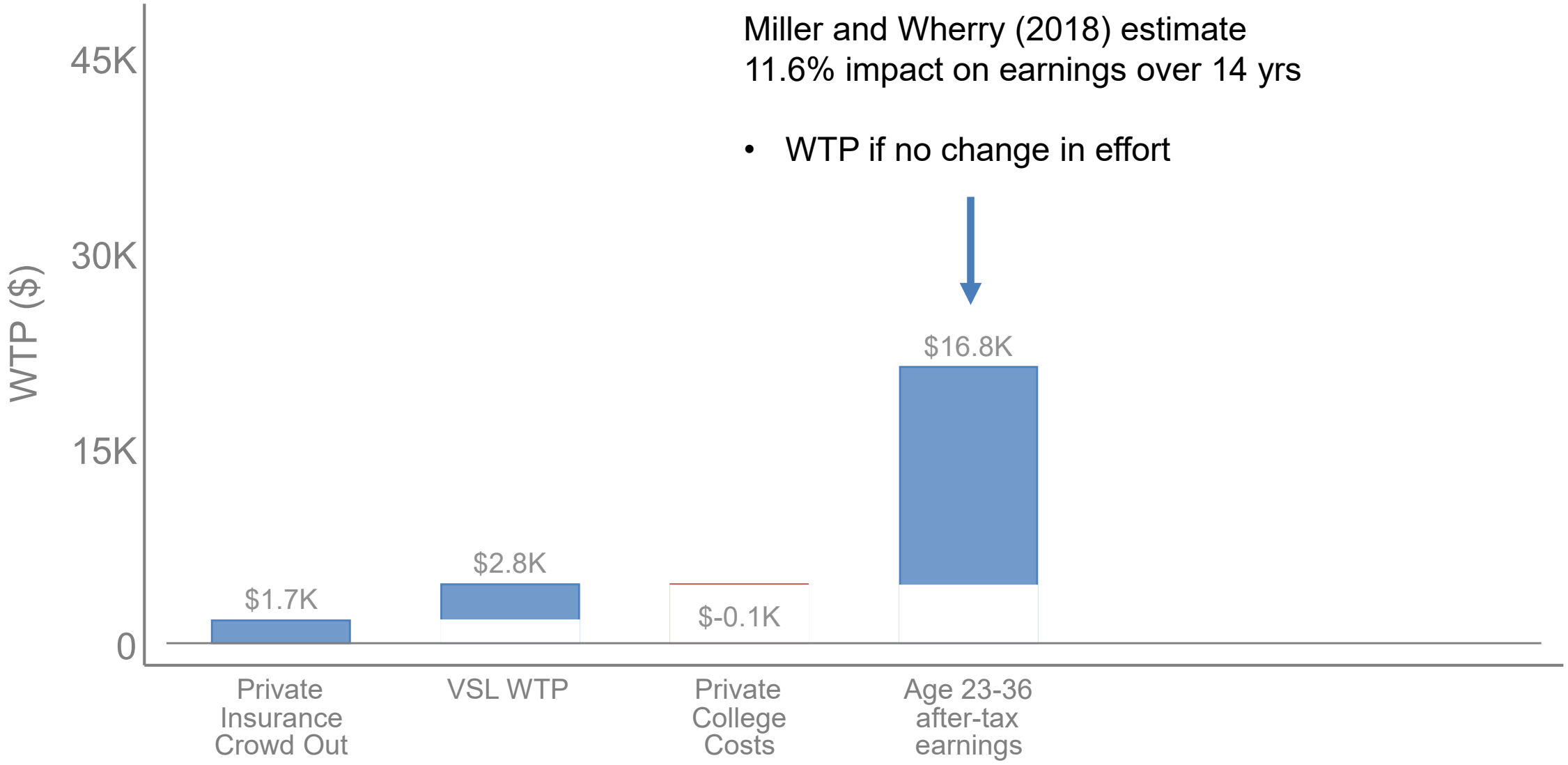
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



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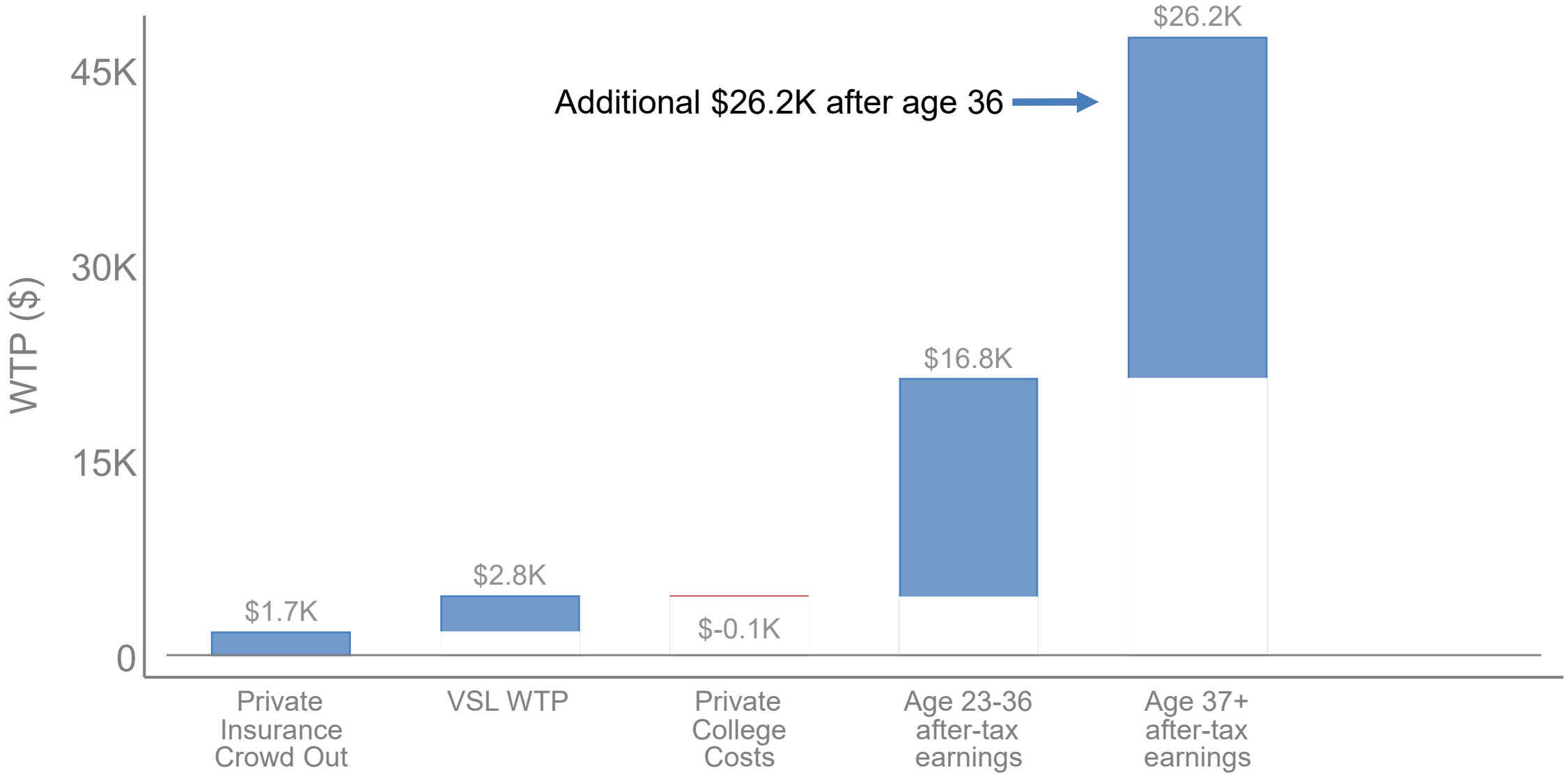
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



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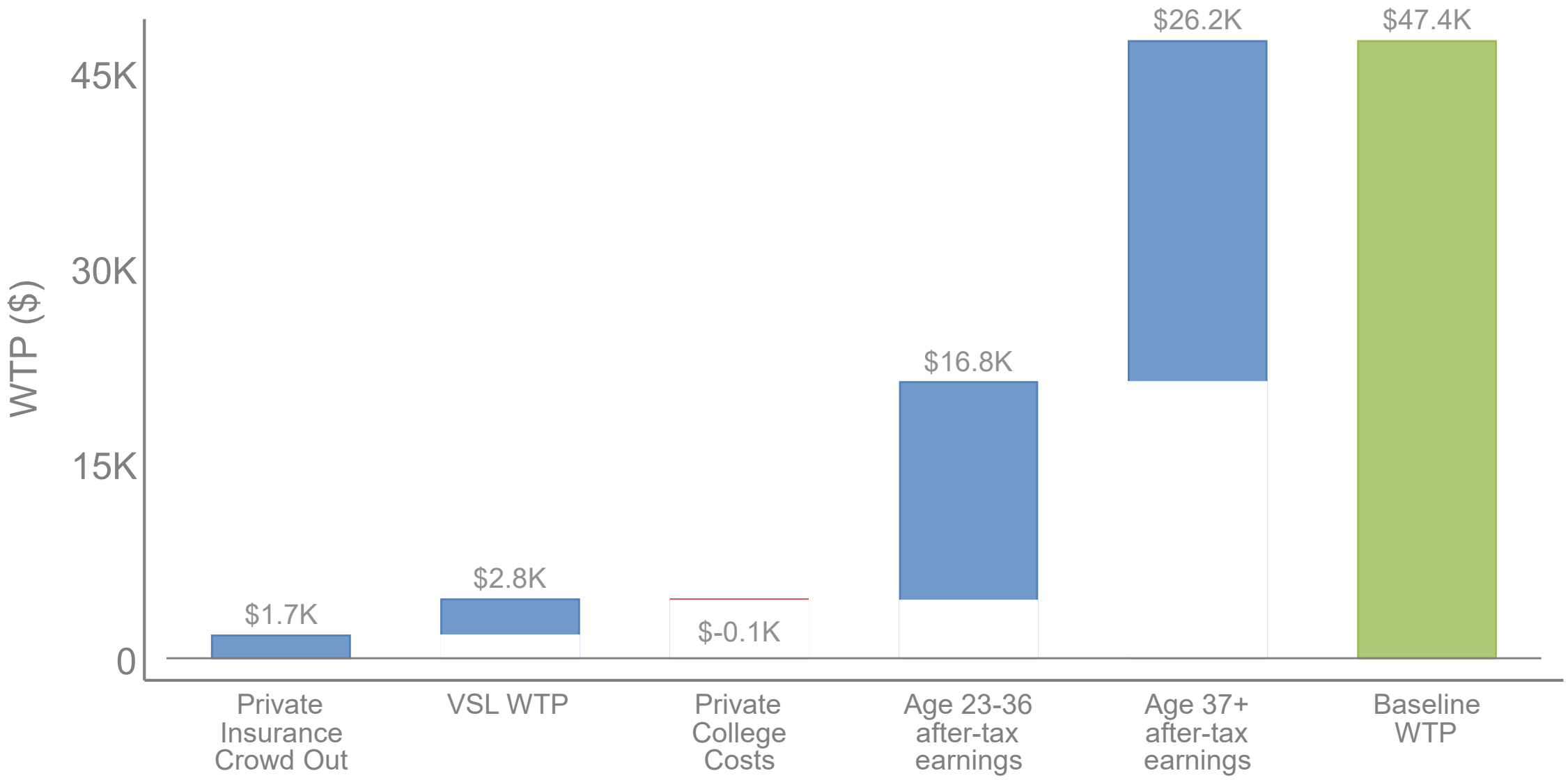
Medicaid Expansion to Pregnant Women and Infants: Willingness to Pay



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