The Insurance Value of State Tax-and-Transfer Programs

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Introduction and Overview

- *Motivation:* How are state tax-and-transfer programs sustainable in equilibrium given residential mobility across states?
- Standard result of fiscal federalism model is that under perfect mobility redistribution should occur at federal level
- Yet over the past two decades, states have expanded their role in redistribution: greater reliance on state income taxes (including state EITCs), huge spending on Medicaid
- We develop a methodology to decompose the *redistributive* and *insurance* components of state tax-and-transfer programs
  - Use the PSID to measure these two components
  - Can changes in the relative importance of the insurance value help explain the involvement of state governments in tax-and-transfer programs?

The big picture: value of tax/transfer system

- Redistributive value: The equivalent variation of getting the *expected value* of taxes/transfers (both current and future) rather than the population average.
- Insurance value: The equivalent variation of getting the actual stream of taxes/transfers rather than the expected value.

Key: Differentiating between expected and unexpected changes in circumstances conditional on your information

  - The expected component drives redistributive value
  - The unexpected component drives insurance value

- Such insurance benefits are inherent in UI, but are also present (and understudied) in public health insurance, welfare, personal income taxes, and sales taxes.

This paper

- PSID 1968-2005: panel data following individuals and families over time.
- Measure the bundle of tax/transfer policies in the state:
  - Taxes: personal income (including state EITC), sales tax
  - Transfers: AFDC/TANF, Medicaid, SCHIP
- Develop a methodology to decompose tax/transfer system into redistributive and insurance components
- This requires measuring tax/transfer benefits for individuals under counterfactual outcomes (different earnings, family structure and so on) → tax and program calculators.
- Once we have this in place we can explore the importance of changes in mobility, tax/transfer programs and so on.

→ **Ultimately a descriptive paper**
(no estimates of behavioral response to policy)

Connections to other work

- Varian (1980) extends optimal tax problem to allow for insurance component to redistribution
- Many papers extend political economy voting models to explore importance of insurance vs. redistribution in centralized government redistribution policies (Buchanan 1976, Benabou & Ok 2001)
- Empirical analyses of impact of state taxes on pre-tax earnings (Feldstein & Wrobel 1998)
- Current vs. lifetime incidence of taxes (Pechman 1985, Fullerton and Lim Rogers 1993) and social security (Brown et al 2009); long-run participation in means tested transfers (Bane and Ellwood, Blank and Ruggles)
- Consumption smoothing of social insurance (Gruber 1997 UI) and means-tested transfers (Gruber 2000 AFDC).

Our contribution

1. Develop a methodology that decomposes the value of government policies into insurance and redistributive elements
2. Focus on state (rather than federal) tax-and-transfer programs.
3. Emphasis on estimating the value of the state tax-and-transfer programs and decomposing their sources of change.
4. Model the major state tax-and-transfer programs including taxes (income taxes, state Earned Income Tax Credit, sales taxes) and means-tested transfers (AFDC/TANF, Medicaid, and SCHIP).

Outline

1. Introduction (done)
2. Methodology
3. Data and implementation
4. Results
5. Conclusion

2. Methodology

Basic thought experiment behind our measurement:

- The *total value of the government policies* is the equivalent variation of the tax-and-transfer system relative to a baseline of having no tax-and-transfer system
- In the absence of the tax-and-transfer system, each individual pays the lump sum tax
- Government expenditures are unchanged across the two states of the world
- The equivalent variation is the amount such that the individual is indifferent between the tax-and-transfer system and the equivalent variation and lump sum tax

2. Methodology (cont)

Insurance vs. Redistribution:

- Redistribution: The expected net benefit (= transfer - tax)
- Insurance: The unexpected component of the net benefit

Note:

- Future net benefits are uncertain because of income shocks / mobility, changes in family composition, and residential mobility.
- Individuals care about future net benefits from their current state to the extent they expect to continue to reside in that state (so residential mobility affects the "effective horizon")
- Net benefits have insurance value if (i) individuals are risk averse and (ii) the unexpected component covaries negatively with income

Key empirical challenge: modeling conditional moments

- Need to calculate for each individual a *conditional* expectation of future net benefits and the *conditional* covariance between income and future net benefits. What is the relevant information set on which to condition these moments?

Expanding to within-person vs. between-person values

We measure the value of the tax and transfer system over a 10-year horizon → there is redistribution and insurance both *within* and *between* persons.

We will distinguish these components (so calculate all 4 cells):

	Insurance Value: EV of realized net benefits relative to expected net benefits	**Redistributive Value:** EV of expected net benefits relative to overall mean net benefits
Across-person Value: EV of the net benefits if persons can perfectly smooth consumption over time	Transfer from those with unexpectedly high income to those with unexpectedly low income	Transfer from those with high expected income to those with low expected income. Note: This is the only cell that does *not* depend on risk aversion.
Within-person Value:	Transfers within a person from periods of unexpectedly high income to periods with unexpectedly low income	Transfers within a person from periods of high expected income to periods of low expected income. (Not important, can plan for this.)

Effective Total Value = Sum of highlighted cells

The Value of a Tax/Transfer Program

- **Total Value:** The Equivalent Variation (EV) of being subject to the state's current T&T system relative to a baseline of receiving the state's mean net benefit. (Link to equation)
  - The difference between two states' total values is a measure of an individual's incentive of move between these two states *if* the individual values the difference in the states' non-transfer spending by the difference in the states' mean net benefit.
- **Insurance Value:** The Equivalent Variation of being subject to the state's current T&T system relative to a baseline of receiving your expected net benefit. (Link to equations)
- **Redistributive Value:** The Equivalent Variation of receiving your expected net benefit relative to a baseline of receiving the state's mean net benefit. (Link to equations)

Maintained assumptions

- Income is exogenous: we do not model distortions due to the tax-and-transfer programs
- The incidence of tax-and-transfer programs falls fully on workers
- Utility depends only on consumption; individuals fully consume net income each period (no saving/borrowing)
- CRRA utility as a function of family consumption adjusted for family size (using an equivalence scale) for person i in state s in period t:

$$U(C_{ist}) = \frac{C_{ist}^{1-\rho}}{1-\rho}$$

  - Set ρ=3 as baseline (and for robustness ρ=1 and ρ=5)
  - Discount future utility with a 3 percent discount rate

Three ways of valuing the state T&T program

1. "Naïve" Annual Value $= B_{ist} - \overline{B}_{st}$
   - Only considers net state benefits in the *current* year

2. Across-person Redistributive Value

   Across-person redistrib. value = naïve annual value + horizon effect

   Horizon effect reduces value for poor and increases value for rich

   This equalization effect is stronger if:

   - More mean reversion in income (i.e., more income mobility)
   - Individuals stay longer in current state (i.e., less residential mobility)

3. Effective Total Value

   Effective total value = Across-person redistrib. value + insurance value

   Insurance value is positive for everyone and stronger if:

   - Higher income uncertainty (conditional on current information)
   - Net benefits are a more negative function of income (more redist)
   - Individuals stay longer in current state (i.e., less residential mobility)

Estimating Conditional Expectations I

- Define $X(i,t)$ as the set of individuals in year *t* with the same values of their conditioning variables as individual *i* (e.g., same income, family composition, state of residence).

- Use the path of realized outcomes for those in $X(i,t)$ to form expectations for person *i*.

- Problem:

  We'd like to calculate conditional expectations non-parametrically by taking the mean of realizations of all individuals *j* in $X(i,t)$. In practice, this is *not* feasible since there are only very few observations with the same income, family composition, and state of residence.

Estimating Conditional Expectations II

Two possible solutions to this dimensionality problem:

1. Limit the set of conditioning variables
   - Highly restrictive assumption; conditional expectations will be less accurate

2. Create a parametric model
   - Need to model the *joint* mobility in income, family composition, and state of residence
   - Income mobility has many dimensions
     - expected trend (that may vary by initial income, education, state, occupation, age, family composition),
     - the variance of shocks around the trend (that again might vary with all these factors)
     - the pattern of serial correlation in these shocks (not just 1st order serial correlation)
   - Difficult to model changes in family composition

Hybrid Solution – combination of two approaches

Use non-parametric approach for conditional joint income and family composition processes:

- Define *X*(*i,t*) coarsely using cells defined by: year, income decile, current net benefit quintile, and age decade.
- Do not use state to construct *X(i,t)*. Instead take each *j* in *X(i,t)* and assign it *B* using *i*'s state's program rules. (We use state T&T calculators to get *B*. We can use realized values for *Y* and *F*.)
- Benefit percentiles, defined *within* income group, are meant to capture determinants of *B* such as family composition, education, that predict future income and benefit use.

Parametric model for residential mobility

- Estimate hazard model of leaving state of residence as function of fixed effects for state, year and demographics (polynomials in age, income percentile and changes in income percentile; interactions of these polynomials with the generosity of the state's T&T system, dummies for gender, own and spousal education, marital status, family size, number/ages of children, and foreign born)

Assumptions Needed for Hybrid Solution

<u>Key assumptions:</u>

1. The joint income and family composition process does not depend on state of residence (after conditioning on current income decile and effective net benefit quintile).

2. Initial effective net benefit percentile is a sufficient statistic for household characteristics (other than income, age) that are predictive of future benefits.

3. The probability of leaving the current state of residence *k* years in the future can be modeled parametrically (so no interactions between the various explanatory variables of the hazard model).

Likely bias if, as seems likely, the conditioning set is too coarse

- Since the individual in all likelihood has more information about the future than available from the conditioning set, we likely overestimate the conditional covariance between income and net benefits

- Consequences:

  → Upward bias in insurance value. Moreover, since insurance value increases with income this bias is likely larger for higher incomes. Any way to bound this bias?

  → no bias in redistributive value when plotted by income (by the law of iterated expectations; income is in the conditioning set)

Using a kernel smoother to operationalize $X(i,t)$

- As an alternative to assigning fixed groups based on income decile, net benefit quintile and age decade, we identify the observations "closest" to observation *i.*
- Define the distance from *j* to *i* by:

$$d(i,j) = \sqrt{\left(\frac{p_i^{income} - p_j^{income}}{h^{income}/2}\right)^2 + \left(\frac{p_i^{benefit} - p_j^{benefit}}{h^{benefit}/2}\right)^2 + \left(\frac{age_i - age_j}{h^{age}/2}\right)^2}$$

- Information set includes all those with all *j s.t* $d(i,j) \leq 1$
- We use weights, decreasing in $d(i,j)$
- We set $h^{income} = 10$, $h^{benefit} = 20$, and $h^{age} = 10$.

Common Macro Shocks

- In the framework described so far, common shocks are treated as expected (since they occur for all realizations in the set $X(i,t)$).
- Many common year-specific shocks (e.g. recessions) are not expected, and state T&T programs provide value by insuring against them.
- We adjust for this by adding counterfactual income paths not only in year *t*, but in the 3 years before and after *t* . So $X(i,t)$ contains all observations from a 7-year window centered around year *t*.
  - We take all 10-year income and household composition paths *starting* anywhere within this 7-year window
  - We shift the start date of all the paths to year *t* (calculating the net state benefits they would have received under the rules of year *t*)

3. Data and Implementation

- Panel Study of Income Dynamics
  - Interview years 1968-2005 (→ income years 1967-2004)
  - Bi-annual interviews starting in 1997
  - We include an individual in base year t if: they are observed for the next 9 years
  - Limit sample to ages 25-52 in base year so <62 throughout 10 year forward calculation (avoid retirement)
- Three "decade" samples for base years: 1972, 1982, 1992
- Baseline sample = 1992 [with 10 year look-forward and 3-year time shifting for common shocks, this uses data through 2004]
- All calculations use PSID weights (oversample low SES)
- Link to summary statistics

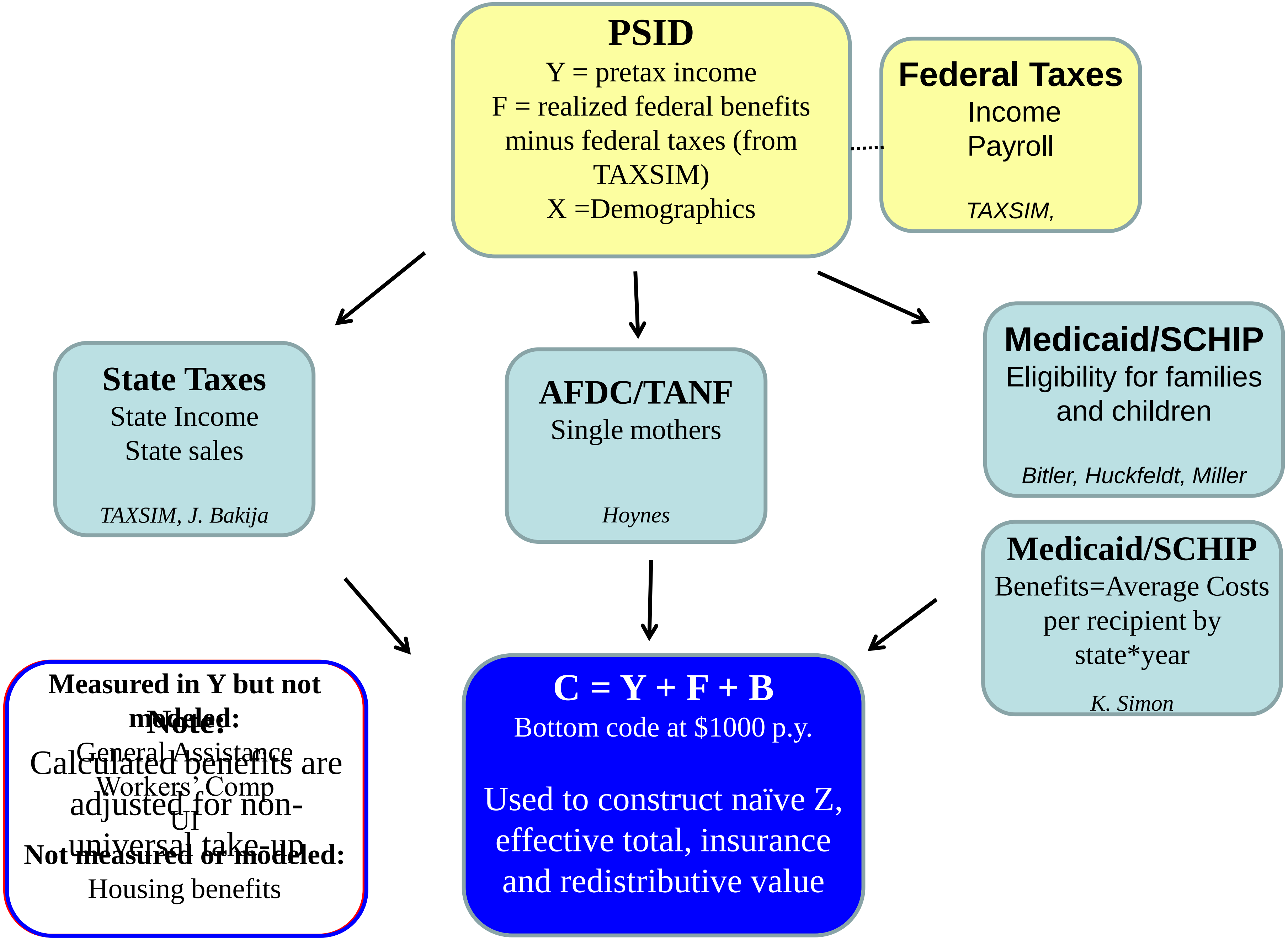
3. Data and Implementation (cont)

- Unit of observation is the individual, but income and benefits are at the family level (adjusted for family size using equivalence scale)
  - Avoids difficulties of changes in family structure/composition over the life cycle. We follow individuals but capture their family circumstances.
- Interpolate Y, B, F for missing PSID years (bi-annual interviews starting in 1997)
  - decision to interpolate B & F rather than the determinants of net benefits (which would require interpolating changes in family structure, income components, etc)
- Unless otherwise stated, the family’s income/benefits are adjusted to per-person amounts using the equivalence scale.
- Values are in 2005$ and all means are weighted using the PSID sample weights.

Measurement of Y, B and F

- Y = family pre-tax, pre-transfer income
- B = net state benefit (= transfer – tax)
- F = net federal benefit (= transfer – tax)

- We rely on "realized" values of these variables in the PSID as much as possible.
- But, in order to implement our methodology for calculating the redistributive (Z^R) and insurance (Z^I) values of state transfers and to perform our decomposition exercises:
  - we have to calculate B under alternative realizations
  - requires state tax and transfer calculators


PSID
Y = pretax income
F = realized federal benefits minus federal taxes (from TAXSIM)
X =Demographics
Federal Taxes
Income
Payroll
TAXSIM,
State Taxes
State Income
State sales
TAXSIM, J. Bakija
AFDC/TANF
Single mothers
Hoynes
Medicaid/SCHIP
Eligibility for families and children
Bitler, Huckfeldt, Miller
Medicaid/SCHIP
Benefits=Average Costs per recipient by state*year
K. Simon
Measured in Y but not modeled:
General Assistance
Workers' Comp
UI
Not measured or modeled:
Housing benefits
Note:
Calculated benefits are adjusted for non-universal take-up
C = Y + F + B
Bottom code at $1000 p.y.
Used to construct naïve Z, effective total, insurance and redistributive value

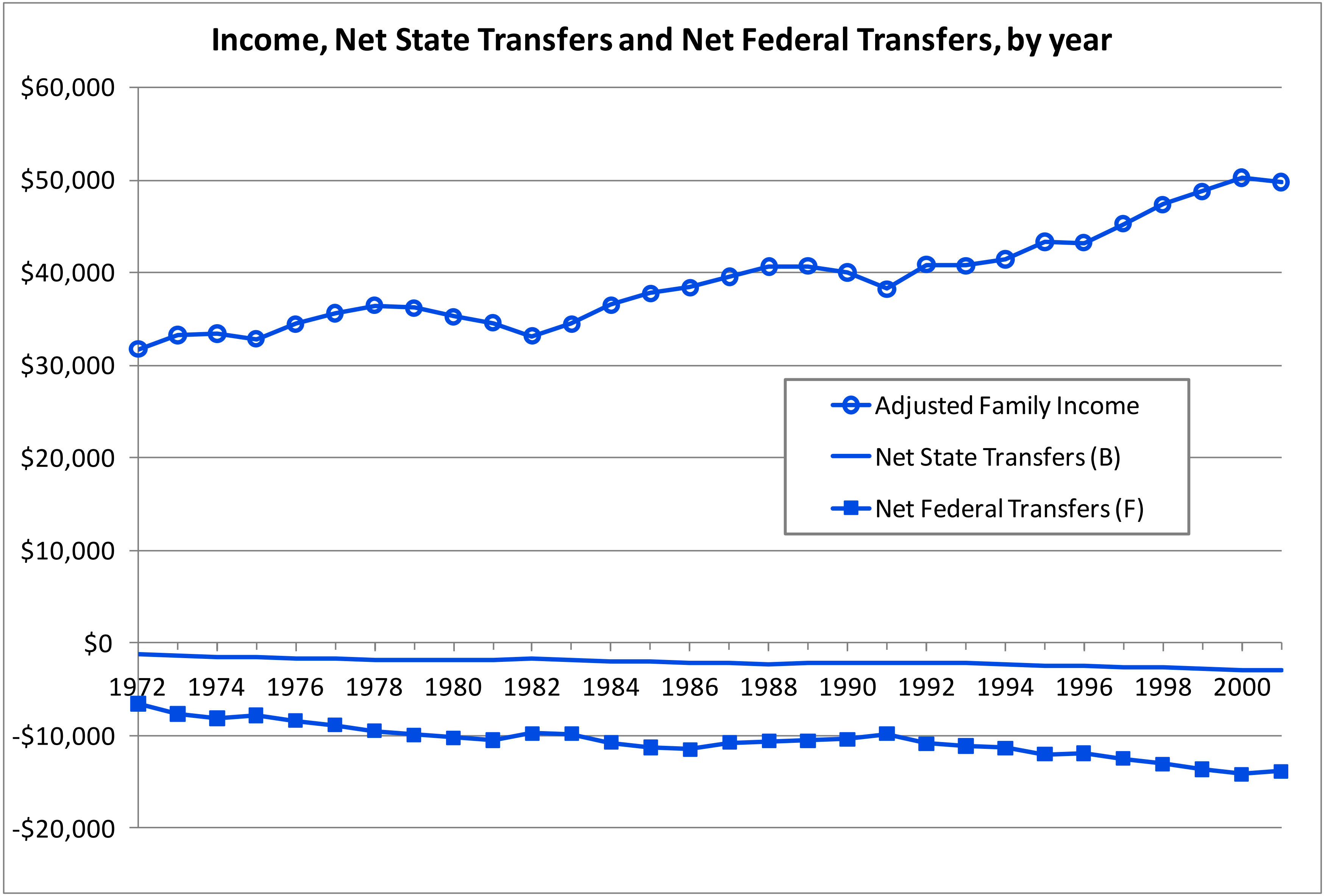
Realized income and federal transfers from PSID

	Total Family Income (Y)	Federal Tax and Transfer Payments (F)	State Tax and Transfer payments (B)
Definitions used to calculate value of state tax and transfer programs	**Labor Earnings** **Child Support & Alimony** **Income from Assets** **Lumpsum Payments** **Private transfers from relatives** **Other private transfers** **Unemployment Insurance** **General Assistance & Other** **Worker's Compensation**	**Social Security** **Supplemental Security Inc.** **Food Stamps** **(-) Federal Tax Liability** **(-) FICA Liability**	**AFDC/TANF** **Medicaid (value of)** **SCHIP (value of)** **(-) State Tax Liability** **(-) State Sales Tax**

Taxes and benefits calculated using program calculators

State transfers we are not modeling (so we put in Y), realized values from PSID

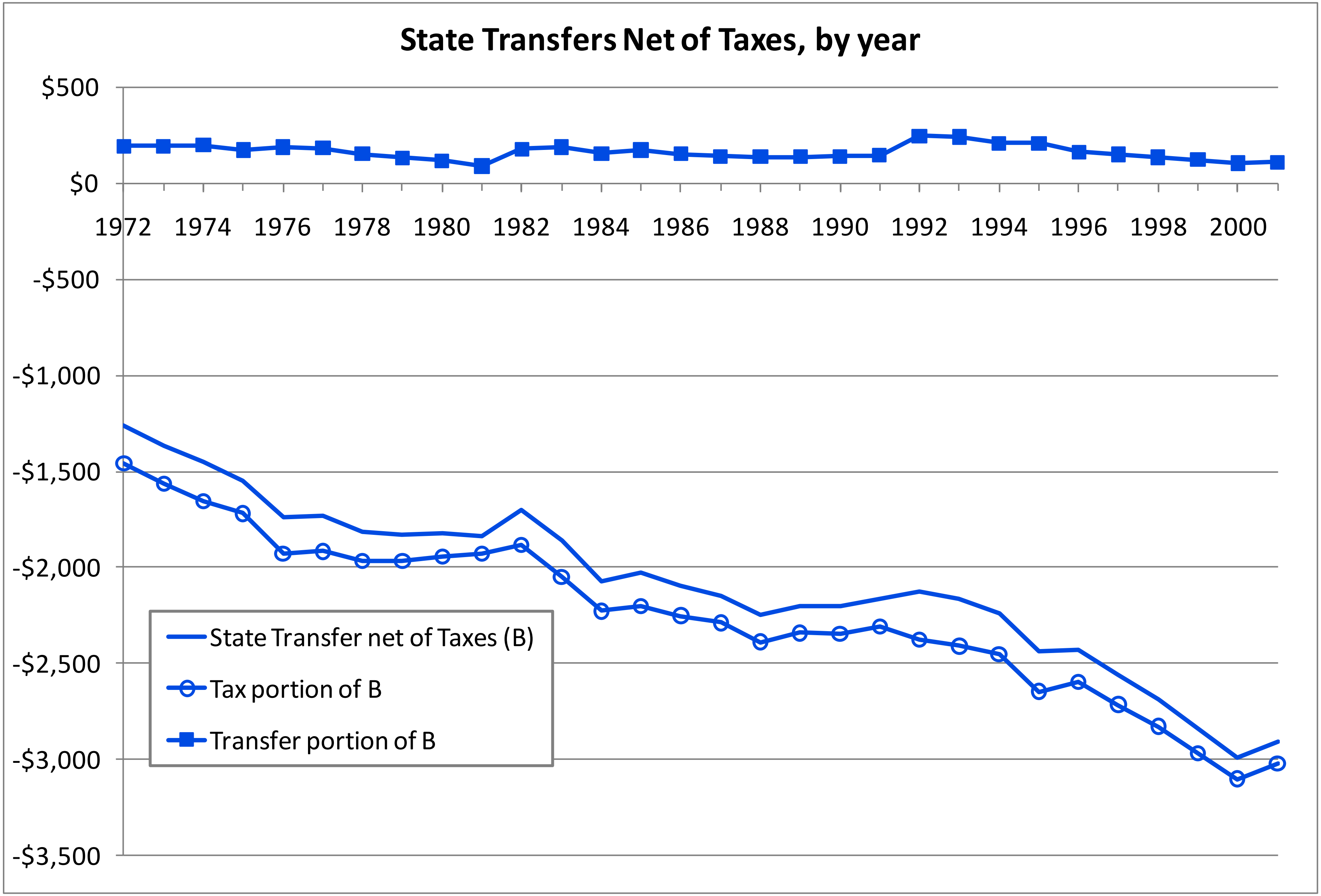
Summary measures over time



Income, Net State Transfers and Net Federal Transfers, by year
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
-$10,000
-$20,000
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Adjusted Family Income
Net State Transfers (B)
Net Federal Transfers (F)

Evolution of B over time

- Net state benefits (B) are calculated using realized earnings and family structure. But all state tax and transfer values are constructed using our program calculators
- Decompose B into tax- and benefit- component


State Transfers Net of Taxes, by year
$500
$0
-$500
-$1,000
-$1,500
-$2,000
-$2,500
-$3,000
-$3,500
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
State Transfer net of Taxes (B)
Tax portion of B
Transfer portion of B

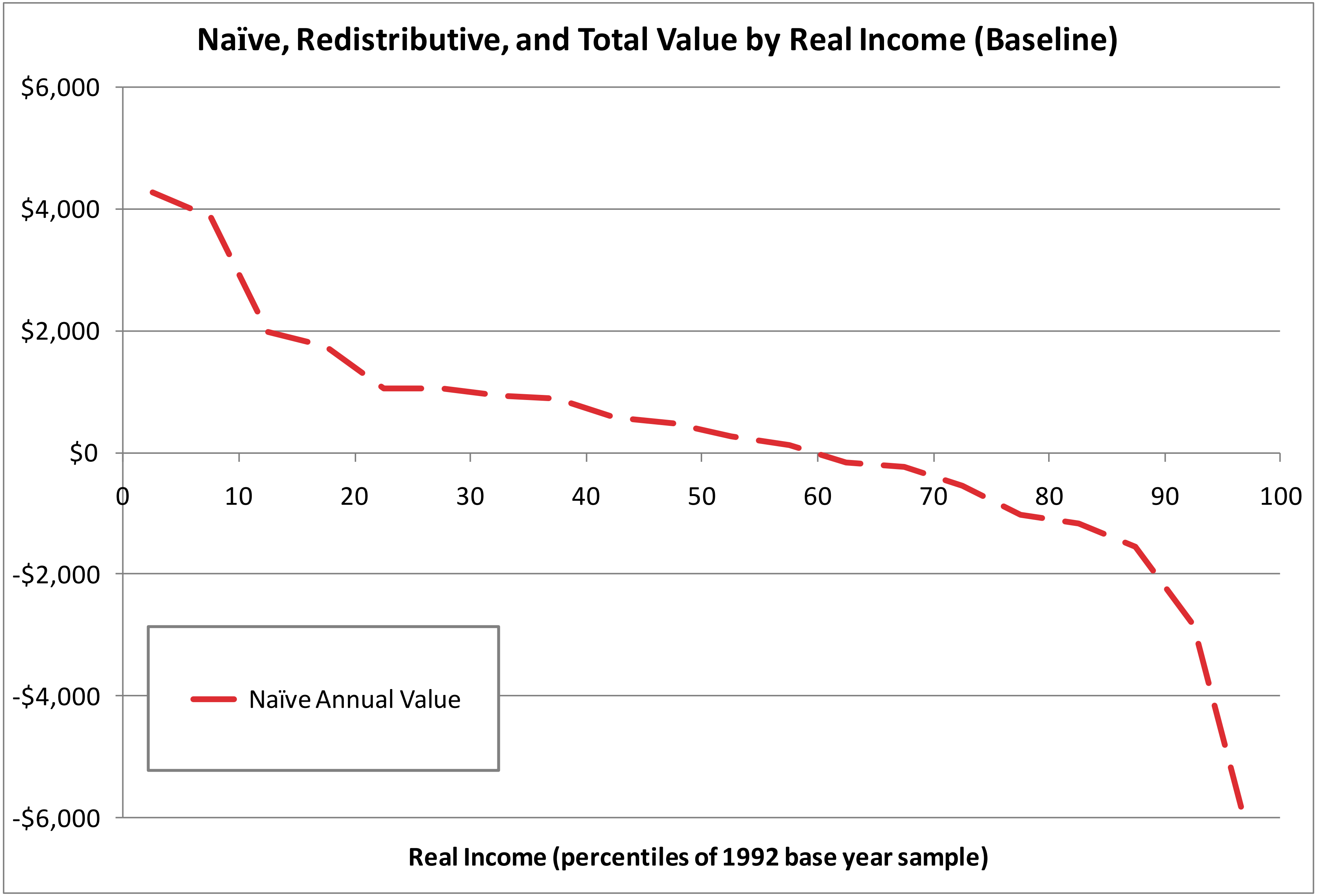
4. Basic Results

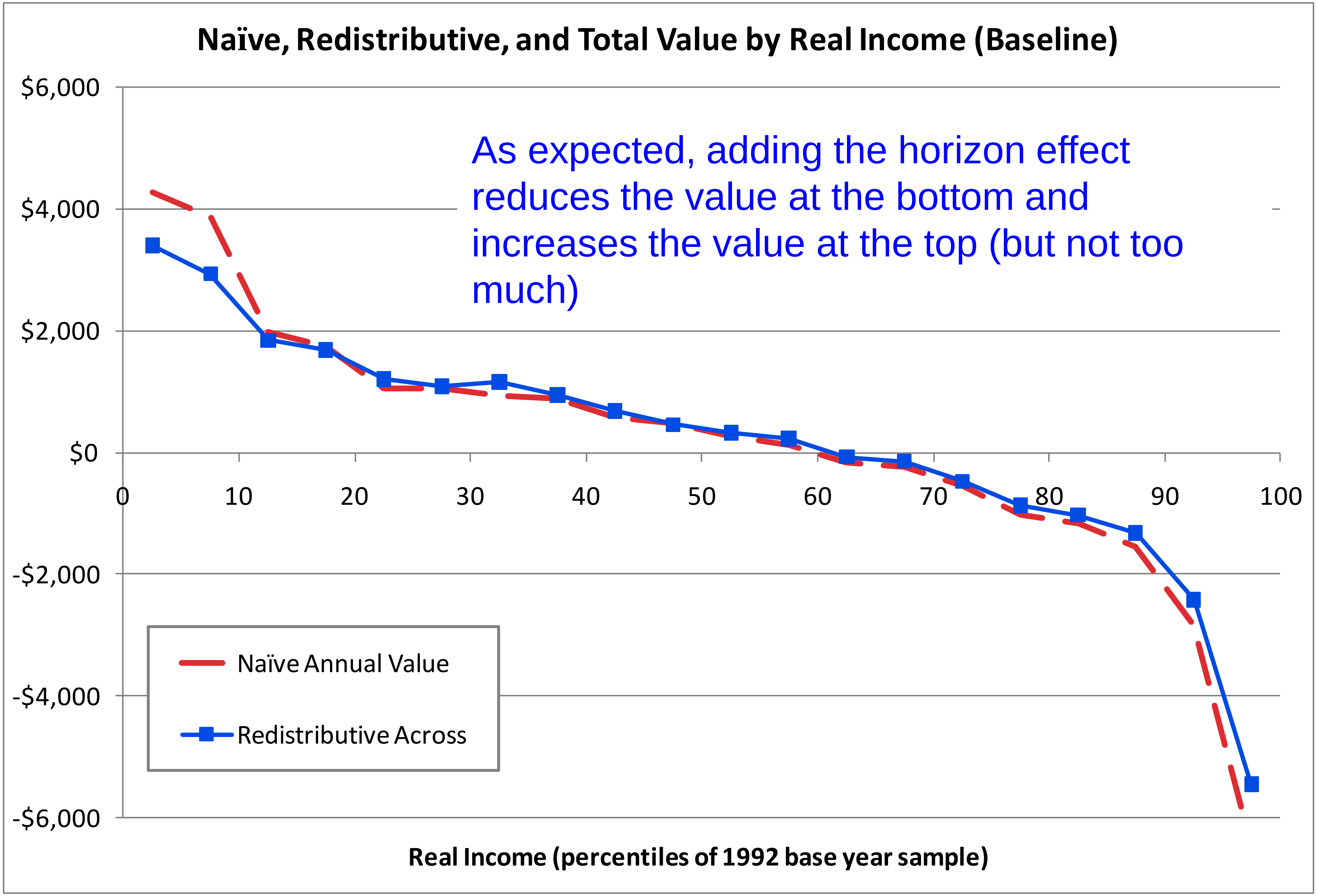
- Baseline: 1992 sample “decade-3”
- Baseline: CRRA utility function with ρ=3

- Unless otherwise stated, the family’s income/benefits are adjusted to per-person amounts using the equivalence scale.
- Values are in 2005$ and all means are weighted using the PSID sample weights.

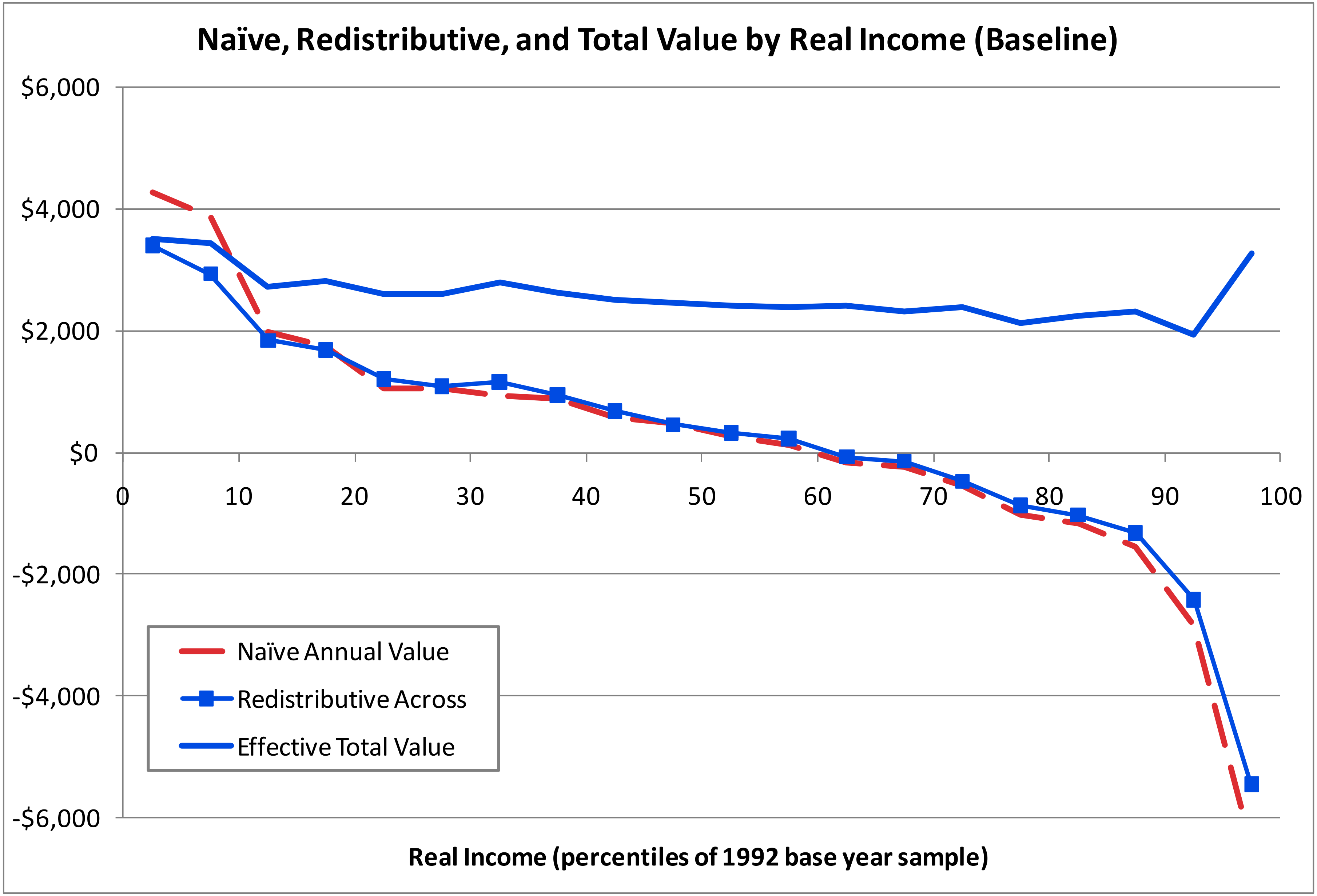
Results for Insurance and Redistributive Value

- Three key measures of value:
  1. $Z^{naïve}$: Naïve Value
     - net state benefit in current year – the mean by state x year)
  2. $Z^{Redis,across}$: Redistributive Across-Person Value
     - Adds "horizon effect"
  3. $Z^{EffectiveTotal}$: Effective Total Value
     - $Z^{EffectiveTotal} = Z^{Redis,across} + Z^{Insure,across} + Z^{Insure,withing}$
     - Adds insurance effect
- We plot means by percentiles of base year (1992) income; think of as "real income"


Naïve, Redistributive, and Total Value by Real Income (Baseline)
$6,000
$4,000
$2,000
$0
-$2,000
-$4,000
-$6,000
0
10
20
30
40
50
60
70
80
90
100
Naïve Annual Value
Real Income (percentiles of 1992 base year sample)



Naïve, Redistributive, and Total Value by Real Income (Baseline)
$6,000
$4,000
$2,000
$0
-$2,000
-$4,000
-$6,000
0
10
20
30
40
50
60
70
80
90
100
As expected, adding the horizon effect reduces the value at the bottom and increases the value at the top (but not too much)
Naïve Annual Value
Redistributive Across
Real Income (percentiles of 1992 base year sample)

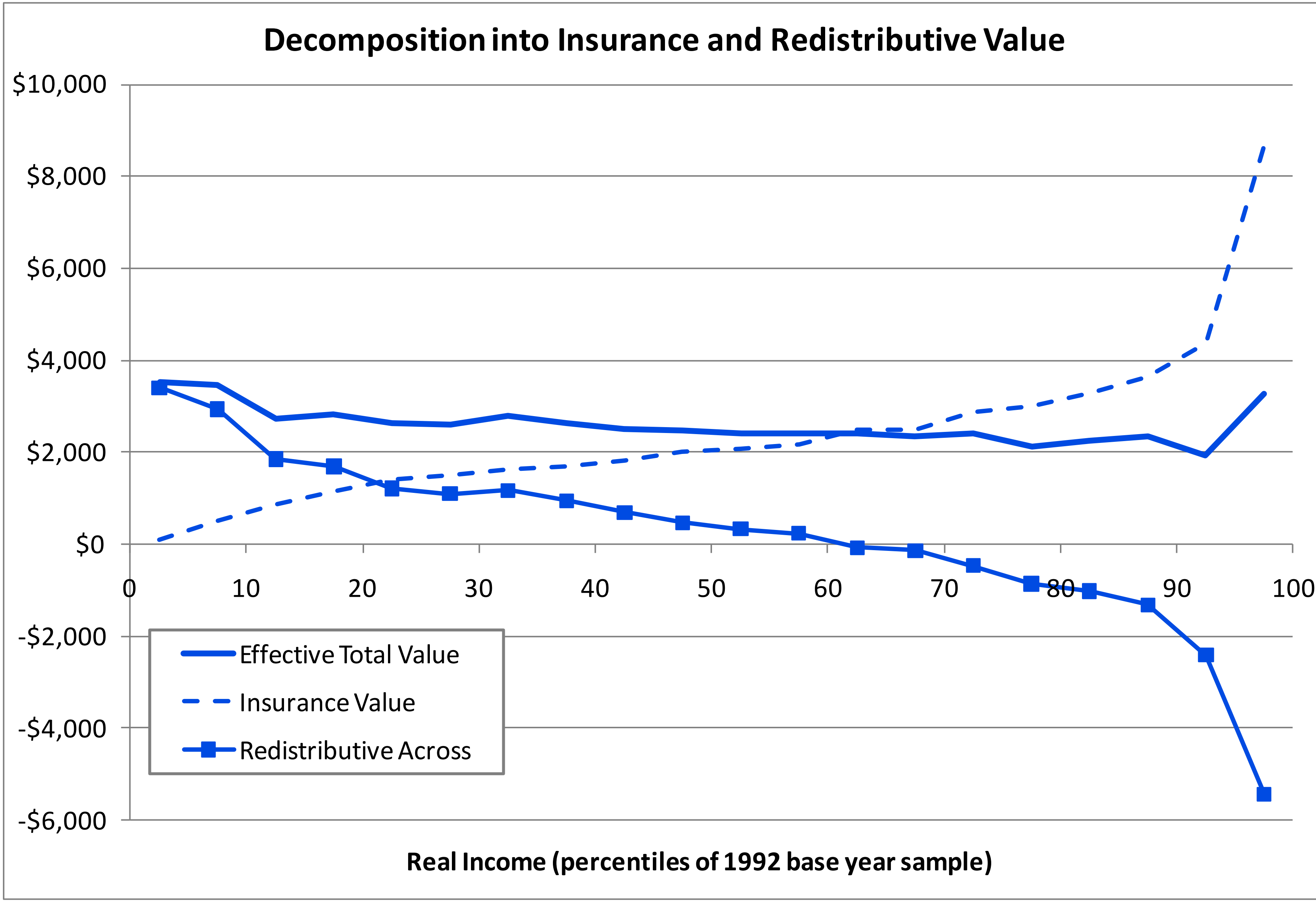

Naïve, Redistributive, and Total Value by Real Income (Baseline)
$6,000
$4,000
$2,000
$0
-$2,000
-$4,000
-$6,000
0
10
20
30
40
50
60
70
80
90
100
Naïve Annual Value
Redistributive Across
Effective Total Value
Real Income (percentiles of 1992 base year sample)

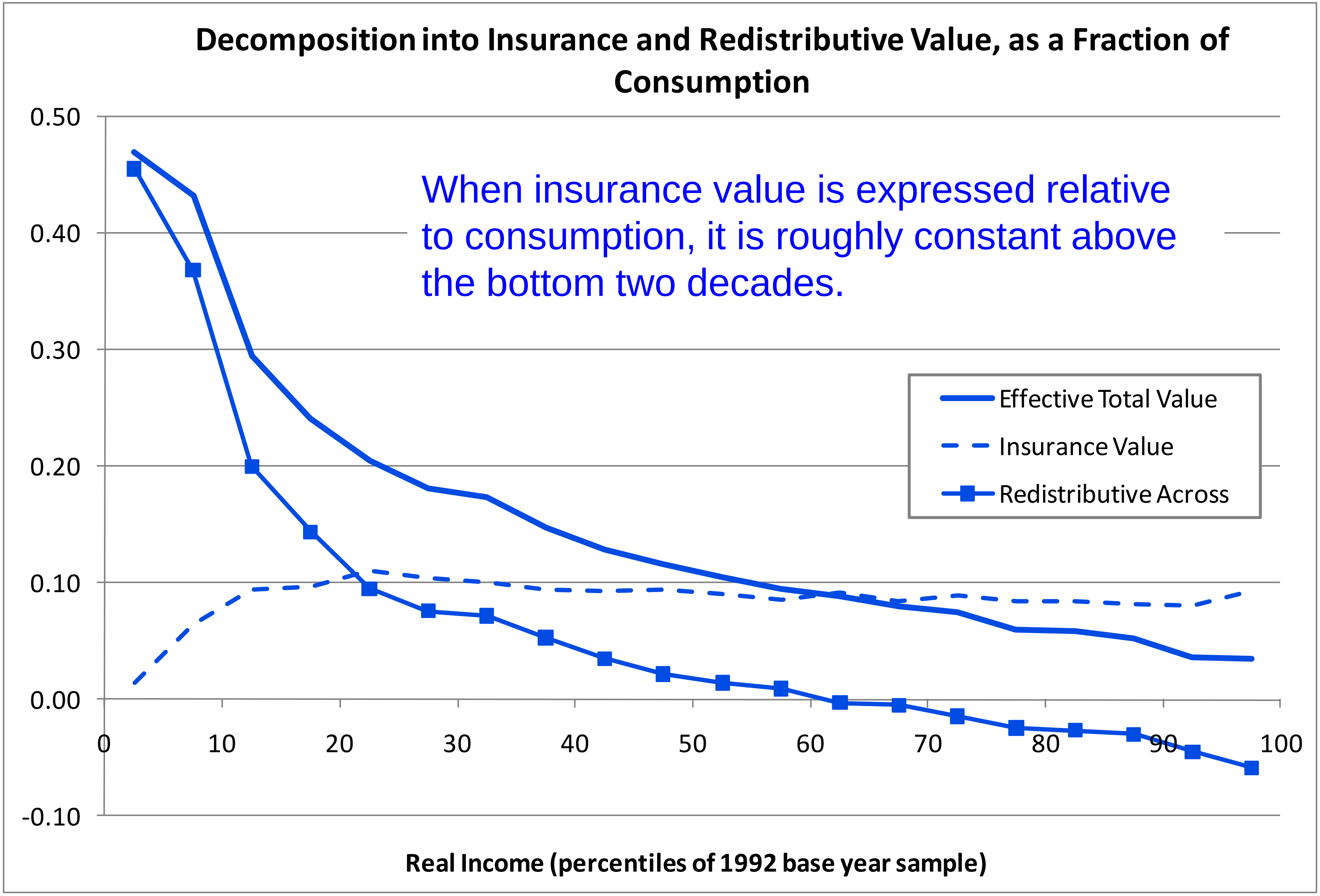
Key Results

- <u>Key results:</u>
  1. The “horizon” effect reduces the gradient of value with respect to current income, but only slightly
  2. The insurance effect greatly reduces the gradient of value with respect to current income

  So when using the a more inclusive measure (“effective total value”) of the value to individuals of their state’s tax-and-transfer system, differential migration incentives by income are not as large
  → it is less puzzling that states can sustain tax-and-transfer programs despite residential mobility

- <u>Next:</u>
  - Does it make sense that high-income individuals receive positive effective total value from tax-and-transfer programs?
  - Sensitivity
  - Decompositions


Decomposition into Insurance and Redistributive Value
$10,000
$8,000
$6,000
$4,000
$2,000
$0
-$2,000
-$4,000
-$6,000
0
10
20
30
40
50
60
70
80
90
100
Effective Total Value
Insurance Value
Redistributive Across
Real Income (percentiles of 1992 base year sample)



Decomposition into Insurance and Redistributive Value, as a Fraction of Consumption
When insurance value is expressed relative to consumption, it is roughly constant above the bottom two decades.
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
0
10
20
30
40
50
60
70
80
90
100
Effective Total Value
Insurance Value
Redistributive Across
Real Income (percentiles of 1992 base year sample)

Why does insurance value rise with income?

- If (i) shocks are roughly proportional to income, (ii) dB/dY is constant, and (iii) people have constant relative risk aversion, then insurance value would be proportional to income.
  → we'd expect insurance value to rise with income

- Nevertheless, it is still surprising that it rises sufficiently to offset redistributive value.

Is (part of) the Insurance Value mechanical?

- Insurance value = EV of current T&T system relative to receiving one's expected T&T.
- For high-income people, the expected T&T is a large tax.
- Even high-income people face some risk of zero (or close to zero) future incomes.
- If they get a bad income realization, and are stuck with their expected state tax, their consumption would go negative → minus infinite utility (for CRRA, independent of ρ)

➔ **They require a large compensation to be stuck with their expected tax, i.e., the insurance value of the T&T system is high.**

Are these high insurance values realistic?

They are technically correct in the context of our model and the thought experiment that defines insurance value,

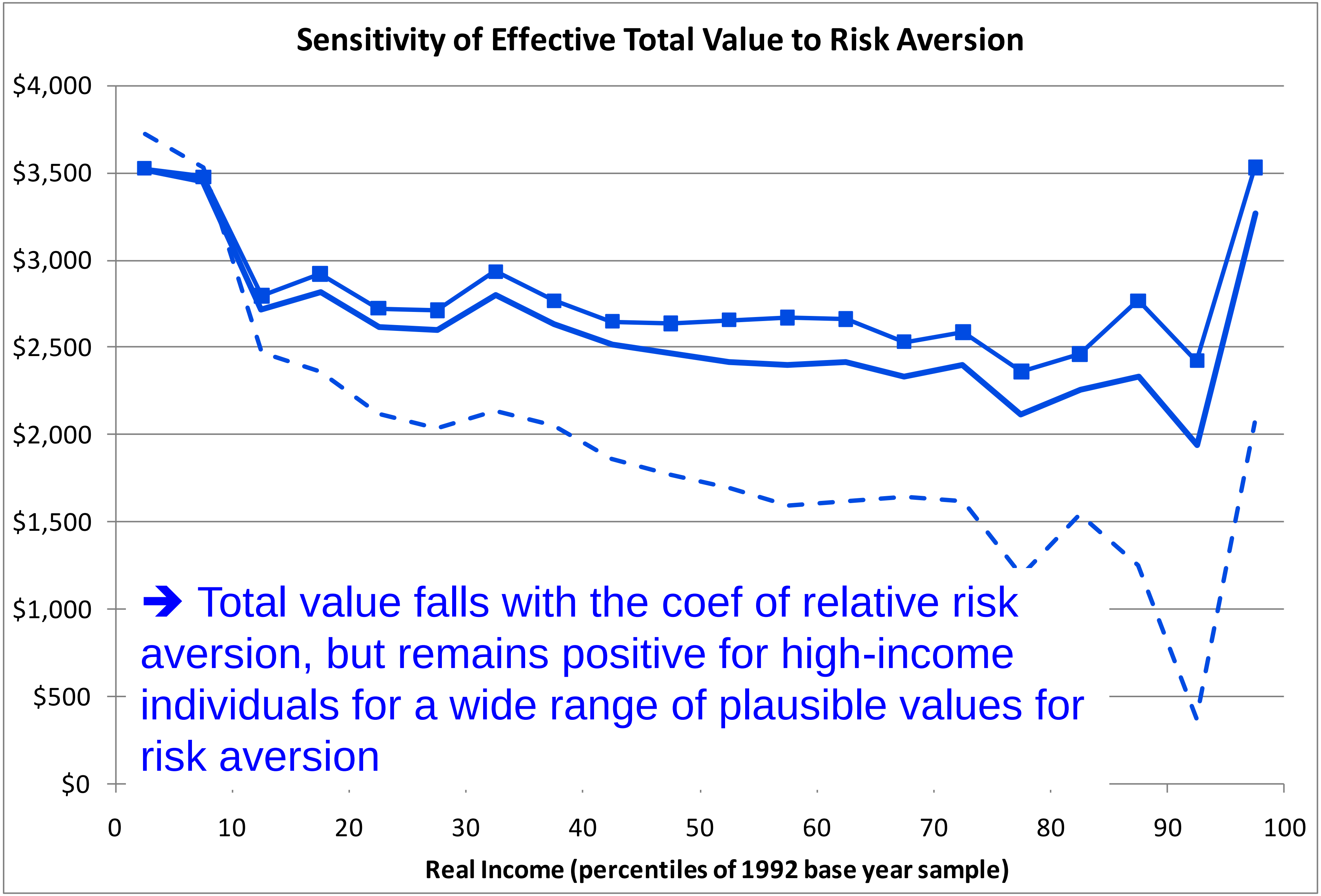
but in reality:

- You could perhaps privately insure against large income losses (e.g., buy an annuity that pays for the expected state income tax)
- Engage in buffer stock saving
- Adjust labor supply (if consumption threatens to go negative)
- Go bankrupt
- Rely on help from friends or family (i.e., informal insurance)
- Receive help from charities
- The state might not enforce collection of the expected net benefit if that benefit is negative and you have no income

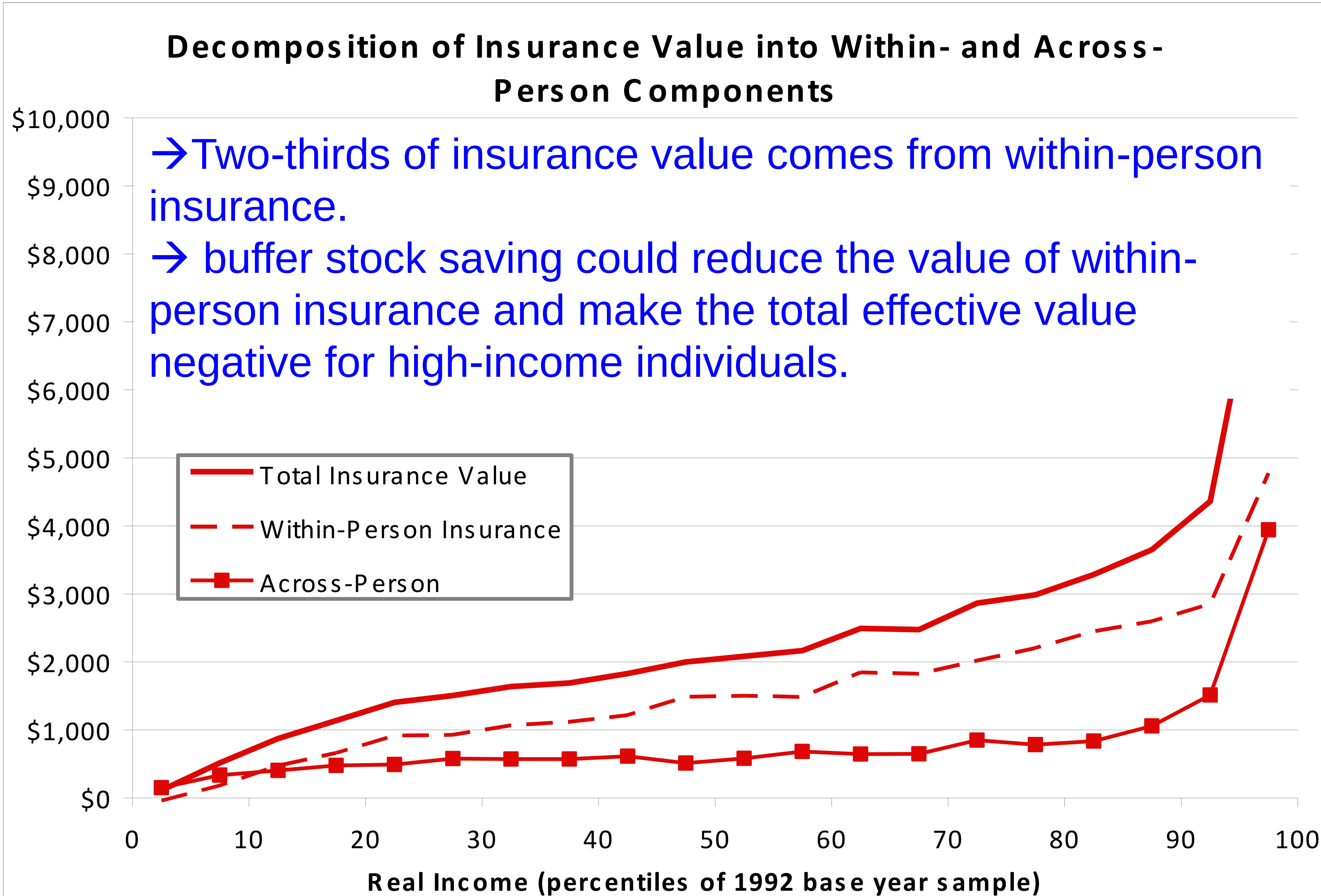
Possible ways to create a more realistic measure of insurance value

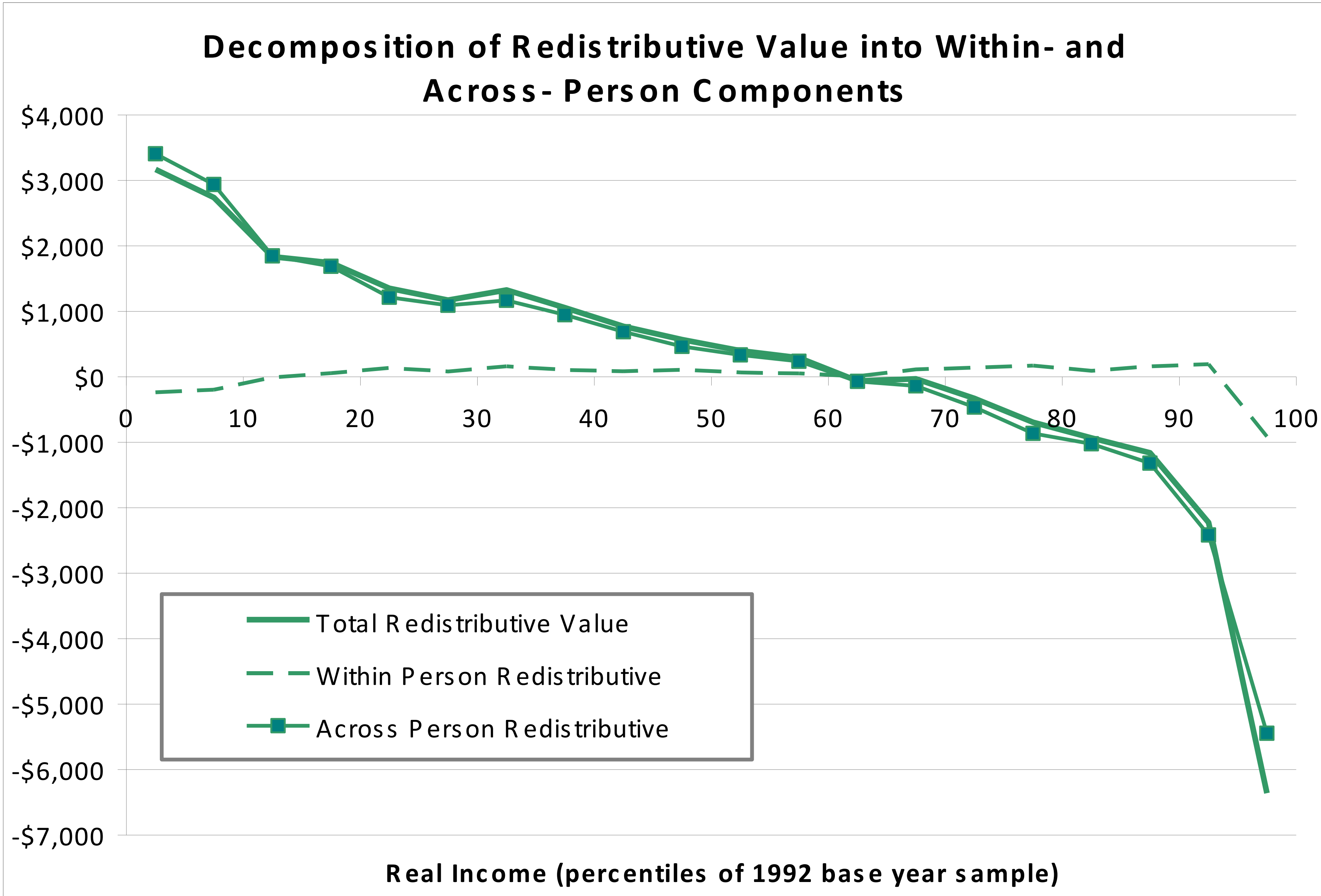
- Examine utility functions with lower risk aversion
- Exclude the within-person insurance value
  - This effectively assumes buffer stock saving/borrowing with perfect foresight…
- Bottom code utility at the level that would occur at very low consumption levels (equal to food stamps or 10% of assets).
  - See this as a somewhat ad-hoc way of measuring the possibility of bankruptcy, informal insurance, or charitable assistance.

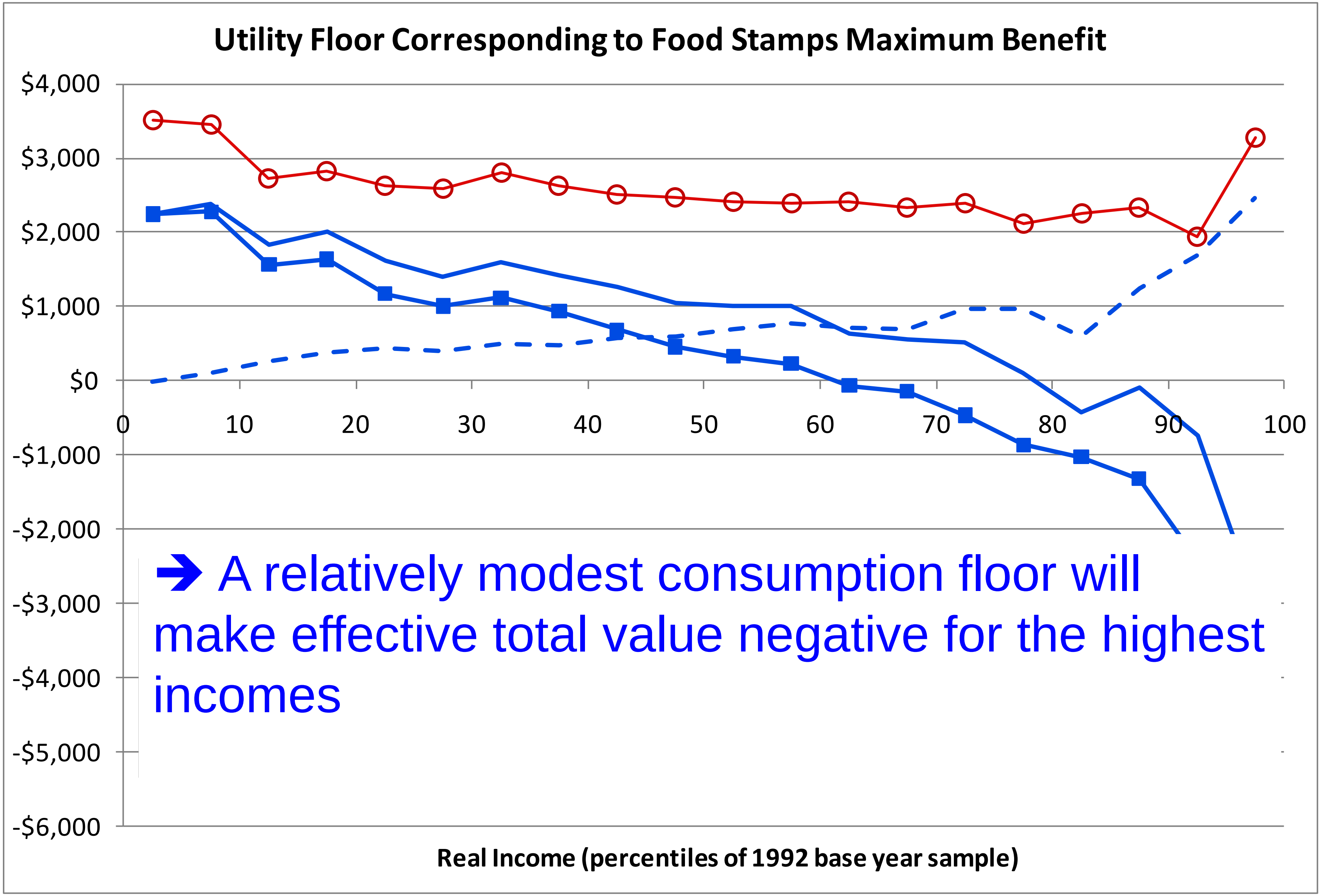
→ We show results for these cases …

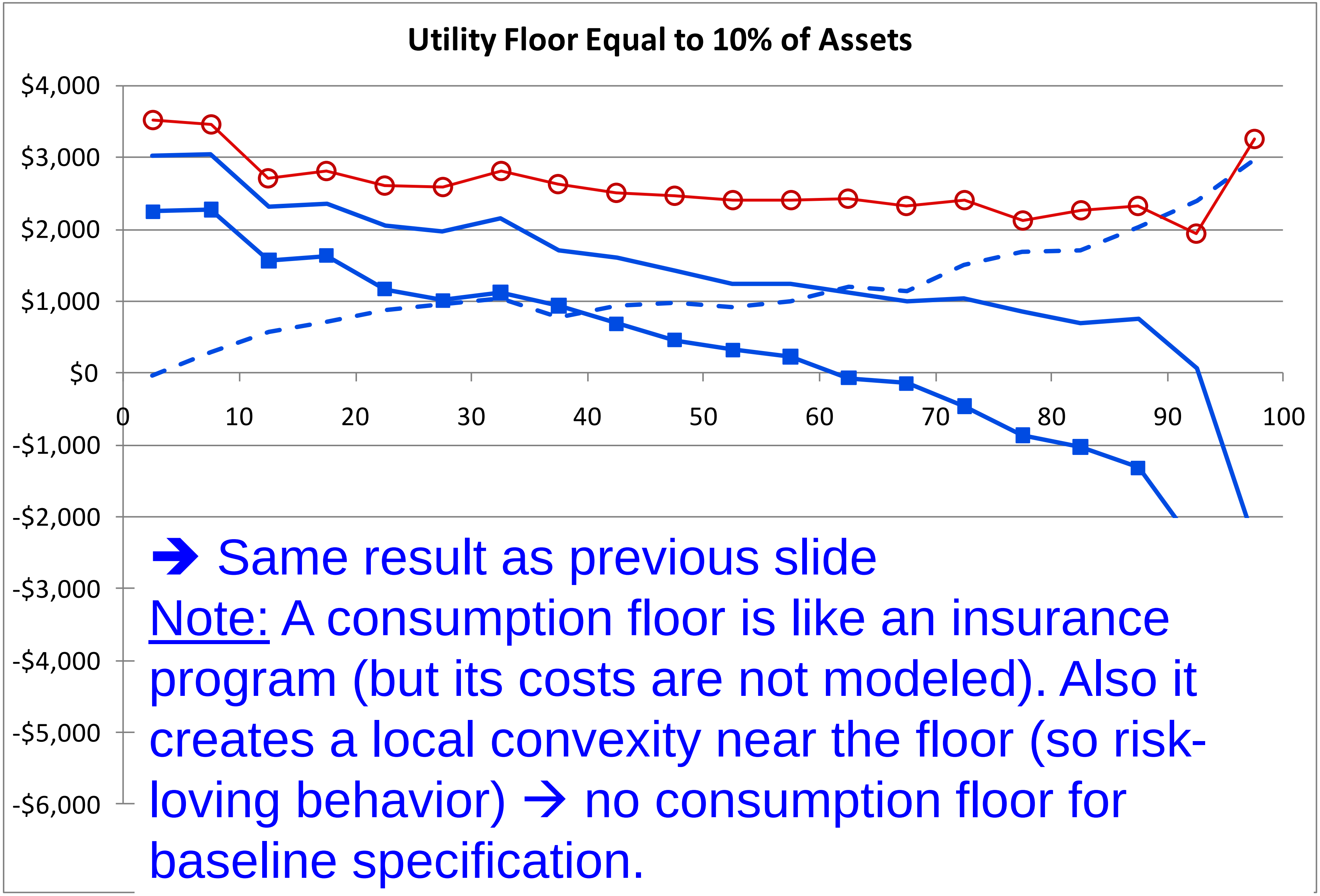


Sensitivity of Effective Total Value to Risk Aversion
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)
➔ Total value falls with the coef of relative risk aversion, but remains positive for high-income individuals for a wide range of plausible values for risk aversion


Decomposition of Insurance Value into Within- and Across-Person Components
→Two-thirds of insurance value comes from within-person insurance.
→ buffer stock saving could reduce the value of within-person insurance and make the total effective value negative for high-income individuals.
$10,000
$9,000
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Total Insurance Value
Within-Person Insurance
Across-Person
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)


Decomposition of Redistributive Value into Within- and Across- Person Components
$4,000
$3,000
$2,000
$1,000
$0
-$1,000
-$2,000
-$3,000
-$4,000
-$5,000
-$6,000
-$7,000
0
10
20
30
40
50
60
70
80
90
100
Total Redistributive Value
Within Person Redistributive
Across Person Redistributive
Real Income (percentiles of 1992 base year sample)


Utility Floor Corresponding to Food Stamps Maximum Benefit
$4,000
$3,000
$2,000
$1,000
$0
-$1,000
-$2,000
-$3,000
-$4,000
-$5,000
-$6,000
0
10
20
30
40
50
60
70
80
90
100
➔ A relatively modest consumption floor will make effective total value negative for the highest incomes
Real Income (percentiles of 1992 base year sample)

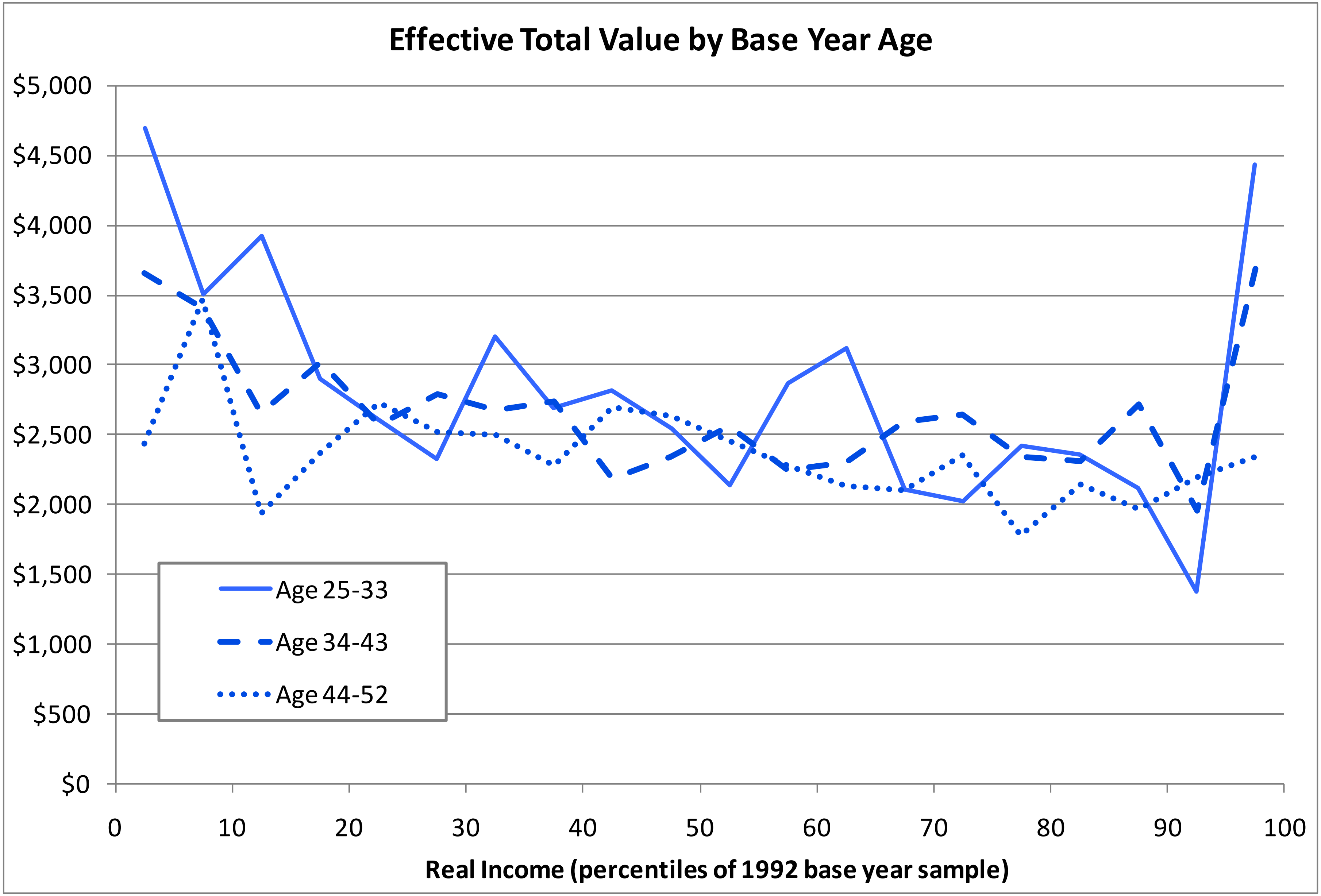


➔ Same result as previous slide

Note: A consumption floor is like an insurance program (but its costs are not modeled). Also it creates a local convexity near the floor (so risk-loving behavior) → no consumption floor for baseline specification.

Decomposition by age of individual

- Effective Total Value is somewhat larger for younger individuals (but these differences are relatively modest)

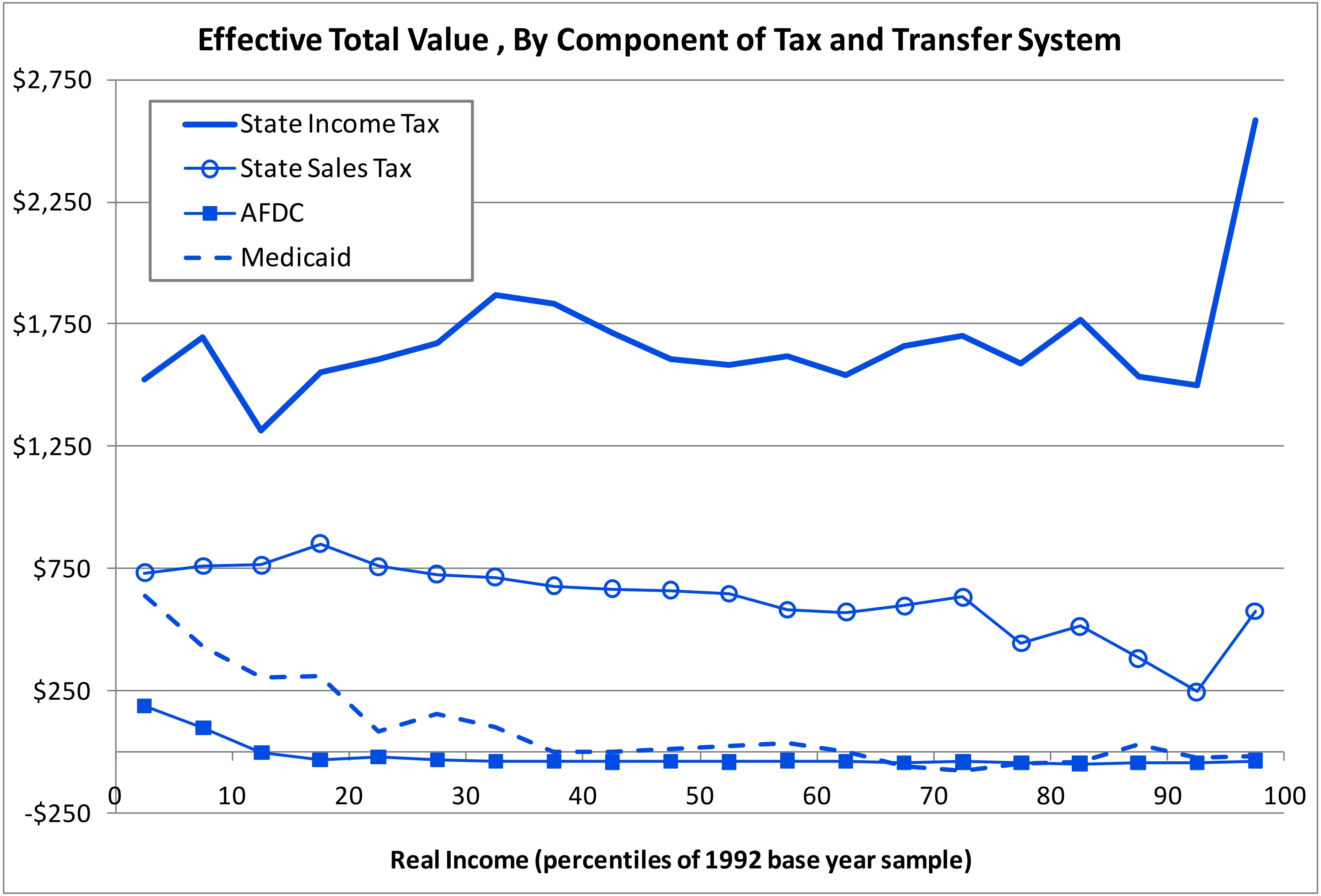


Effective Total Value by Base Year Age
$5,000
$4,500
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)
Age 25-33
Age 34-43
Age 44-52

Decomposition by program

- Show the *marginal* contributions to effective total value of each of the 4 programs:
  - State income taxes
  - State sales taxes
  - AFDC/TANF
  - Medicaid/SCHIP

- Because these are marginal contributions, these four marginal contribution need not add up to the total effective value

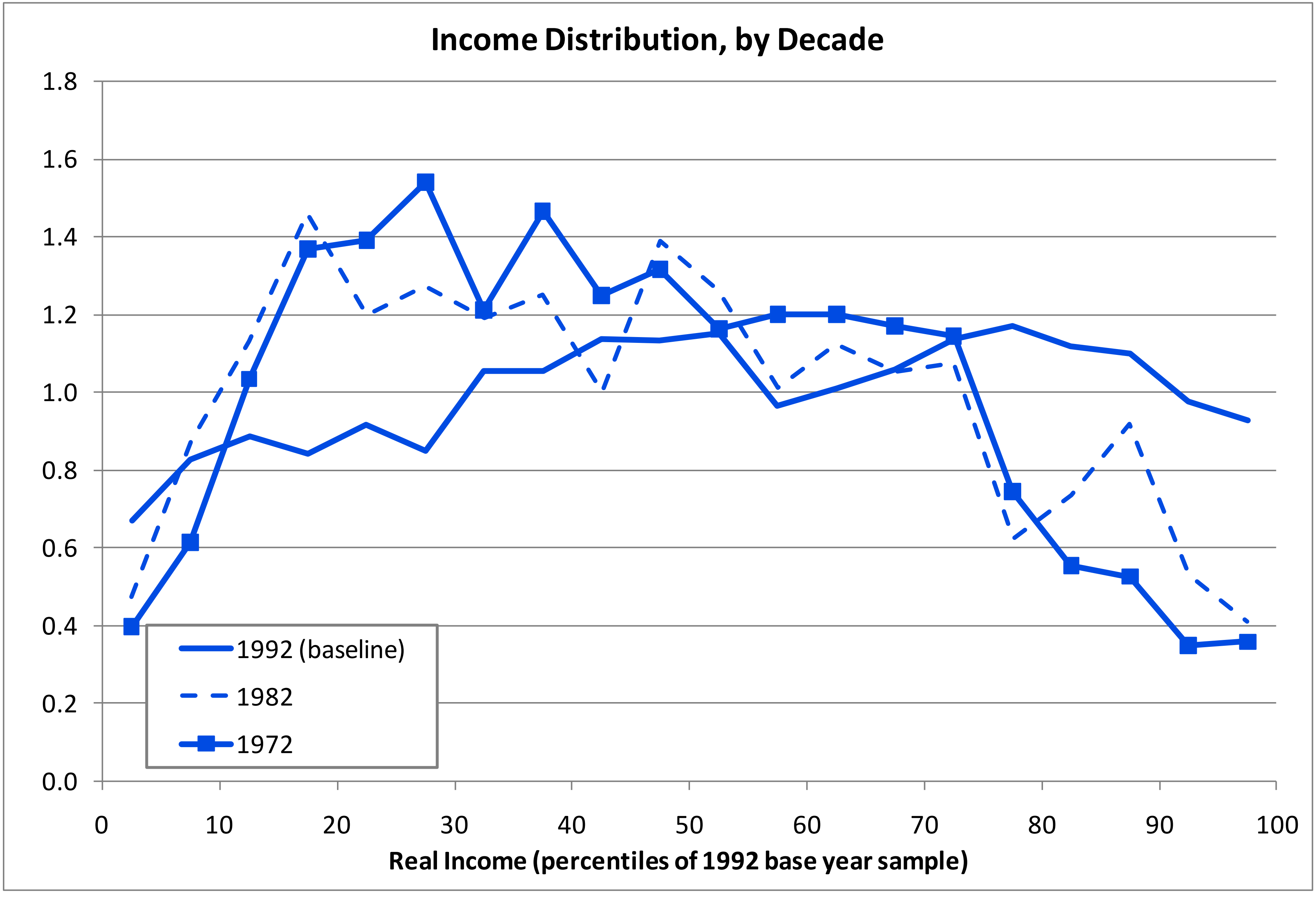


Effective Total Value , By Component of Tax and Transfer System
$2,750
$2,250
$1,750
$1,250
$750
$250
-$250
State Income Tax
State Sales Tax
AFDC
Medicaid
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)

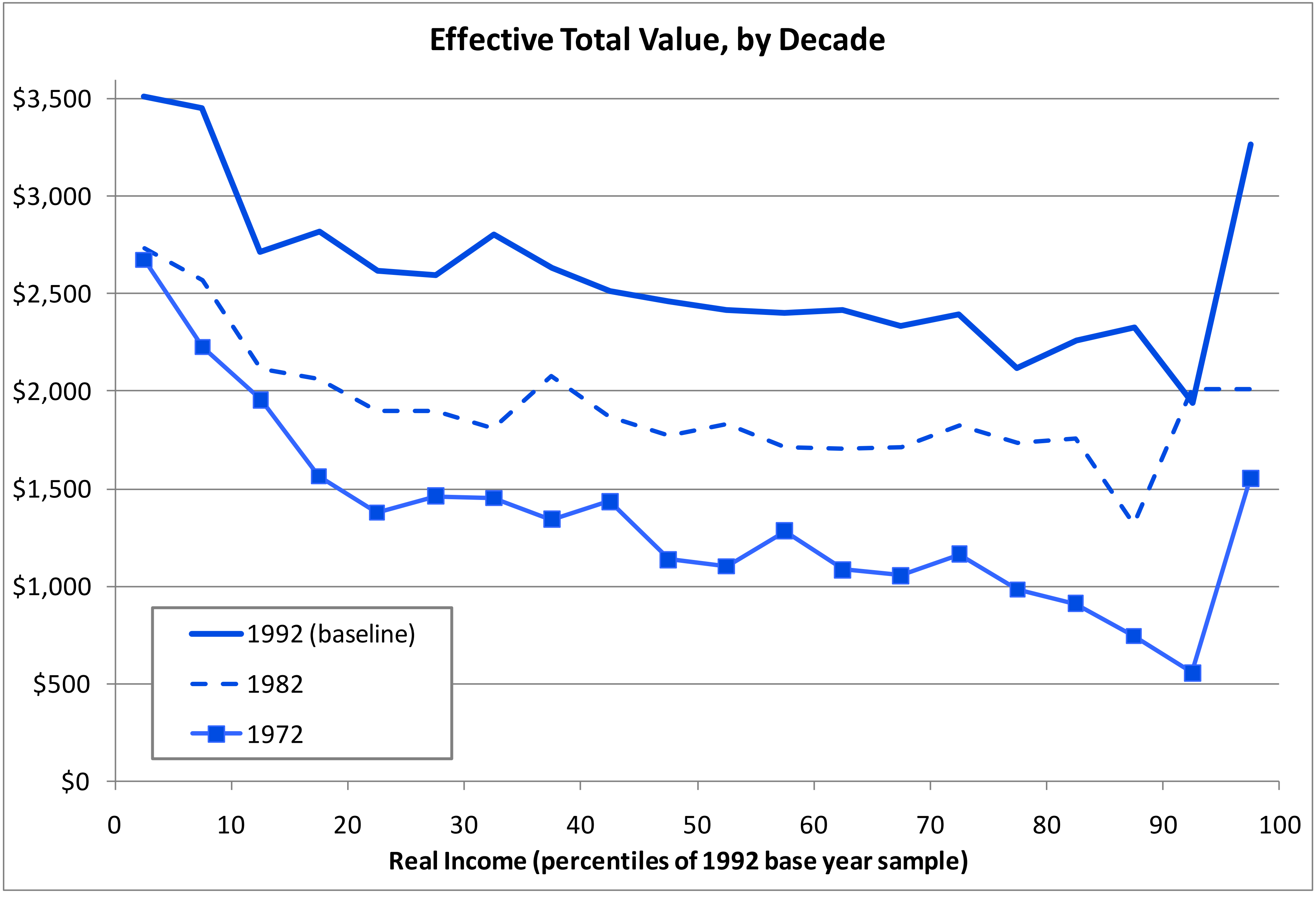
Decomposition over time

- Compare three "decades":
  - 1972-1981 (base year 1972)
  - 1982-1991 (base year 1982)
  - 1992-2001 (base year 1992)

- X-axis contains real income (transformed into percentiles in 1992 distribution) → comparable X-axis.



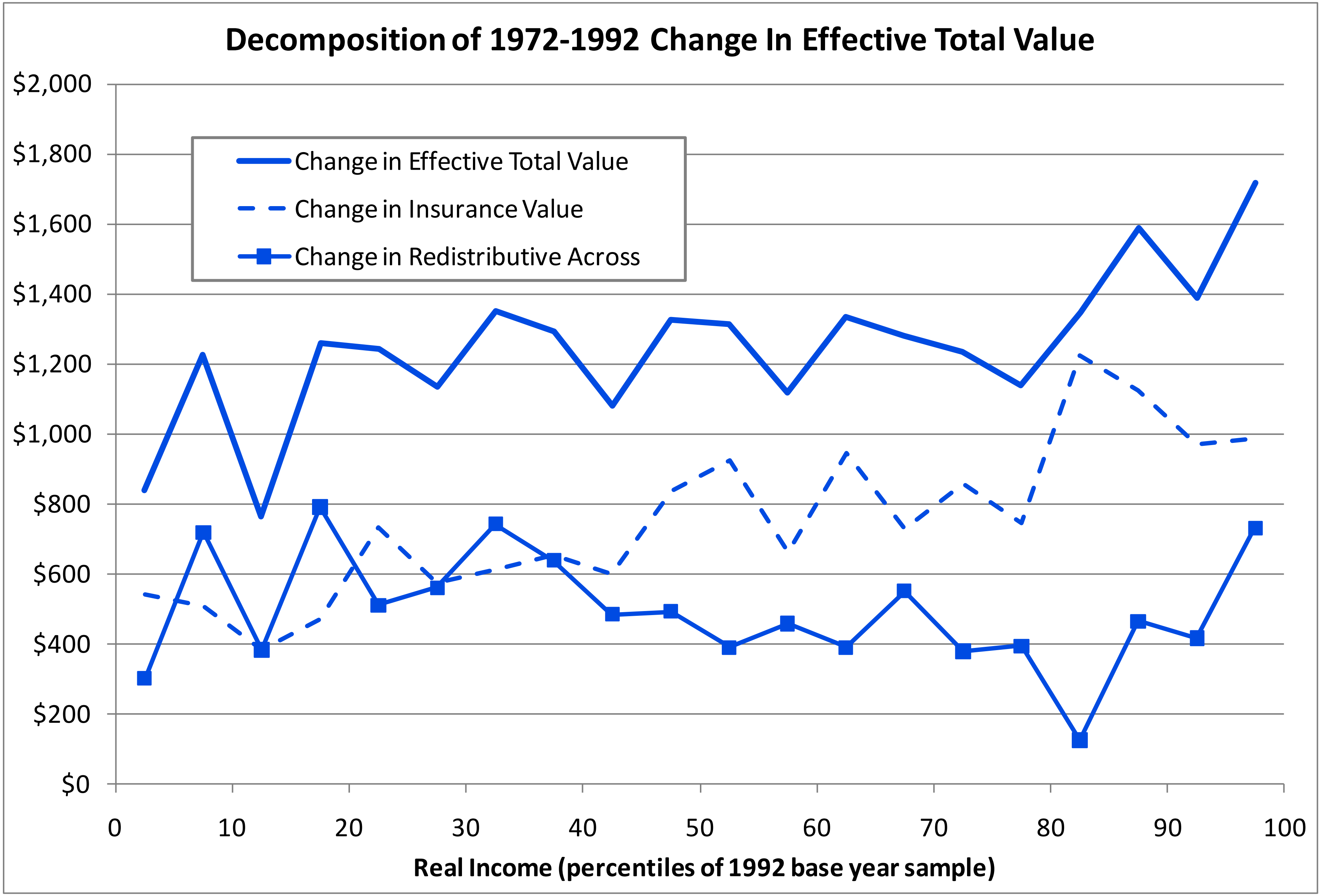
Income Distribution, by Decade
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)
1992 (baseline)
1982
1972

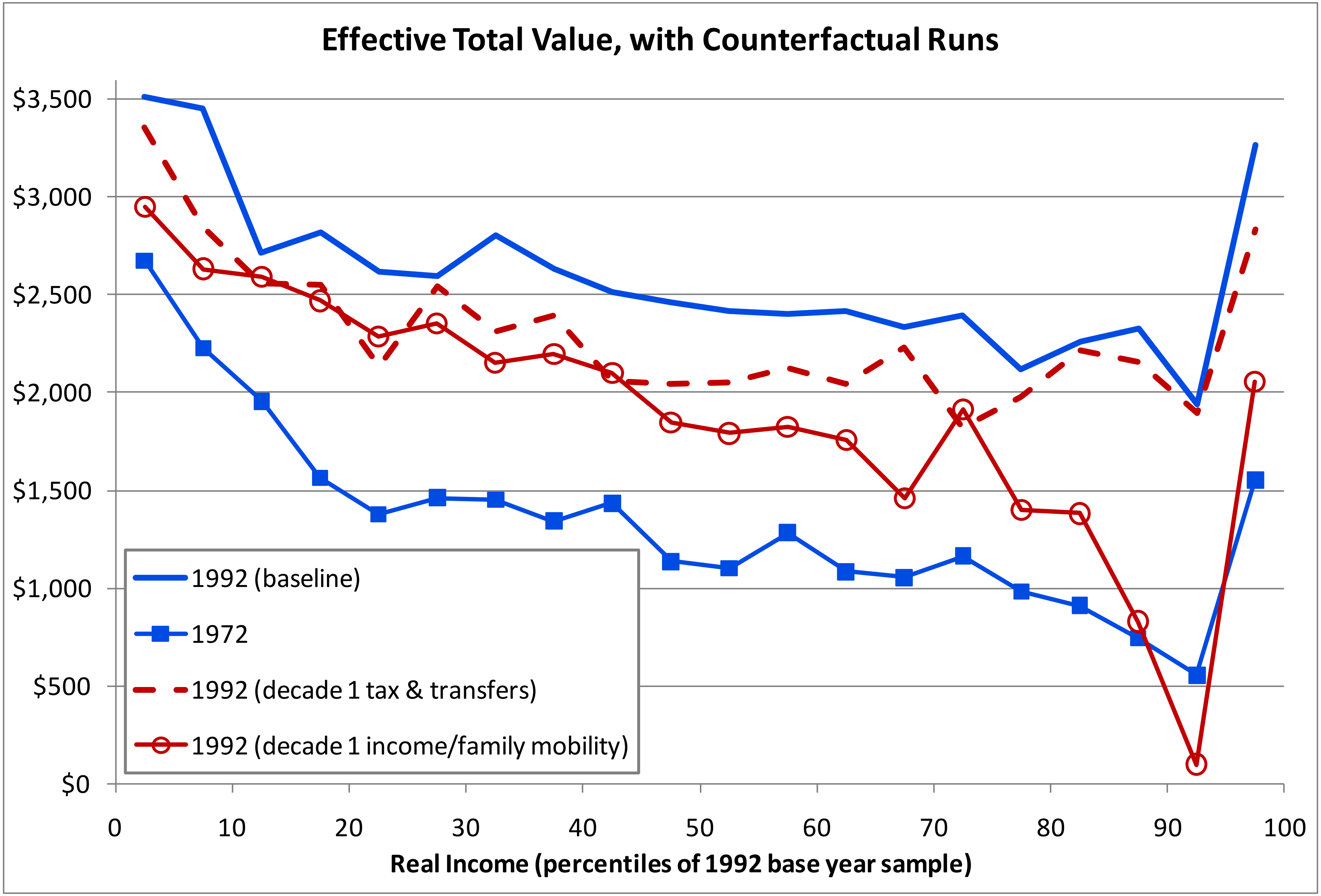

Effective Total Value, by Decade
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)
1992 (baseline)
1982
1972

What accounts for this increase in effective total value?

- Due to changes in insurance or redistributive value?

- Due to changes in:
  - Program rules?
  - Mobility in income and family characteristics?
  - Residential mobility?


Decomposition of 1972-1992 Change In Effective Total Value
Change in Effective Total Value
Change in Insurance Value
Change in Redistributive Across
$2,000
$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)



Effective Total Value, with Counterfactual Runs
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
0
10
20
30
40
50
60
70
80
90
100
Real Income (percentiles of 1992 base year sample)
1992 (baseline)
1972
1992 (decade 1 tax & transfers)
1992 (decade 1 income/family mobility)

Summary of decomposition over time

- From the 70s to the 90s, the Effective Total Value roughly doubled in real terms
- What accounts for this doubling:
  - Both increases in insurance and redistributive value contributed to this doubling. Increases in insurance value are esp. pronounced for higher incomes.
  - At least 20-50% of increase in effective total value accounted for by changes in program rules
  - At least 50-80% of the increase in effective total value accounted for by changes in income and family composition dynamics
  - Changes in residential mobility had no effect
  - Link to decompositions of insurance and redistributive value

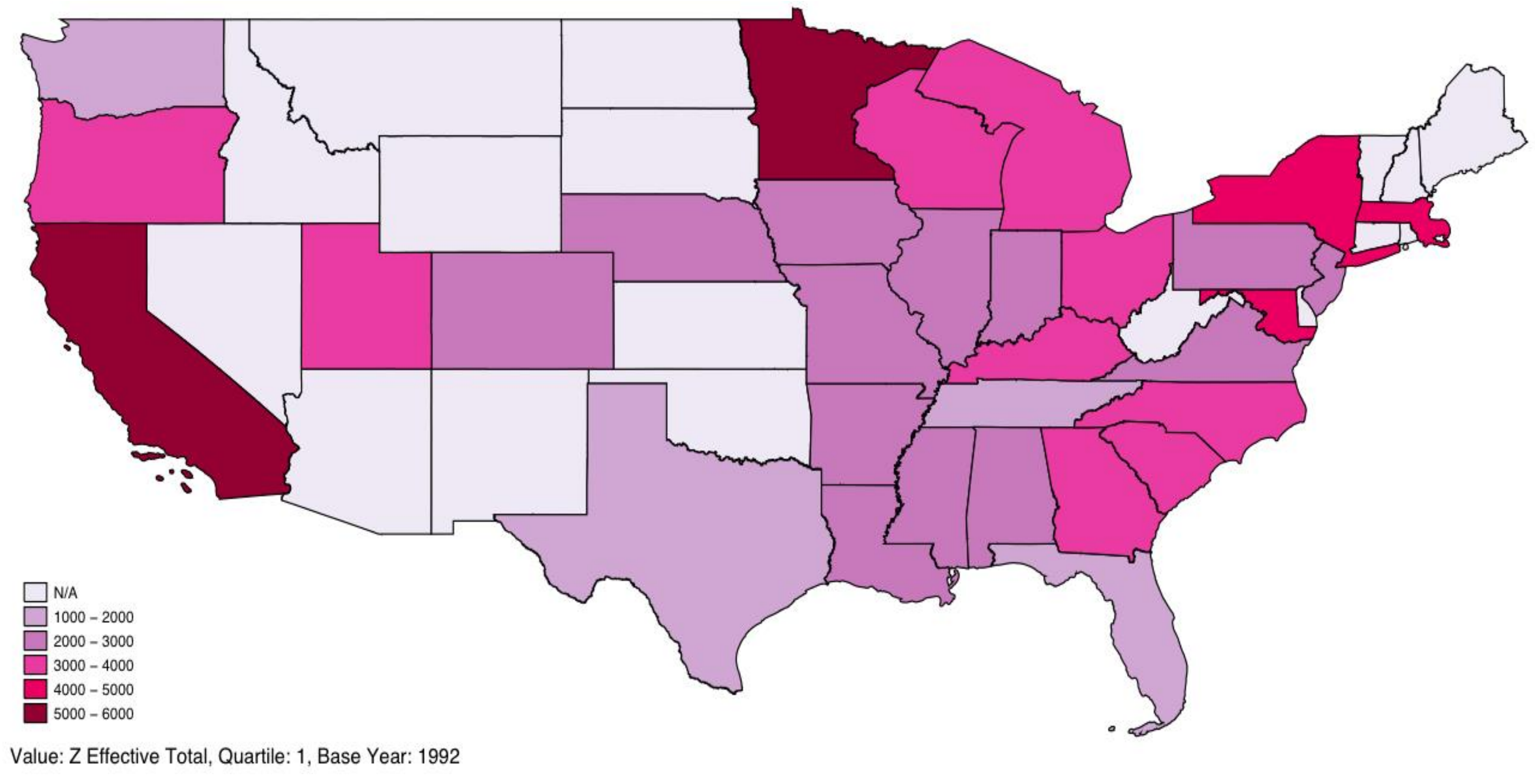
Results by State

- We show the value of the state tax-and-transfer system by state
- We split each state into 4 income quartiles and compare the value in the top- and bottom quartiles

Effective Total Value for bottom quartile

Highest values in:

California, Minnesota, New York, Massachusetts, and Maryland

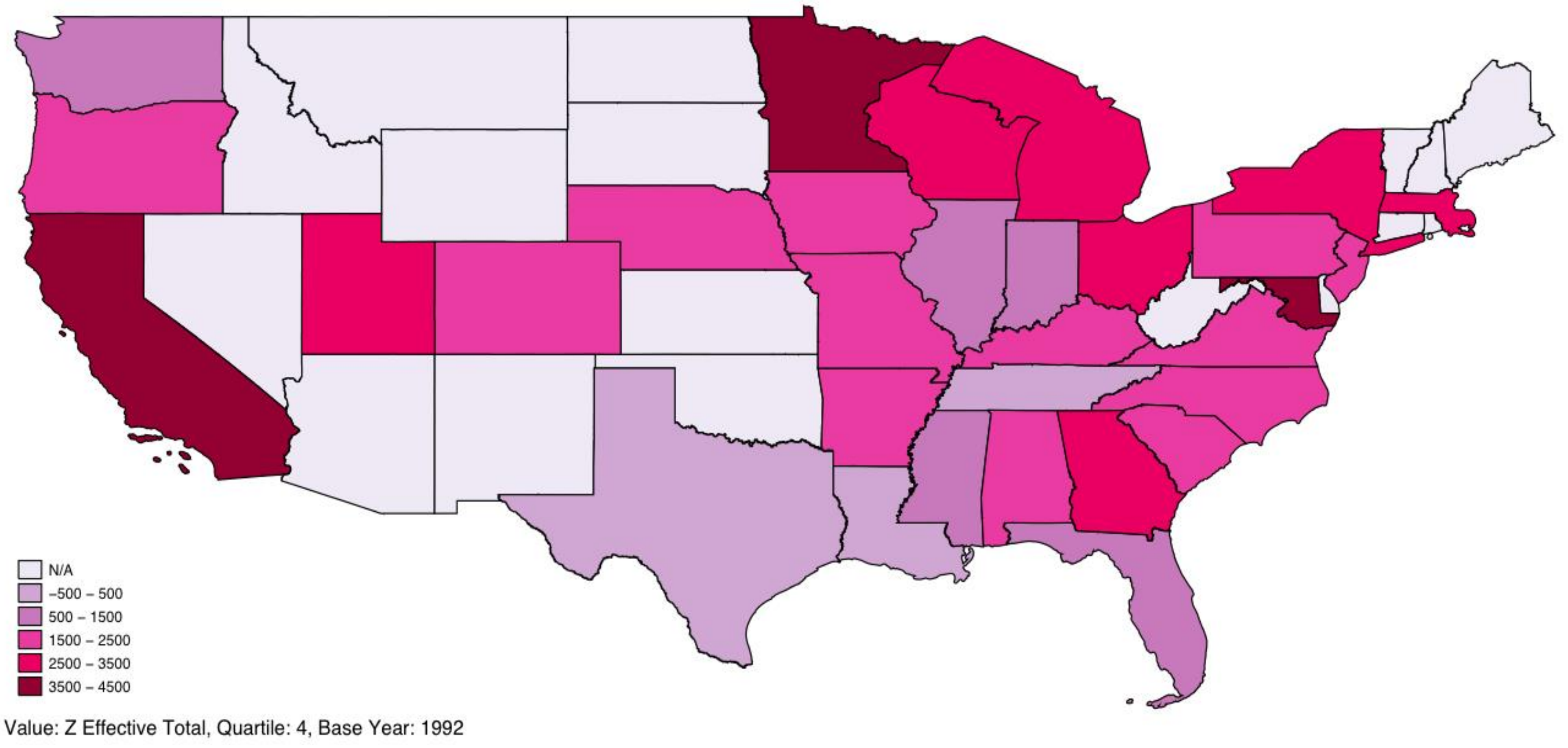


Effective Total Value for top quartile

Highest values in: Same list as before plus Michigan, Wisconsin, Ohio, Georgia, and Utah

Correlation in Eff. Tot. Val. for top and bottom quartile: 0.85

States that give high redistributive value to the bottom quartile tend to give much insurance value to their top quartile.



5. Conclusions

1. The effective total value of state taxes and transfers is relatively flat across real incomes (in our baseline spec.)

2. The insurance effect helps to offset the gradient of the redistributive value of T&T programs w.r.t. income
   - The insurance value is greatest for richer individuals
   - The insurance value is economically meaningful for a range of risk aversion coefficients (ρ = 1 to 5).
   - The insurance value remains important even if there is alternative catastrophic insurance or if we exclude within-person insurance value

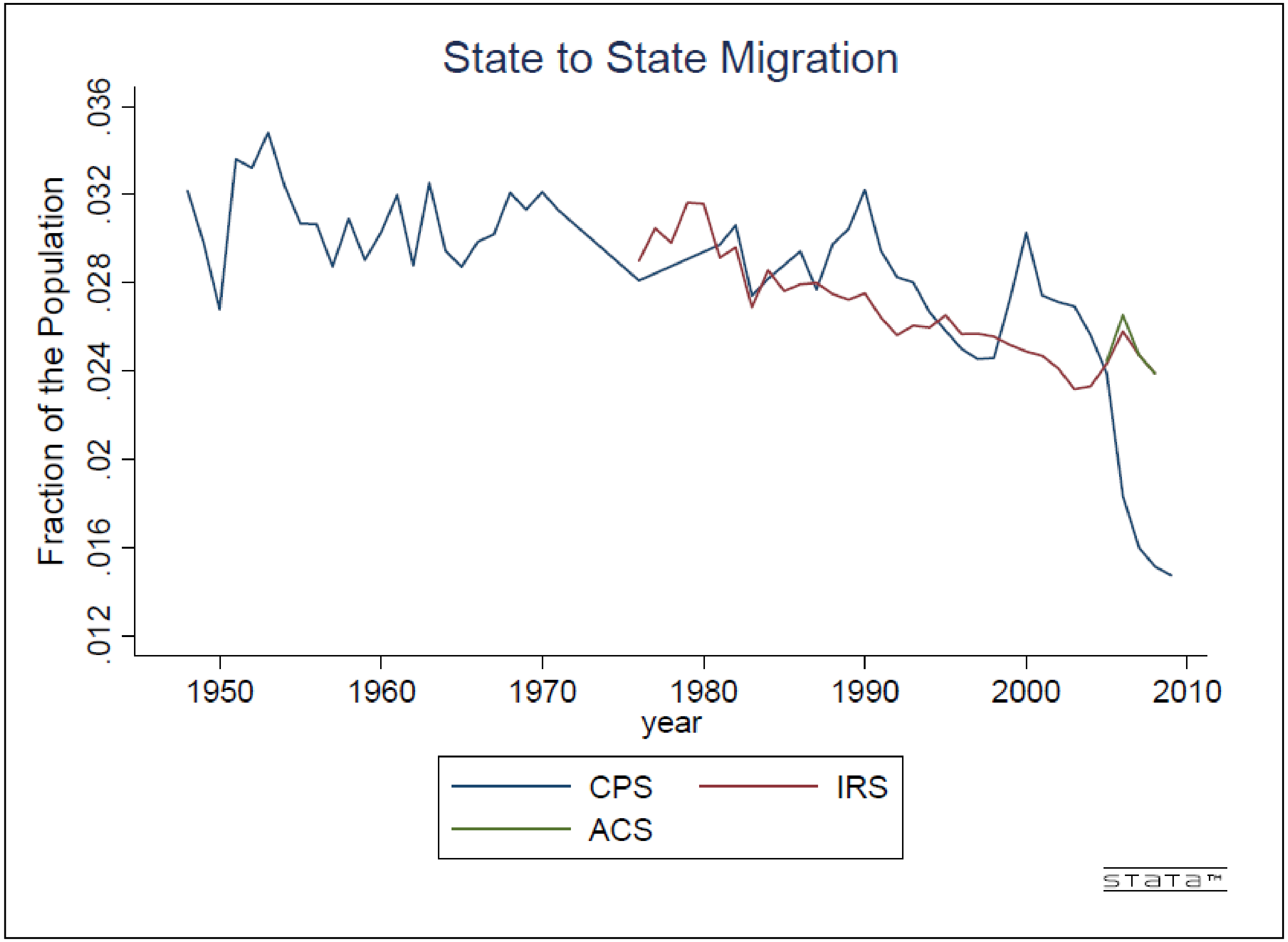
3. The effective total value roughly doubled in real terms from the 70s to the 90s
   - Changes in family- and income dynamics account for 50-80%
   - Changes in tax-and-transfer policies account for 20-50%

Implications

- The insurance effect can help explain why state T&T programs are sustainable despite residential mobility
- There are complementary explanations:
  - Federal mandates and incentives (matching formulas) for state tax-and-transfer programs. See, e.g., Baicker et al. 2010
  - States may have informational advantages in implementing tax-and-transfer programs (better information about preferences or lower monitoring costs)
  - Gordon & Cullen (2010) show that relatively small mobility costs allow for equilibria with substantial tax-and-transfer programs at the state level.
- Next step: Can our estimates of effective total value by state, year, and income group explain migration patterns?

(end)

Note: choice of these particular years may be obscuring what is a larger trend toward less mobility



Source: Abigail Wozniak

	Total Family Income (Y)	Federal Tax and Transfer Payments (F)	State Tax and Transfer payments (B)
Measured in the PSID	Labor Earnings Child Support & Alimony Income from Assets Lumpsum Payments from insurance or inheritance Private transfers from relatives Other private transfers	Social Security Supplemental Security Inc. Food Stamps	AFDC/TANF Unemployment Insurance General Assistance & Other Worker's Compensation
Tax and Transfers modeled using calculators		(-) Federal Tax Liability (-) FICA Liability	AFDC/TANF Medicaid (value of) SCHIP (value of) (-) State Tax Liability (-) State Sales Tax
Definitions used to calculate value of state tax and transfer programs	Labor Earnings Child Support & Alimony Income from Assets Lumpsum Payments Private transfers from relatives Other private transfers Unemployment Insurance General Assistance & Other Worker's Compensation	Social Security Supplemental Security Inc. Food Stamps (-) Federal Tax Liability (-) FICA Liability	AFDC/TANF Medicaid (value of) SCHIP (value of) (-) State Tax Liability (-) State Sales Tax

Summary Statistics of PSID Data by the Three Base Years, part I (back)

	1972		1982		1992	
	Mean	SD	Mean	SD	Mean	SD
Age	38.4	8.0	36.8	7.5	39.3	6.3
Male	0.46	0.50	0.47	0.50	0.48	0.50
Female	0.54	0.50	0.53	0.50	0.52	0.50
White	0.88	0.33	0.87	0.34	0.86	0.35
Black	0.09	0.29	0.10	0.30	0.13	0.34
Other	0.03	0.18	0.03	0.17	0.01	0.11
High School Dropout	0.28	0.45	0.18	0.38	0.09	0.28
High School Graduate	0.40	0.49	0.41	0.49	0.37	0.48
Some College	0.13	0.34	0.19	0.39	0.24	0.43
College Plus	0.18	0.39	0.23	0.42	0.30	0.46
Married	0.87	0.34	0.75	0.43	0.70	0.46
Household Size	4.2	1.9	3.4	1.5	3.2	1.4
Children Present	0.76	0.43	0.66	0.47	0.60	0.49
Single Parent	0.06	0.24	0.09	0.28	0.11	0.31
N	3615		4160		2808	

Summary Statistics of PSID Data by the Three Base Years, part II (back)

	1972		1982		1992	
	Mean	SD	Mean	SD	Mean	SD
Adjusted HH Income	31,737	22,441	33,164	25,832	40,860	36,738
Below Poverty Line	0.10	0.30	0.07	0.25	0.06	0.23
Any State Transfers t	0.02	0.15	0.03	0.18	0.06	0.23
Any State Transfers t,t+10	0.04	0.20	0.04	0.20	0.06	0.23
Log Adjusted Real HH Income	10.1	0.8	10.1	1.0	10.3	1.0
Delta Log Adjusted HH Income t+1	0.052	0.432	0.040	0.533	-0.039	0.675
Delta Log Adjusted HH Income t+5	0.033	0.645	0.129	0.736	0.016	0.826
Delta Log Adjusted HH Income t+10	-0.024	0.886	0.074	0.983	0.129	0.945
Moved t+1	0.02	0.15	0.03	0.18	0.03	0.18
Moved Out of State t+1	0.02	0.15	0.03	0.18	0.03	0.18
Moved t+5	0.07	0.26	0.09	0.28	0.08	0.27
Moved Out of State t+5	0.06	0.25	0.08	0.26	0.07	0.26
Moved t+10	0.12	0.33	0.15	0.36	0.13	0.33
Moved Out of State t+10	0.10	0.30	0.12	0.33	0.11	0.31
N	3615		4160		2808	

2A. Insurance vs. Redistribution

Z = Total value of tax and transfer system (conceptually):

$$E_Y[U(Y+B(Y))] = E_Y[U(Y+E_Y[B(Y)]+Z)] \qquad (1)$$

$U(.)$ = Utility function

Y = Stochastic determinant of benefits ("future income")

$B(Y)$ = Realized net benefits (current and future)

$E_Y[B(Y)]$ = Overall mean net benefits (current and future)

Z = The equivalent variation of the tax and transfer system (compared to giving everyone the average transfer)

$E_Y[..]$ = is just the unconditional mean (easy to calculate)

Conceptual Decomposition

Total value, driven by realization vs overall mean:

$$E_Y[U(Y+B(Y))] = E_Y[U(Y+E_Y[B(Y)] + Z^I + Z^R)] \quad (1)$$

Insurance vs. redistribution decomposition:

Z^I = Insurance value, driven by realization vs conditional expectation

$$E_Y[U(Y+B(Y))] = E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I)]] \quad (2a)$$

Z^R = Redistr. value, driven by conditional expectation vs overall mean

$$E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I)]] = E_Y[U(Y+E_Y[B(Y)] + Z^I + Z^R)] \quad (2b)$$

→*Conditional* expectations are key to separating the insurance and redistributive value

Conditional on current observed information, what are each person's expected future income and net benefits?

Importance of Conditioning Variables *X*

Insurance vs. redistribution decomposition:

Z^I = Insurance value, driven by realization vs conditional expectation

$$E_Y[U(Y+B(Y))] = E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I)]] \quad (2a)$$

Z^R = Redistr. value, driven by conditional expectation vs overall mean

$$E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I)]] = E_Y[U(Y+E_Y[B(Y)]+ Z^I + Z^R)] \quad (2b)$$

Note:

- No insurance value ($Z^I=0$) if X perfectly predicts realizations ($B(Y)=E_{Y|X}[B(Y)]$)
- No redistributive value ($Z^R=0$) if X has no predictive power at all ($E_{Y|X}[B(Y)]= E_Y[B(Y)]$), i.e., under "veil of ignorance."

Individual–Specific Decomposition

<u>The insurance and redistributive value varies across persons</u>

$Z^I(X)$ = Insurance value for person with characteristics X

$$E_{Y|X}[U(Y+B(Y))] = \quad E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I(X))] \tag{3a}$$

$$E_Y[U(Y+B(Y))] = E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I \quad)]] \qquad \text{(cf. 2a)}$$

$Z^R(X)$ = Redistributive value for person with characteristics X

$$E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I(X))] = E_{Y|X}[U(Y+E_Y[B(Y)]+Z^I(X)+Z^R(X))] \tag{3b}$$

$$E_X[E_{Y|X}[U(Y+E_{Y|X}[B(Y)] + Z^I)]] \quad = \quad E_Y[U(Y+E_Y[B(Y)]+ Z^I + Z^R)] \qquad \text{(cf. 2b)}$$

→ Now we can plot $Z^R(X)$ and $Z^I(X)$ by components of X

In particular, we can show how $Z^R(X)$ and $Z^I(X)$ vary by current income percentiles.

Equation for Total Value (back)

Define *X*(*i,t*) as the set of individuals in year *t* with the same values of their conditioning variables as individual *i (*e.g., same income, family composition, state of residence).

$$\sum_{j\in\mathcal{X}(i,t)} \sum_{k=0}^{K-1} \Big(U(Y_{j,t+k} + B_{j,s,t+k} + F_{j,t+k}) - U(Y_{j,t+k} + \overline{B}_{s,t+k} + F_{j,t+k} + Z_{ist}^{Total}) \Big) R_{jt}(t+k)\big(1+r\big)^{-k} = 0$$

Total value

Y = income
B = state net benefits
F = federal net benefits
bar: overall mean within a state* year cell
R = indicator for still residing in the same state as in the baseyear
r = discount rate
K = planning horizon (10 years)
Z = equivalent variation (“total value”)

Equations for Insurance Value (back)

$$\sum_{j \in \mathcal{X}(i,t)} \sum_{k=0}^{K-1} \Big(U(Y_{j,t+k} + B_{j,s,t+k} + F_{j,t+k}) - U(Y_{j,t+k} + \mathrm{E}_{\mathcal{X}(i,t)}[B_{s,t+k}] + F_{j,t+k} + \underbrace{Z_{ist}^{I}}_{\text{Total insurance value}}) \Big) \times R_{jt}(t+k)(1+r)^{-k} = 0,$$

Total insurance value

Discounted average for any variable *W*

$$\tilde{W}_{j,t} \equiv \sum_{k=0}^{K-1} \tilde{W}_{j,t+k} R_{jt}(t+k)(1+r)^{-k} \Big/ \sum_{k=0}^{K-1} R_{jt}(t+k)(1+r)^{-k}$$

Solving for across person insurance value (replace with discounted averages)

$$\sum_{j \in \mathcal{X}(i,t)} \sum_{k=0}^{K-1} \Big(U(\tilde{Y}_{j,t} + \tilde{B}_{j,s,t} + \tilde{F}_{j,t}) - U(\tilde{Y}_{j,t} + \mathrm{E}_{\mathcal{X}(i,t)}[\tilde{B}_{s,t}] + \tilde{F}_{j,t} + Z_{ist}^{I,Across}) \Big) \times R_{jt}(t+k)(1+r)^{-k} = 0,$$

Across-person insurance value

Equations for Redis. Value (back)

Expected benefits, using information set

$$\mathrm{E}_{\mathcal{X}(i,t)}[B_{i,s,t+k} \mid R_{it}(t+k)=1] = \sum_{j\in\mathcal{X}(i,t)} \left(B_{j,s,t+k} R_{jt}(t+k)\right) \Big/ \sum_{j\in\mathcal{X}(i,t)} R_{jt}(t+k)$$

Solving for total redistributive value (expected)

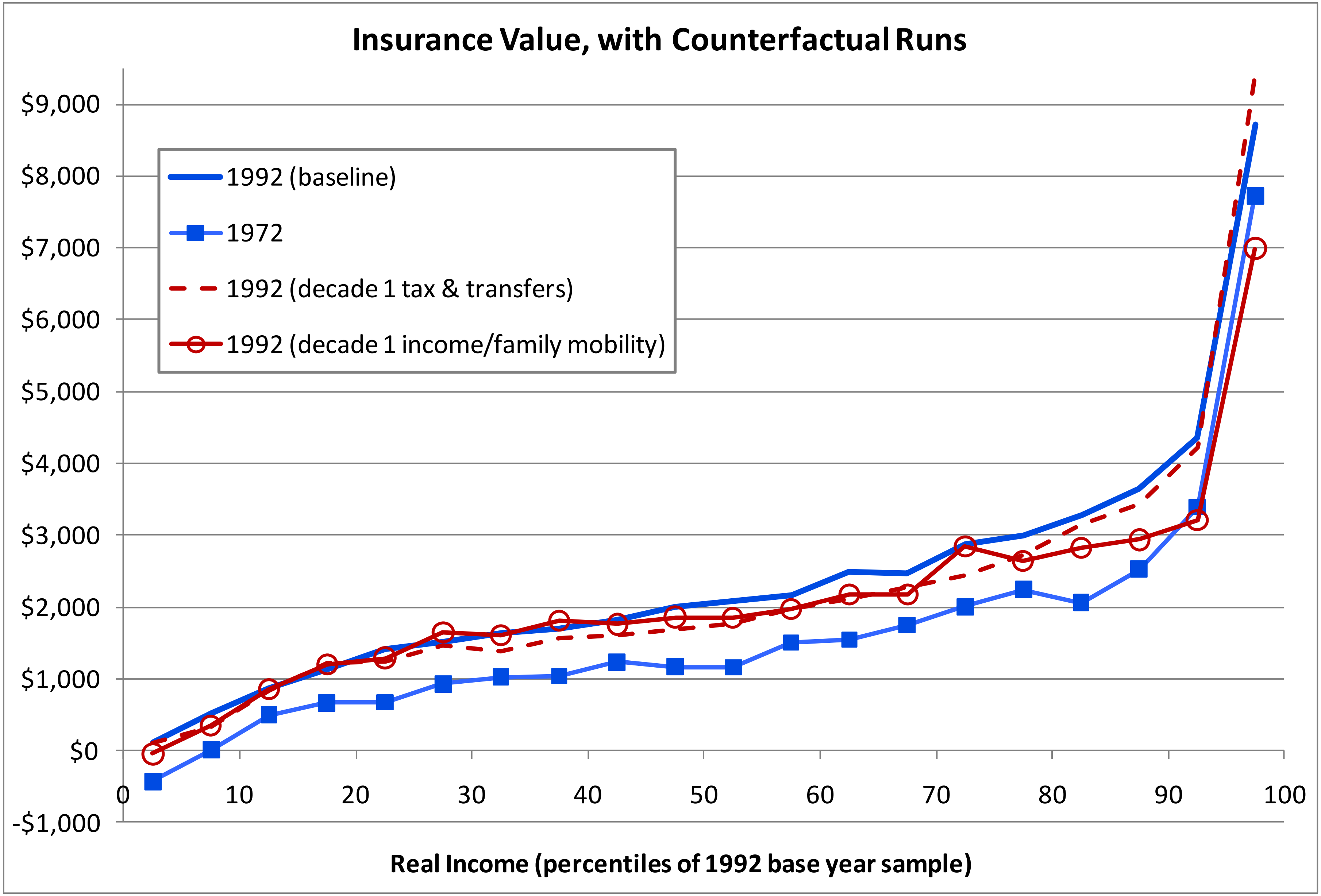
$$\sum_{j\in\mathcal{X}(i,t)} \sum_{k=0}^{K-1} \Big(U(Y_{j,t+k} + \mathrm{E}_{\mathcal{X}(i,t)}[B_{s,t+k}] + F_{j,t+k} + Z_{ist}^{I}) - U(Y_{j,t+k} + \overline{B}_{s,t+k} + F_{j,t+k} + Z_{ist}^{I} + \underbrace{Z_{ist}^{R}}_{\text{Total redistributive value}}) \Big) R_{jt}(t+k)(1+r)^{-k} = 0.$$

Solving for across-person redistributive value (replace with discounted averages)

$$\sum_{j\in\mathcal{X}(i,t)} \sum_{k=0}^{K-1} \Big(U(\tilde{Y}_{j,t} + \mathrm{E}_{\mathcal{X}(i,t)}[\tilde{B}_{s,t}] + \tilde{F}_{j,t} + Z_{ist}^{I}) - U(\tilde{Y}_{j,t} + \tilde{\overline{B}}_{s,t} + \tilde{F}_{j,t} + Z_{ist}^{I} + \underbrace{Z_{ist}^{R,Across}}) \Big) \times R_{jt}(t+k)(1+r)^{-k} = 0.$$

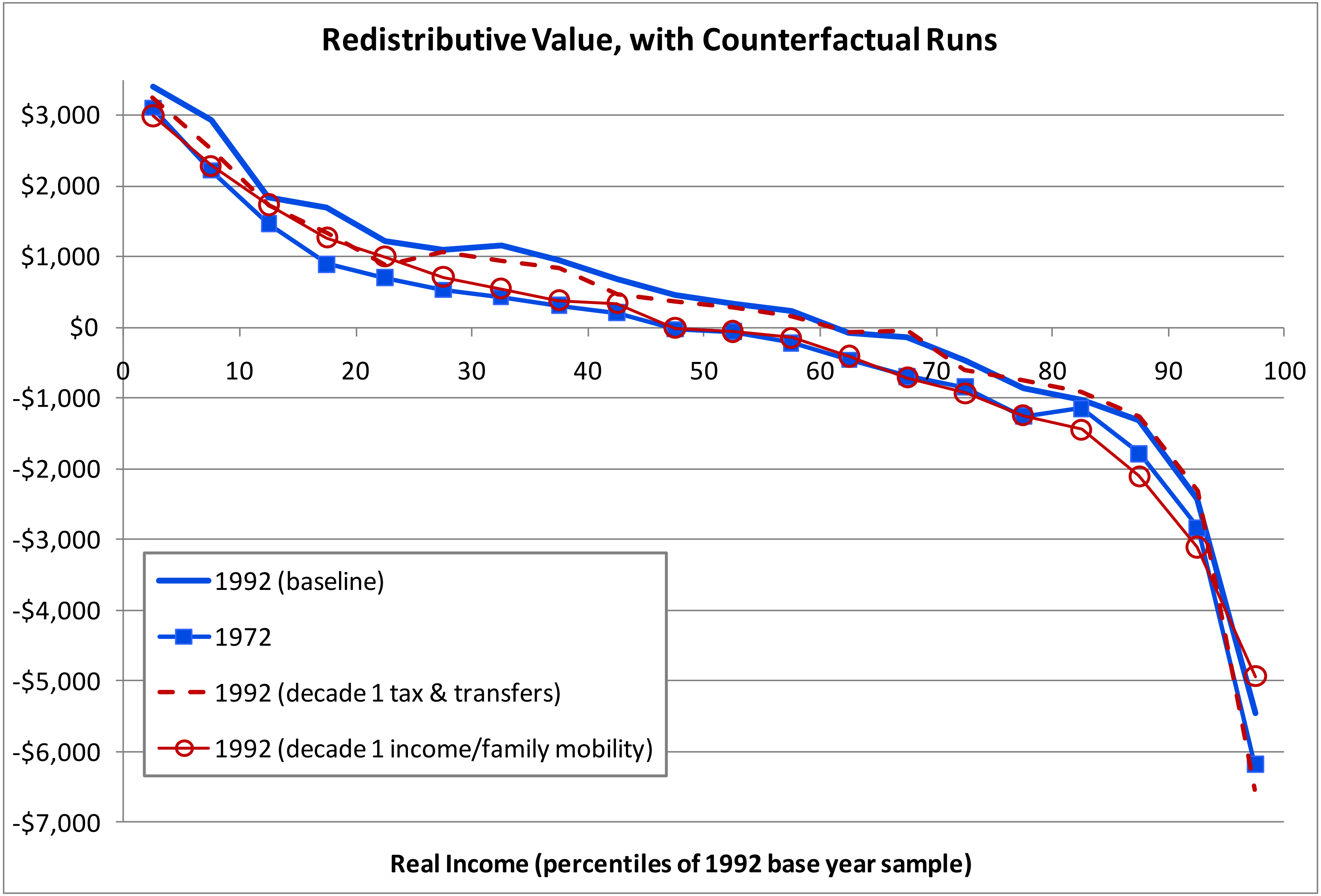
Across person redistributive [explicit solution]

(back)



Insurance Value, with Counterfactual Runs
$9,000
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
-$1,000
0
10
20
30
40
50
60
70
80
90
100
1992 (baseline)
1972
1992 (decade 1 tax & transfers)
1992 (decade 1 income/family mobility)
Real Income (percentiles of 1992 base year sample)

(back)



Redistributive Value, with Counterfactual Runs
$3,000
$2,000
$1,000
$0
-$1,000
-$2,000
-$3,000
-$4,000
-$5,000
-$6,000
-$7,000
0
10
20
30
40
50
60
70
80
90
100
1992 (baseline)
1972
1992 (decade 1 tax & transfers)
1992 (decade 1 income/family mobility)
Real Income (percentiles of 1992 base year sample)