Methods and Assumptions of the CPS ASEC Tax Model and Imputing 2020 Stimulus Payments

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ECONOMY

Poverty fell overall in 2020 as result of massive stimulus checks and unemployment aid, Census Bureau says

The official rate rose slightly to 11.4%, but the agency says that after accounting for pandemic relief aid, the poverty fell to 9.1%. The uninsured population also rose slightly.
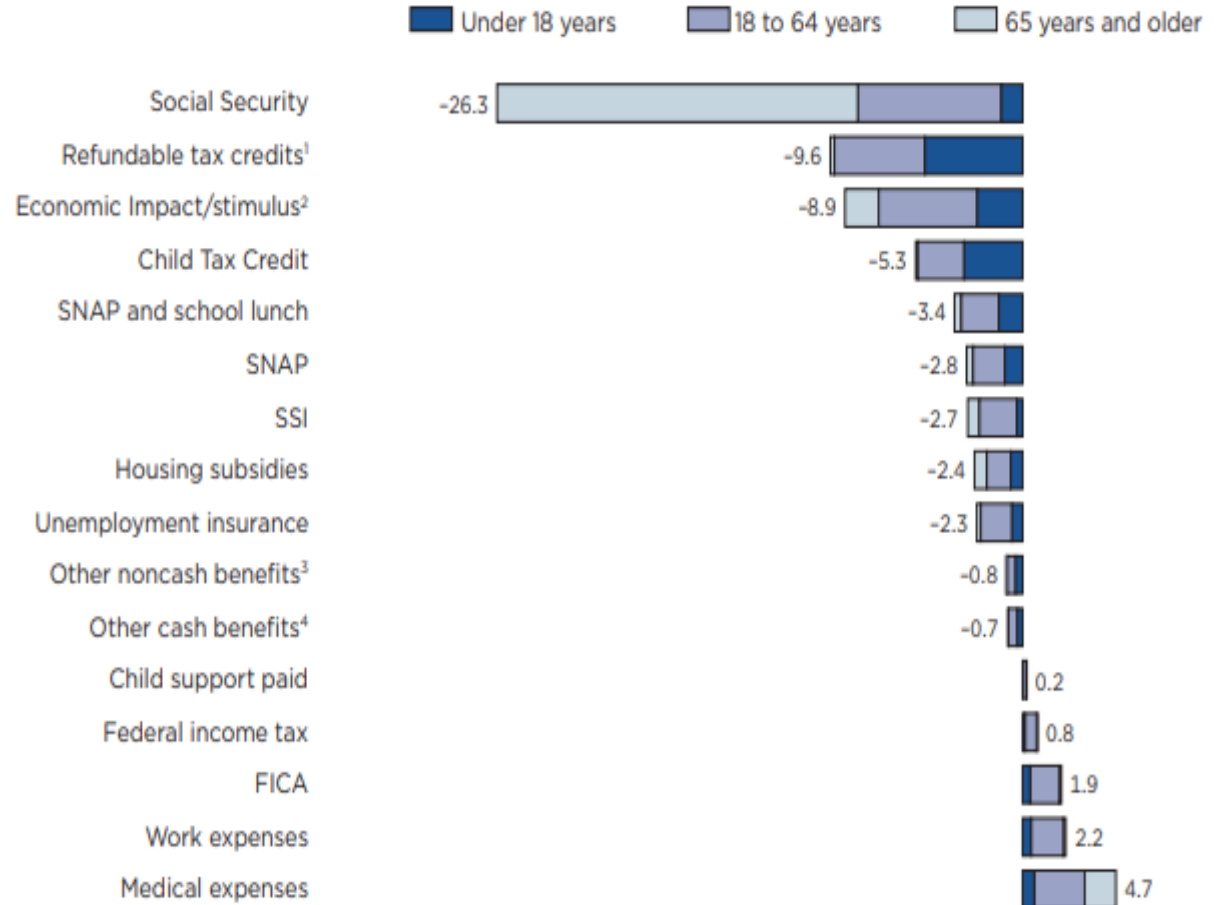
The New York Times

The U.S. Economy Today | September Inflation Report | CO[

Pandemic Aid Cut U.S. Poverty to New Low in 2021, Census Bureau Reports

A measure that accounts for all federal subsidies also showed a reduction of almost half in the number of children below the poverty level.

United States Census Bureau

Figure 11.
Change in Number of People in Poverty After Including Each Element: 2021
(In millions)

Legend: Under 18 years | 18 to 64 years | 65 years and older

Element	Value
Social Security	-26.3
Refundable tax credits[1]	-9.6
Economic Impact/stimulus[2]	-8.9
Child Tax Credit	-5.3
SNAP and school lunch	-3.4
SNAP	-2.8
SSI	-2.7
Housing subsidies	-2.4
Unemployment insurance	-2.3
Other noncash benefits[3]	-0.8
Other cash benefits[4]	-0.7
Child support paid	0.2
Federal income tax	0.8
FICA	1.9
Work expenses	2.2
Medical expenses	4.7

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CPS ASEC Tax Model

- The CPS ASEC Tax Model estimates federal, state, and payroll taxes, and several tax credits for the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC)
  - Provides post-tax income for the Income in the United States report
  - Provides tax credits for the Supplemental Poverty Measures (SPM)
- First comprehensive documentation will be released soon
  - Lin, Daniel. 2022. "Methods and Assumptions of the CPS ASEC Tax Model." SEHSD Working Paper 2022-18. U.S. Census Bureau.

2021 Public-Use CPS ASEC Tax Variables

Variable	Definition
ACTC_CRD	Additional child tax credit
AGI	Adjusted gross income
CTC_CRD	Child tax credit and other dependent credit
DEP_STAT	Person index (A_LINENO) of filer who claimed this dependent
EIP_CRD	Sum of Economic Impact Payment 1 (CARES Act) and Economic Impact Payment 2 (CRRSA Act)
EIT_CRED	Earned income tax credit
FED_RET	Federal retirement payroll deduction
FEDTAX_AC	Federal income tax liability, after all refundable credits and Economic Impact Payments 1 and 2.
FEDTAX_BC	Federal income tax liability, before refundable credits
FICA	Social security retirement payroll deduction
FILESTAT	Tax filer status
MARG_TAX	Marginal tax rate
STATETAX_A	State income tax liability, after all credits
STATETAX_B	State income tax liability, before credits
TAX_INC	Taxable income amount
TAX_ID	Tax unit ID number

Assumptions of CPS ASEC Tax Model

- All respondents
  - Are US residents for eligibility purposes
  - Are full-year state residents
  - Can work in the US
  - Choose deductions that minimize taxes
  - Take maximum available credits
  - Only single, head of household, and married joint filers

Tax Model Steps

- Construct tax filing units

- Construct income

- Statistical match to IRS Statistics of Income (SOI) Individual Public-Use Microdata Files

- Federal and state tax calculation

- Determine filers and non-filers

Tax Units

- CPS ASEC person and household files are transformed into tax units

- Tax unit is a group of people who files a single tax return together

- Filing Status
  - Married filing jointly: units with two spouses
  - Head of household: units with single person linked with dependents
  - Single: units with one individual

Income Construction

- Person-level earned wages are used to calculate federal payroll taxes also known as Federal Insurance Contribution Act (FICA) taxes
- Adjusted Gross Income (AGI) is estimated for federal income tax calculation
  - Follows IRS 1040 forms and schedules line by line

More

Imputing line items from IRS microdata

- Match on characteristics to IRS Statistics of Income (SOI) individual public use microdata

- Model line items from several 1040 supplemental forms that are not captured by CPS ASEC
  - Inputs for AGI
  - Itemized deduction line items

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Federal and State Taxes

- Tax calculation follows an iterative process
- First run of federal taxes
  - Using imputed state and local taxes from IRS
- State taxes
  - Using first run federal tax liabilities and credits
- Second run of federal taxes
  - Using newly estimated state tax liabilities

Filing Requirement

- CPS ASEC tax model defines a set of filing requirements
  - Income above IRS filing threshold determined by age and filing status
  - Positive Earned Income Tax Credit
  - Positive self-employment income
  - Positive Additional Child Tax Credit
- Tax units that do not satisfy any of the requirements are presumed to be nonfilers in the tax model
  - For 2020, additional requirements are imposed on receiving EIPs

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Comparison to IRS Benchmark

	ASEC/SOI Ratio	2020 CPS ASEC Tax Model aggregate ($Bil)	IRS 2020 filing season aggregate ($Bil)
Adjusted Gross Income	105.0	11,900	11,330
		(140.9)	
Taxable Income	103.4	9,025	8,727
		(118.5)	
Itemized Amount	110.9	701	632
		(15.0)	
Federal Taxes	91.7	1,449	1,579
		(24.1)	
Earned Income Credit	62.2	39	62
		(0.8)	
Child Tax Credit and/or Credit for Other Dependents	102.6	88	85
		(1.6)	
Additional Child Tax Credit	72.2	25	34
		(0.5)	

Sources: Internal Revenue Service Statistics of Income (SOI) 2020 Filing Season Statistics by AGI as of December 31, 2020 (https://www.irs.gov/statistics/filing-season-statistics). Census Bureau 2020 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: The ratios represent CPS ASEC tax-modeled aggregates to its corresponding IRS SOI benchmark. The IRS SOI benchmark is 2019 tax year aggregates as of December 31, 2020. The values in parenthesis are the standard error of the aggregate modeled sums. Amounts are in billions.

2020 Stimulus Payments

- CARES Act – March 2020
  - First Economic Impact Payments (EIP 1)
- CRRSA Act – December 2020
  - Second Economic Impact Payments (EIP 2)

2021 CPS ASEC Questions

- *"Since April 1, 2020, have you or anyone in your household received a 'stimulus payment,' that is the coronavirus (COVID-19) related Economic Impact Payment from the Federal Government?"*

- *"What was the amount of the stimulus payment(s) that you received for all the covered adults and children since April 1, 2020?"*

Imputing 2020 Stimulus Payments

- The CPS ASEC Tax Model imputed the first and second Economic Impact Payments for the 2021 CPS ASEC.
- EIP 1 maximum payment
  - $2,400 for Married filing jointly
  - $1,200 for Single and Head of household
  - Plus $500 per qualifying child
  - Reduced by 5% of AGI over threshold
- EIP 2 maximum payment
  - $1,200 for Married filing jointly
  - $600 for Single and Head of household
  - Plus $600 per qualifying child
  - Reduced by 5% of AGI over threshold

Assumptions for 2020 Stimulus Payments

- Production model
  - SS and VA recipients or responding yes to survey questions on receipt of EIP

- Upper Bound model
  - All individuals eligible for EIP

- Lower Bound model
  - Target aggregate count of single filers receiving EIP by official IRS tabulation

EIP Imputation Benchmarks

(Bee, Hokayem, Lin 2021)

Table 1. ASEC/SOI ratios of first- and second-round aggregate payments by categories of adjusted gross income.

	Production Model			Upper Bound Model			Lower Bound Model			Survey Reported		
	Count	Amount	Mean Amount	Count	Amount	Mean Amount	Count	Amount	Mean Amount	Count	Amount	Mean Amount
Overall	**0.97**	**1.02**	**1.05**	**0.99**	**1.04**	**1.05**	**0.86**	**0.95**	**1.10**	**0.65**	**0.77**	**1.18**
Take-Up Rate (%)	98.0			100.0			86.6			66.0		
Negative or zero	0.93	1.09	0.86	1.06	1.25	0.86	0.77	0.94	0.89	0.48	0.62	0.96
$1 under $10,000	1.06	1.21	1.14	1.06	1.21	1.14	0.91	1.07	1.18	0.64	0.75	1.17
$10,000 under $20,000	0.74	0.76	1.02	0.74	0.76	1.02	0.64	0.68	1.06	0.39	0.45	1.16
$20,000 under $30,000	0.86	0.87	1.00	0.86	0.87	1.00	0.74	0.78	1.05	0.44	0.54	1.23
$30,000 under $40,000	0.92	0.94	1.02	0.92	0.94	1.02	0.80	0.85	1.07	0.52	0.61	1.17
$40,000 under $50,000	0.94	0.97	1.03	0.94	0.97	1.03	0.82	0.88	1.08	0.60	0.69	1.15
$50,000 under $60,000	1.07	1.07	1.00	1.07	1.07	1.00	0.93	0.97	1.05	0.69	0.78	1.13
$60,000 under $75,000	1.08	1.10	1.03	1.08	1.10	1.03	0.97	1.04	1.07	0.77	0.84	1.09
$75,000 under $100,000	1.07	1.04	0.97	1.07	1.04	0.97	0.98	1.01	1.03	0.81	0.90	1.10
$100,000 under $200,000	1.15	1.16	1.01	1.15	1.16	1.01	1.15	1.16	1.01	1.09	1.07	0.98
$200,000 or more	1.50	1.52	1.01	1.50	1.52	1.01	1.50	1.52	1.01	13.00	56.77	4.37

Source: Internal Revenue Service Statistics of Income (IRS SOI) tables (irs.gov/statistics/soi-tax-stats-coronavirus-aid-relief-and-economic-security-act-cares-act-statistics), U.S. Census Bureau 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the ratio of the CPS ASEC tax-modeled sum of the first and second rounds of Economic Impact Payments to its corresponding IRS SOI benchmark. Underlying levels are listed in Appendix Table 1. SOI counts are the maximum of first- and second-round EIP aggregate counts, as the union of recipients is not separately tabulated. SOI totals include payments not based on tax returns, which is more comparable to the totals from the ASEC Tax Model. The "negative or zero" AGI category for SOI was modified to include payments to individuals without tax returns. Ratios may differ slightly from those implied by Appendix Table 1 due to use of unrounded SOI values.

EIP Imputation Benchmarks

(Bee, Hokayem, Lin 2021)

Table 2. ASEC/SOI ratios of first- and second-round aggregate payments by filing status.

	Production Model			Upper Bound Model			Lower Bound Model			Survey Reported		
	Count	Amount	Mean Amount	Count	Amount	Mean Amount	Count	Amount	Mean Amount	Count	Amount	Mean Amount
Overall[1]	**0.97**	**1.02**	**1.05**	**0.99**	**1.04**	**1.05**	**0.86**	**0.95**	**1.10**	**0.65**	**0.77**	**1.18**
Single or qualifying widow(er)[2]	1.26	1.26	0.99	1.26	1.26	0.99	1.00	0.99	0.99	0.66	0.79	1.21
Married filing joint or separately[3]	1.14	1.16	1.02	1.14	1.16	1.02	1.14	1.16	1.02	1.04	0.97	0.94
Head of household	0.72	0.81	1.12	0.72	0.81	1.12	0.72	0.81	1.12	0.50	0.59	1.18

Source: Internal Revenue Service Statistics of Income (IRS SOI) tables (irs.gov/statistics/soi-tax-stats-coronavirus-aid-relief-and-economic-security-act-cares-act-statistics), U.S. Census Bureau 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the ratio of the CPS ASEC tax-modeled sum of the first and second rounds of Economic Impact Payments to its corresponding IRS SOI benchmark. Underlying levels are listed in Appendix Table 2. SOI counts are the maximum of first- and second-round EIP aggregate counts, as the union of recipients is not separately tabulated. Ratios may differ slightly from those implied by Appendix Table 2 due to use of unrounded SOI values.

[1] The overall values for the Upper Bound Model include payments received by nonfilers.

[2] The CPS ASEC Tax Model assigns single filer status such that it is most comparable to the sum of SOI single filers and SOI qualifying widow(er) filers.

[3] The CPS ASEC Tax Model assigns married filing jointly such that counts are most comparable to the sum of SOI married joint and one-half of SOI married separate filers, and amounts are most comparable to the sum of SOI married joint and separate filers.

Working Papers

- Comprehensive documentation of the CPS ASEC Tax Model
  - Lin, Daniel. 2022. "Methods and Assumptions of the CPS ASEC Tax Model." SEHSD Working Paper 2022-18. U.S. Census Bureau.

- Modeling 2020 Economic Impact Payments
  - Bee, Adam, Charles Hokayem, and Daniel Lin. 2021. "Imputing 2020 Economic Impact Payments in the 2021 CPS ASEC." SEHSD Working Paper 2021-18. U.S. Census Bureau.

- Modeling 2021 expanded Child Tax Credits
  - Bee, Adam, Charles Hokayem, and Daniel Lin. 2022. "Modeling the 2021 Child Tax Credit in the CPS ASEC." SEHSD Working Paper 2022-17. U.S. Census Bureau.

Questions/Comments?

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CPS ASEC Tax Model Documentation (forthcoming)

https://www.census.gov/library/working-papers/2022/demo/SEHSD-wp2022-18.html