

Imputing 2020 Economic Impact Payments in the 2021 CPS ASEC*

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Abstract

In response to the COVID-19 pandemic, Congress passed legislation to aid individuals and families. This legislation included the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) in March 2020 and the Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA Act) in December 2020. Both the CARES Act and the CRRSA Act provided households with additional resources in the form of stimulus payments. This paper presents a model of the two rounds of stimulus payments received by households in 2020 based on combining survey responses from the 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) with the CPS ASEC Tax Model. We present the Production Model used in the 2021 CPS ASEC and in the 2020 Supplemental Poverty Measure (SPM). We present two additional models with different underlying assumptions that affect take-up rates and provide upper and lower bounds on the aggregate stimulus amount and the number of individuals receiving payments. We also provide aggregates comparable to tabulations released by the Internal Revenue Service Statistics of Income program and estimate the SPM rate under each model.

* This paper is released to inform interested parties of ongoing research and to encourage discussion of work in progress. All errors are those of the authors. Any views expressed, including those related to statistical, methodological, technical, or operational issues, are solely those of the authors and do not necessarily reflect the official positions or policies of the U.S. Census Bureau. The Census Bureau reviewed this product for unauthorized disclosure of confidential information and has approved the disclosure avoidance practices applied to this release. CBDRB-FY21-POP001-0183 and CBDRB-FY21-POP001-208.

Background

Economic Impact Payments

In March 2020 the Coronavirus Aid, Relief, and Economic Security Act, also known as the CARES Act, created a refundable tax credit for the 2020 tax year. The advance payment of this tax credit was referred to as the First Economic Impact Payment (EIP 1). In December 2020 the Coronavirus Response and Relief Supplemental Appropriations Act of 2021 created an additional refundable tax credit for the 2020 tax year. The advance payment of this credit was referred to as the Second Economic Impact Payment (EIP 2). The table on the following page (Economic Impact Payment Comparison) summarizes features of each payment including eligibility criteria and amount.¹ We describe these features below.

People were eligible for EIP 1 if they were either a U.S. citizen or U.S. resident alien, and they were not claimed as a dependent of another taxpayer in 2018 or 2019, and they had a Social Security number (SSN) valid for employment.² Generally, married joint filers with adjusted gross income (AGI) under \$150,000, head of household filers with AGI under \$112,500, and individual filers using any other filing status with AGI under \$75,000 were eligible for their full EIP 1 and EIP 2 payments.³ The maximum EIP 1 amount was \$1,200 for single, head of household, and married separate filers and \$2,400 for married joint filers, plus \$500 per qualifying child. The maximum EIP 2 amount was \$600 for single, head of household, and married separate filers and \$1,200 for married joint filers, plus \$600 per qualifying child. A qualifying child is defined by the Internal Revenue Service (IRS) as someone who is the child, stepchild, eligible foster child, sibling, half sibling, step sibling, or descendant, who can be claimed as a dependent, who is under age 17 at the end of the reference tax year,⁴ is a U.S. citizen, U.S. national, or U.S. resident alien, and has a valid SSN or taxpayer identification number. Both EIP 1 and EIP 2 had a phaseout provision where the payments were reduced by 5 percent of the amount by which

¹ Information for this table was compiled from these IRS websites: <<https://www.irs.gov/newsroom/questions-and-answers-about-the-first-economic-impact-payment-topic-a-eligibility>>, <<https://www.irs.gov/newsroom/first-economic-impact-payment-questions-and-answers-topic-h-social-security-railroad-retirement-and-department-of-veteran-affairs-benefit-recipients>>, and <<https://www.irs.gov/coronavirus/second-eip-faqs#Eligibility>>.

² The Social Security Administration issues three types of Social Security cards: (1) an unrestricted card for U.S. citizens and people lawfully admitted to the U.S. on a permanent basis; (2) “VALID FOR WORK ONLY WITH DHS AUTHORIZATION” for people lawfully admitted to the U.S. on a temporary basis with authorization to work; and (3) “NOT VALID FOR EMPLOYMENT” for people who are lawfully admitted to U.S. without work authorization or people who need a Social Security number for federal benefits or services.

³ In December 2020 the COVID-related Tax Relief Act of 2020 increased the AGI phaseout amount for a Qualifying Widow(er) from \$75,000 to \$150,000.

⁴ Our interpretation of the limited available information regarding eligibility suggests that children’s eligibility was determined by the tax year of the return used by IRS. For example, a filer with a child who was aged 16 years in the 2018 tax return, and did not file a 2019 tax return, still received the extra amount for that qualifying child. However, we uniformly model children’s eligibility based on their ages as of 2020.

the filer's AGI exceeded the applicable thresholds. Qualifying income for EIP 1 could be either 2018 or 2019 income, depending on what IRS records showed at the time of payment.

Eligibility for EIP 2 was broadly similar. EIP 2 expanded eligibility to additional groups; these expansions were retroactively applied to EIP 1, but tax filers needed to apply for the additional amounts in tax year 2020 returns. Qualifying income for EIP 2 was only based on 2019 income. Eligibility criteria are summarized in the table below.

In March 2021 the American Rescue Plan created the Third Economic Impact Payment (EIP 3) which is a refundable tax credit for the 2021 tax year. Since EIP 3 is a 2021 tax credit, and the advance payments of EIP 3 were made in 2021, and the Recovery Rebate Credit for EIP 3 is also for tax year 2021, the third EIP is not included in the models presented in this paper, which cover payments for only 2020.

Economic Impact Payment Comparison

	Economic Impact Payment 1 (EIP 1)	Economic Impact Payment 2 (EIP2)
Legislation/ Date	Coronavirus Aid, Relief, and Economic Security Act (CARES Act) March 2020	Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA Act) December 2020
Maximum payment	<ul style="list-style-type: none"> • \$2,400 for married filing jointly • \$1,200 for single, head of household, married filing separately, and widowers • \$500 per qualifying child 	<ul style="list-style-type: none"> • \$1,200 for married filing jointly • \$600 for single, head of household, married filing separately, and widowers • \$600 per qualifying child
Income threshold for full payment amount	<ul style="list-style-type: none"> • Married, filing jointly: \$150,000 • Head of Household: \$112,500 • Single or married filing separately: \$75,000 • Widower* : \$75,000 	<ul style="list-style-type: none"> • Married, filing jointly: \$150,000 • Head of Household: \$112,500 • Single or married filing separately: \$75,000 • Widower: \$150,000
Phaseout	Payment reduced by 5% of AGI exceeding threshold	Payment reduced by 5% of AGI exceeding threshold
Eligibility	Recipients must have a Social Security number valid for employment. Qualifying dependents are qualifying children under 17 at the end of 2019 tax year. Married joint filers may be eligible for a partial credit when only one spouse has a Social Security number valid for employment**.	Recipients must have a Social Security number valid for employment. Qualifying dependents are qualifying children under 17 at the end of 2019 tax year. Married joint filers only need one spouse to have SSN valid for employment.
Auto-Payment Recipients	<ul style="list-style-type: none"> • Tax year 2018 and 2019 filers. • Social Security, Supplemental Security, Veterans Affairs, and Railroad Retirement recipients 	<ul style="list-style-type: none"> • Tax year 2019 filers. • Social Security, Supplemental Security, Veterans Affairs, and Railroad Retirement recipients

Source: U.S. Internal Revenue Service, <<https://www.irs.gov/newsroom/questions-and-answers-about-the-first-economic-impact-payment-topic-a-eligibility>>, <<https://www.irs.gov/newsroom/first-economic-impact-payment-questions-and-answers-topic-h-social-security-railroad-retirement-and-department-of-veteran-affairs-benefit-recipients>>, and <<https://www.irs.gov/coronavirus/second-eip-faqs#Eligibility>>.

Notes:

* As updated in December 2020, expansion of the AGI threshold for widow/widower filers under EIP 2 was retroactively applied to EIP 1. Affected filers needed to apply for the Recovery Rebate Credit to receive the full amount.

** As updated in December 2020, expansion of eligibility for some joint filers under EIP 2 was retroactively applied to EIP 1. Affected filers needed to apply for Recovery Rebate Credit to receive the full amount.

2021 Current Population Survey Annual Social and Economic Supplement

To collect data on the Economic Impact Payments for 2020 the Census Bureau added new questions about the receipt and amount of these payments to the 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).⁵ The questions asked, at the household level:

“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?”

At the time of the questionnaire’s design, only the first payment had been announced. The questions were intended to capture EIP 1 and a possible upcoming EIP 2.⁶ However, because households were only asked to report stimulus payments since April 1, 2020, with no end date, respondent households may have interpreted the question in multiple ways.

Some households may have only reported EIP 1 and EIP 2, as intended. Some households may have only reported stimulus received during the calendar year. Other households may report EIP 1 and EIP 2, even if those were received during 2021. Due to the timing of the survey and the start of EIP 3 distribution, other households may have included EIP 3.⁷ Specifically, the 2021 CPS ASEC was conducted from February 2021 to April 2021. Part of this collection period, March 2021 and April 2021, overlapped with the period that EIP 3 was beginning to be disbursed. To investigate the potential for households including this third payment in their responses, we also model amounts for EIP 3. Among the 53.2 percent of households with positive modelled EIP 3 amounts and non-imputed survey responses, 22.0 percent gave amount responses exactly equal to their modelled sum of EIP 1 and EIP 2, while 13.0 percent provided amount responses equal to the predicted sum of all three payments.

Further, 33.0 percent of households either did not respond to the survey stimulus questions (or had inconsistent responses) and thus required imputation. Due to these variations in the timing of receipt

⁵ For more information on confidentiality protection, methodology, sampling and nonsampling error, and definitions, see <<https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>>.

⁶ The conceptual scope of the Supplemental Poverty Measure (SPM) and the CPS ASEC tax model is to include tax credits filed for the reference tax year (2020 in this case), which excludes EIP 3 because it is a credit for the 2021 tax year.

⁷ EIP 1 was distributed starting April 2020. EIP 2 was distributed starting late-December 2020 and early January 2021.

of EIP 2, potential confusion around EIP 3 timing, and high nonresponse rates to this question, we model payments for EIP 1 and EIP 2 rather than solely rely on the CPS ASEC survey responses.

CPS ASEC Tax Model

Modeling each EIP amount requires three inputs for each tax unit in the household: tax filing status, the number of qualifying children, and adjusted gross income. This section describes the process of creating each input in the 2021 CPS ASEC tax model.

Tax filing status, number of dependents, and number of qualifying children: The CPS ASEC data first must be transformed from person- and household-level units into tax units. The process for forming tax units begins with the person file by creating three subsets: (1) one for all spouses; (2) one for all children; and (3) one for the “others.” The first subset of all filers with spouses is created by looking for any non-zero value for the spouse pointer variable. The second subset of all children is created by looking for any non-zero value in the parent pointer variable. The remaining persons – with no values in spouse pointer or parent pointer – form the third subset for the “others.”

We then adjust those initial sets as follows. We make sure that the children and dependents subset only includes qualifying children or dependents as the IRS defines them⁸ – children aged 18 years or under, children under 24 and enrolled in school, or adult children with a disability. Children that don’t fall into those three categories are moved to the “others” subset. We similarly reassign anyone under age 15 in the “others” subset (with no parent pointer) to the children subset.⁹ The tax model only constructs single dependents and does not consider married dependent filers. The number of qualifying children and qualifying dependents as defined for various federal and state deduction and credits, including economic impact payments, are calculated for each tax unit.

Dependents are then linked to tax units. The child subset (2) is attached to the tax unit of their parent or parents, using the parent pointer variable. If the tax unit contains two spouses, then the filing status of the unit is *Married, Filing Jointly*, and the spouse incomes are combined for the tax unit. The main filer is determined by the family relationship variable. The reference person is the main filer, and the spouse is attached to the main filer. We assume that all married couples file jointly, so we do not model the *Married, Filing Separately* filing status. If the tax unit contains a single person that has dependents, then the filing status is set to *Head of Household*. If the tax unit contains only a single person, then the

⁸ Since all inputs to the tax model are based on responses to the household survey, only resident children and dependents are included.

⁹ Children under 15 and with no parent pointer are assigned to be a dependent of the householder.

filing status is set to *Single*. The survey data don't allow us to identify married separate filers, so the filing status in the ASEC Tax Model only consists of *Single*, *Head of Household*, and *Married, Filing Jointly*.

Adjusted gross income: Federal adjusted gross income (AGI) is computed as the sum of wages and salaries, interest and dividend incomes, alimony income, business self-employment income, capital gains, IRA income, pension income, rent income, farm self-employment income, taxable unemployment compensations, and taxable social security benefits and subtracted by one-half of self-employment taxes, self-employed health insurance, self-employed health savings, and IRA contributions.¹⁰

Several 2020 tax-year-specific tax code changes were applied to the calculation of AGI, such as the Unemployment Compensation Exclusion and the suspension of the charitable contribution limit. The Unemployment Compensation Exclusion, which excluded up to \$10,200, is subtracted from AGI. Changes not applied for tax year 2020 were the Old-Age, Survivors, and Disability Insurance (OASDI) tax deferral by employers, OASDI tax deferral by self-employed, and the \$300 charitable contribution deduction under standard deduction.¹¹

Filing requirements: In addition, the stimulus payments depend on the filing of tax returns, which is also determined by the tax model. The tax model assumes a tax unit files a return if it meets at least one of the following requirements: (1) income above a filing threshold determined by age and filing status; (2) positive Earned Income Tax Credit (EITC); (3) positive self-employment income; (4) gross income less than \$0; (5) self-employment income less than \$0; (6) positive Additional Child Tax Credit; (7) positive self-employment income for either spouse; or (8) has total income above \$2,000. Tax units that do not satisfy any of these eight requirements are presumed nonfilers.

Stimulus Model Approaches

We describe three models for assigning economic impact payments: the Production Model (our preferred model), an Upper Bound Model, and a Lower Bound Model. These models differ in the underlying assumptions that affect the take-up rate of payments. All models implement the same rules for calculating the payments based on tax filing status, qualifying children, and adjusted gross income from the ASEC Tax Model. For single filers, if their AGI is less than or equal to \$75,000, then they receive the full amounts of EIP 1 and EIP 2: \$1,200 and \$600, respectively. For married joint filers, if their AGI is

¹⁰ Some AGI and itemized deduction components are imputed from the IRS Statistics of Income microdata.

¹¹ Since the OASDI taxes must be repaid, the deferrals are not modeled. The \$300 charitable contribution deduction for standard deduction introduced under the CARES Act is not applied to AGI, because in the ASEC Tax Model, charitable contributions are imputed from IRS Statistics of Income microdata. However, there are only records of itemizing filers with charitable contributions, so the data lack information on charitable contributions for standard deduction filers.

less than or equal to \$150,000, then they receive the full amounts of EIP 1 and EIP 2: \$2,400 plus \$500 per qualifying child and \$1,200 plus \$600 per qualifying child, respectively. For head of household filers, if their AGI is less than or equal to \$112,500, then they receive the full amounts of EIP 1 and EIP 2: \$1,200 plus \$500 per qualifying child and \$600 plus \$600 per qualifying child, respectively. The payments are reduced by 5 percent of the amount by which the filer's AGI exceeds the applicable threshold. For example, for filers with no qualifying children, EIP 1 is reduced to \$0 if their AGI is at least \$99,000 for single filers, \$136,500 for head of household filers, and \$198,000 for married joint filers and EIP 2 is reduced to \$0 if their AGI is at least \$87,000 for single filers, \$124,500 for head of household filers, and \$174,000 for married joint filers.

Production Model (preferred model)

The Production Model produces EIP amounts in the CPS ASEC tax file that are also used in the Supplemental Poverty Measure. This model assumes all tax units passing the standard filing requirements according to the ASEC Tax Model (called presumed filers) receive both EIP amounts. Tax units that do not file according to the ASEC Tax Model (called presumed nonfilers) do not receive any EIP amount with four exceptions. Presumed nonfilers reporting (or are imputed to receive) any Social Security, Supplemental Security Income (SSI), or Veterans Affairs (VA) benefits in the CPS ASEC are assigned both EIP amounts. These groups represent actual nonfilers who were automatically issued payments by the IRS. Additionally, we give EIP amounts to presumed nonfilers who are in households that report receiving (or imputed receiving) any EIP amount.¹² These additional payments could be considered roughly analogous to the nonfiling households without Social Security, SSI, or VA payments who had to use the IRS online nonfiler tool in order to receive payment. Given the possible misinterpretation of the questionnaire, we thus incorporate the reported receipt while discarding the reported amount. This model assumes individuals receiving less payments during 2020 than they should have will reclaim the difference in the 2020 Recovery Rebate Credit. Theoretically, taken together these requirements yield an EIP take-up rate of less than 100 percent, because there may be some presumed nonfilers who don't satisfy the above requirements but are still eligible.

Upper Bound Model

The Upper Bound Model assigns both EIP amounts to *all* presumed nonfilers, as well as filers. Recipients still must qualify with respect to modelled AGI, filing status, and number of qualifying children, as determined by the ASEC Tax Model, however. This optimistic model assumes a 100-percent take-up rate, meaning all individuals eligible for both payments receive them. It also assumes individuals

¹² The stimulus response variable used is an edited survey variable which includes imputed values and is available on the internal ASEC file. The modeled stimulus variable (EIP_CRD) is available on the public-use file.

not receiving their full eligible payments during 2020 will claim the difference in the 2020 Recovery Rebate Credit.

Lower Bound Model

The Lower Bound Model addresses a limitation of the ASEC Tax Model which potentially overestimates the number of single filers due to the nature of the ASEC survey and limitations on the construction of tax units. Members of the same tax filing unit in official IRS tax returns may be split up in the tax model if they are not directly related or if they are not living in the same household. When they are split up, the individuals who may have been dependents in a tax unit become separate individual single filers. This process increases the number of single filers, and consequently, the aggregate EIP amount because a qualifying child adds a lower payment amount than a single filer, and nonqualifying dependents do not receive any EIPs. A misclassification of a single filer as a dependent will lead to a combined EIP amount of either \$0 or up to \$1,100 if the dependent is a qualifying child; whereas a single filer will receive a combined EIP amount up to \$1,800.

To address this potential overestimate of aggregate EIP, the Lower Bound Model starts with the Production Model and targets the aggregate number of First Economic Impact Payments made to single filers, as tabulated by IRS.¹³ Since the AGI thresholds for maximum EIP 1 and EIP 2 are the same, all EIP 2 recipients are theoretically also EIP 1 recipients. But the number of EIP 2 recipients is lower in the aggregate since EIP 2 phases out more quickly with respect to AGI than does EIP 1. Therefore, starting with the Production Model, we randomly reassign \$0 to EIP 1 and EIP 2 to filers with a positive EIP 1 until the estimated number of EIP 1 payments matches the IRS aggregate. Like the Production Model, this process yields an EIP take-up rate that is theoretically less than 100 percent. Furthermore, it should yield the lowest take-up rate of the three models. Aside from the people randomly assigned \$0, this model also assumes individuals not receiving their full eligible payments during 2020 will claim the difference in the 2020 Recovery Rebate Credit.

¹³ Aggregate EIP statistics can be found at <<https://www.irs.gov/statistics/soi-tax-stats-coronavirus-aid-relief-and-economic-security-act-cares-act-statistics>>. At the time of writing, this site tabulates the First EIP as of January 2021 and the Second EIP as of February 2021.

Modeling Results

This section presents the results of the three modeling approaches along with the Supplemental Poverty rate for each model. We provide comparisons by adjusted gross income and tax filing status. In addition, we provide robustness checks by checking the use of adjusted gross income from the ASEC Tax Model against tax records and the sensitivity of tax year income used for calculating payments.

Table 1 displays the ratio of each model's output relative to IRS benchmark estimates released by the IRS Statistics of Income (SOI) program.¹⁴ For each model, the table shows the ratio for Number of Payments (Count), Aggregate Payments (Total Amount), and Average Payment (Mean Amount) overall and by aggregate gross income categories. The first set of estimates come from the Production Model (our preferred estimates) while the second and third set of estimates come from the Upper Bound and Lower Bound Models, respectively. Finally, the last set of estimates in the table are from the ASEC survey. Since the survey question is asked at the household level, some choices must be made to allow comparability. The table uses the AGI of the survey householder and combines payments of all tax units in the household. It is possible for other filers within the household to receive their own payments, even when the survey householder does not qualify. The underlying estimates for each ratio and the associated standard errors are available in Appendix Table 1. The table also reports the take-up rate for each model.

Table 2 follows the same structure as Table 1 but shows the ratio by tax filing status: (1) Single or qualifying widow(er); (2) Married filing joint or separately; and (3) Head of household. The underlying estimates for each ratio and the associated standard errors are available in Appendix Table 2.

Tables 3 and 4 show simple robustness checks related to using adjusted gross income from the ASEC Tax Model (Table 3) and actual IRS 1040 AGI across consecutive years used for calculating payments (2020 vs. 2019 and 2019 vs. 2018 in Table 4).¹⁵ Table 3 reports a simple regression of actual adjusted gross income from the linked Form 1040 records on modeled adjusted gross income from the ASEC Tax Model for primary filers who can be linked to their tax record. This table illustrates the fit of this simple AGI model. Table 4 shows a cross tabulation of differences in adjusted gross income across consecutive years and the consequent differences in economic impact payments. Since income from 2019 or 2018 can be used for determining EIP 1, and the ASEC Tax Model uses 2020 income, this table shows

¹⁴ IRS SOI statistics can be found at <<https://www.irs.gov/statistics/soi-tax-stats-coronavirus-aid-relief-and-economic-security-act-cares-act-statistics>>. This site reports the First EIP as of January 2021 and Second EIP as of February 2021.

¹⁵ These actual IRS 1040 AGI values come from individual linked IRS Form 1040 records provided to the Census Bureau under Title 26. This federal tax information is approved for limited statistical evaluations and thus is unavailable for survey production. For additional documentation of the linked IRS Form 1040 records, see <<https://www.census.gov/content/dam/Census/library/working-papers/2019/demo/sehsd-wp2019-36.pdf>>.

the sensitivity of the payment amount to the year of income used. Panel A shows the sensitivity of using 2020 vs. 2019 income while Panel B shows the sensitivity of using 2019 or 2018 income. Each panel shows what happens if the income is greater than, equal to, or less than the prior year and the corresponding effect on the payment amount (equal, greater, or less). Panel A shows that 90.2 percent of filers have EIP amounts that do not change using 2020 vs. 2019 income.

Finally, Table 5 shows the Supplemental Poverty Measure (SPM) rate for each model. The table shows the SPM rate for all people along with the rate by select characteristics (age, gender, type of unit, race, and education). The table also shows the difference in the SPM rate between the Production Model and the Upper and Lower Bound Models.

Discussion of Differences Between CPS ASEC Models and IRS Benchmarks

While the modeling results presented in this paper are shown relative to IRS SOI aggregates, there are reasons for differences between the two sources which include universe differences and assumptions underlying the ASEC Tax Model. The sample universe for the CPS consists of civilian, noninstitutionalized population of the United States. Individuals in group quarters such as prisons, long-term care hospitals, and nursing homes, are not eligible to be interviewed in the CPS. The CPS only collects data in the 50 states and the District of Columbia. It includes military personnel who live either off post or who live on post with civilian family members. It does not include military personnel living on a base without civilian family members. The sample universe for the SOI aggregates differs from the CPS universe. It is larger than the CPS, including the institutionalized population, those living in group quarters, the military (both living with civilians and on base without civilians), and individuals living abroad.

The EIP amounts produced by the models follow several assumptions. CPS ASEC lacks information on SSN, dependents who are not resident in the household or don't have a parent pointer in the survey, and filing status for married separate filers, all of which are known by IRS. The model also does not incorporate 2018 or 2019 income, which is what the actual EIP 1 and EIP 2 were mostly based on. Due to these data constraints, EIP 1 and EIP 2 in the models use 2020 income and assume that filers receive the maximum amount of EIPs they qualify for. This definition is closer to EIP 1 and EIP 2 plus the 2020 Recovery Rebate Credit, which addresses the differences in what tax filers should have gotten.¹⁶ The most recent SOI statistics only cover payments made through January 2021 for the First EIP and February 2021 for the Second EIP, so these statistics likely do not include the 2020 Recovery Rebate

¹⁶ The 2020 Recovery Rebate Credit allows an individual to file for an additional payment during the 2021 tax filing season to make up for the difference between what the individual should have received and actually received in 2020.

Credit, while the models we present implicitly include the credit. The SOI statistics will likely increase when they are updated to reflect the credit. The ASEC Tax Model only models EIPs for single, head of household, and married joint filers within a household.

Another source of difference between the models in this paper and the SOI statistics is the definition of adjusted gross income regarding the treatment of unemployment compensation. Under the American Rescue Plan enacted March 11, 2021, individuals with adjusted gross income of less than \$150,000 can exclude up to \$10,200 of unemployment compensation paid in 2020 from adjusted gross income when filing taxes. The models in this paper incorporate this new exclusion when calculating adjusted gross income. The SOI statistics do not incorporate this exclusion because they are based on 2018 and 2019 tax returns.

Conclusion

This paper presents three models of the Economic Impact Payments (EIP), or stimulus payments, authorized by the CARES Act in March 2020 and the CRSSA Act in December 2020. Our preferred model, the Production Model, is based on combining survey responses from the 2021 CPS ASEC with the CPS ASEC Tax Model. The EIP estimates from this model are incorporated in the 2020 Supplemental Poverty Measure. The two additional models vary underlying assumptions that impact the EIP take-up rate and thus give upper and lower bounds on the aggregate stimulus amount and the number of individuals receiving payments. Data users interested in the modeled sum of both payments from the Production Model should use the EIP_CRD variable available on the 2021 CPS ASEC public-use file.¹⁷ These modeled stimulus payments are reflected in many Census Bureau reports characterizing income and poverty during 2020, including *Income and Poverty in the United States: 2020*, *The Supplemental Poverty Measure: 2020*, and a recent *America Counts* story, “The Impact of Stimulus Payments on Supplemental Poverty.”

¹⁷ The 2021 CPS ASEC public-use file can be found at <<https://www.census.gov/data/datasets/time-series/demo/cps/cps-asec.html>>.

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.

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
Overall¹	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.

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

²The 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.

³The 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.

Table 3. Regressing linked IRS Form 1040 tax year 2019 and 2020 adjusted gross income (AGI) on CPS ASEC-modeled tax year 2020 AGI.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Linear		Linear, restricted to AGI \$1-\$150k		Linear, restricted to AGI \$1-\$200k		Cubic, restricted to AGI \$1-\$150k	
	ty2020	ty2019	ty2020	ty2019	ty2020	ty2019	ty2020	ty2019
Constant	48,890*** (4,048)	49,430*** (2,362)	16,260*** (269)	16,910*** (272)	17,480*** (265)	17,830*** (262)	19,490*** (532)	21,640*** (507)
AGI/10k	5,128*** (383)	5,234*** (374)	6,388*** (54)	5,754*** (54)	6,447*** (51)	5,968*** (51)	2,624*** (395)	889*** (375)
AGI/10k squared	--	--	--	--	--	--	815*** (77)	967*** (72)
AGI/10k cubed	--	--	--	--	--	--	-43*** (4)	-49*** (4)
R-squared	0.006	0.022	0.467	0.377	0.488	0.416	0.472	0.383
N	53,000	63,000	33,000	38,000	36,000	41,000	33,000	38,000

Source: U.S. Census Bureau, 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) individually linked to tax year 2019-2020 Internal Revenue Service (IRS) Form 1040 records.

Notes: The dependent variable is AGI from individually linked IRS Form 1040 records, from tax year 2020 or tax year 2019, linked to primary filers. The main independent variable is AGI as modeled in the CPS ASEC tax model, based on responses to the 2021 CPS ASEC regarding income received during the 2020 calendar year and household characteristics at the time of interview. Form 1040 records are linked via Protected Identification Key of the primary filer. Self-employment is reported to the CPS. AGI sample restrictions are applied to both the IRS amounts and the CPS ASEC-modeled amounts. Standard errors are in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4. Differences in adjusted gross income (AGI) across consecutive years of IRS Form 1040 records, and their consequent differences in Economic Impact Payments (EIP).

Panel A. 2020 compared to 2019

Cell proportions and their standard errors

AGI	EIP			Total
	EIP using 2020 AGI is equal to EIP using 2019 AGI	EIP using 2020 AGI is greater than EIP using 2019 AGI	EIP using 2020 AGI is less than EIP using 2019 AGI	
2020 AGI is equal to 2019 AGI	0.5 (0.04)	- -	- -	0.5 (0.04)
2020 AGI is greater than 2019 AGI	54.2 (0.25)	- -	6.0 (0.12)	60.2 (0.28)
2020 AGI is less than 2019 AGI	35.5 (0.26)	3.8 (0.11)	- -	39.3 (0.28)
Total	90.2 (0.36)	3.8 (0.11)	6.0 (0.12)	

Panel B. 2019 compared to 2018

Cell proportions and their standard errors

AGI	EIP			Total
	EIP using 2019 AGI is equal to EIP using 2018 AGI	EIP using 2019 AGI is greater than EIP using 2018 AGI	EIP using 2019 AGI is less than EIP using 2018 AGI	
2019 AGI is equal to 2018 AGI	0.6 (0.04)	- -	- -	0.6 (0.04)
2019 AGI is greater than 2018 AGI	56.7 (0.25)	- -	6.3 (0.12)	63.0 (0.28)
2019 AGI is less than 2018 AGI	32.6 (0.24)	3.8 (0.10)	- -	36.5 (0.26)
Total	89.9 (0.35)	3.8 (0.10)	6.3 (0.12)	

Source: U.S. Census Bureau, 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) individually linked to tax year 2018-2020 Internal Revenue Service (IRS) Form 1040 records.

Notes: Form 1040 records are linked via Protected Identification Key of the primary filer. Lower AGI generally corresponds to higher EIP amounts. Economic Impact Payment amounts are imputed from linked Form 1040 AGI, with filing status and dependents as modeled from the CPS ASEC Tax Model. The only variable changing across years is AGI. Samples are restricted to persons who are primary filers in both of each pair of consecutive years. High proportions of equal EIP amounts are generally due to a filing unit having sufficiently low AGI to have received a full, unphased amount based on either year's AGI value. "Less than" and "greater than" categories include differences as small as \$1.

Table 5. Supplemental Poverty Measure for each Economic Impact Payment model.

	Production Model		Upper Bound Model			Lower Bound Model		
	Percent	MOE	Percent	MOE	Production Model - Upper Bound Model	Percent	MOE	Production Model - Lower Bound Model
All people	9.1	0.2	9.0	0.2	0.1***	9.4	0.2	-0.2***
Sex								
Male	8.6	0.3	8.5	0.3	0.1***	8.9	0.3	-0.2***
Female	9.6	0.3	9.5	0.3	0.1***	9.9	0.3	-0.3***
Age								
Under 18 years	9.7	0.4	9.5	0.4	0.2***	9.8	0.4	-0.1***
18 to 64 years	8.8	0.3	8.7	0.3	0.1***	9.1	0.3	-0.3***
65 years and older	9.5	0.4	9.4	0.4	Z ***	9.8	0.4	-0.3***
Type of Unit								
Married couple unit	5.0	0.2	5.0	0.2	Z **	5.0	0.2	Z *
Cohabiting partner unit	8.5	0.8	8.2	0.8	0.3***	9.1	0.8	-0.6***
Female reference person unit	18.2	1.0	17.9	0.9	0.3***	18.7	1.0	-0.5***
Male reference person unit	11.7	1.2	11.4	1.2	0.3***	12.0	1.2	-0.3***
Unrelated individuals	17.5	0.5	17.5	0.5	Z *	18.3	0.5	-0.8***
Race and Hispanic Origin								
White	8.1	0.2	8.0	0.2	0.1***	8.3	0.2	-0.2***
White, not Hispanic	6.5	0.2	6.5	0.2	Z ***	6.7	0.3	-0.2***
Black	14.6	0.8	14.4	0.8	0.3***	15.1	0.8	-0.5***
Asian	8.8	1.0	8.7	1.0	0.1	8.9	1.0	-0.1***
Hispanic (any race)	14.0	0.7	13.7	0.7	0.2***	14.2	0.7	-0.3***
Educational Attainment								
Total, aged 25 and older	8.4	0.2	8.3	0.2	0.1***	8.7	0.2	-0.3***
No high school diploma	20.3	0.9	20.1	0.9	0.2***	21.1	0.9	-0.8***
High school, no college	11.1	0.4	11.0	0.4	0.1***	11.4	0.4	-0.3***
Some college, no degree	7.3	0.3	7.3	0.3	0.1***	7.6	0.3	-0.3***
Bachelor's degree or higher	4.3	0.2	4.3	0.2	Z *	4.4	0.3	-0.1***

Source: U.S. Census Bureau, 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The margin of error (MOE) is a measure of an estimate's variability. The larger the MOE in relation to the size of the estimate, the less reliable the estimate. This number, when added to and subtracted from the estimate, forms the 90-percent confidence interval. The MOEs shown in this table are based on standard errors calculated using replicate weights. Z represents statistically significant differences that round to zero.

Appendix Table 1. Estimates and standard errors for each model by adjusted gross income.

Estimates

	Production Model		Upper Bound Model		Lower Bound Model		Survey Reported		IRS SOI	
	Count	Amount	Count	Amount	Count	Amount	Count	Amount	Count	Amount
Negative or zero	21.82	47.95	25.10	55.18	18.27	41.55	11.23	27.44	23.59	43.99
\$1 under \$10,000	21.94	51.36	21.94	51.36	18.76	45.63	13.24	31.76	20.67	42.45
\$10,000 under \$20,000	14.50	35.45	14.50	35.45	12.44	31.75	7.64	21.27	19.52	46.77
\$20,000 under \$30,000	15.54	38.48	15.54	38.48	13.35	34.54	7.89	23.87	17.99	44.37
\$30,000 under \$40,000	14.20	36.78	14.20	36.78	12.35	33.45	7.99	23.76	15.47	39.19
\$40,000 under \$50,000	11.47	30.78	11.47	30.78	9.98	28.08	7.28	21.86	12.20	31.84
\$50,000 under \$60,000	10.54	28.76	10.54	28.76	9.15	26.25	6.85	21.11	9.89	26.97
\$60,000 under \$75,000	12.46	37.76	12.46	37.76	11.21	35.50	8.89	28.56	11.57	34.20
\$75,000 under \$100,000	14.63	43.20	14.63	43.20	13.40	42.07	11.11	37.28	13.66	41.49
\$100,000 under \$200,000	19.56	71.41	19.56	71.41	19.56	71.41	18.56	65.92	16.99	61.34
\$200,000 or more	0.62	0.41	0.62	0.41	0.62	0.41	5.36	15.34	0.41	0.27

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 modeled aggregate sum of the first and second rounds of Economic Impact Payments. 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. Counts are in millions. Amounts are in billions of dollars. Ratios in Table 1 are based on unrounded SOI statistics.

Standard Errors

	Production Model		Upper Bound Model		Lower Bound Model		Survey Reported	
	Count	Amount	Count	Amount	Count	Amount	Count	Amount
Negative or zero	0.29	0.63	0.31	0.65	0.26	0.57	0.18	0.58
\$1 under \$10,000	0.25	0.60	0.25	0.60	0.22	0.56	0.21	0.63
\$10,000 under \$20,000	0.20	0.52	0.20	0.52	0.19	0.51	0.14	0.51
\$20,000 under \$30,000	0.20	0.50	0.20	0.50	0.18	0.49	0.14	0.60
\$30,000 under \$40,000	0.21	0.55	0.21	0.55	0.19	0.52	0.14	0.56
\$40,000 under \$50,000	0.18	0.47	0.18	0.47	0.17	0.46	0.14	0.50
\$50,000 under \$60,000	0.19	0.54	0.19	0.54	0.17	0.52	0.15	0.49
\$60,000 under \$75,000	0.19	0.65	0.19	0.65	0.18	0.64	0.16	0.64
\$75,000 under \$100,000	0.20	0.66	0.20	0.66	0.20	0.67	0.18	0.67
\$100,000 under \$200,000	0.22	0.91	0.22	0.91	0.22	0.91	0.23	1.09
\$200,000 or more	0.04	0.04	0.04	0.04	0.04	0.04	0.12	0.50

Source: U.S. Census Bureau, 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the standard error of the aggregate modeled sum of the first and second rounds of Economic Impact Payments. Counts are in millions. Amounts are in billions of dollars.

Appendix Table 2. Estimates and standard errors for each model by filing status.

Estimates

	Production Model		Upper Bound Model		Lower Bound Model		Survey Reported		IRS SOI	
	Count	Amount	Count	Amount	Count	Amount	Count	Amount	Count	Amount
Single or qualifying widow(er) ¹	87.44	152.40	87.44	152.40	69.23	120.70	45.50	96.16	69.21	121.31
Married filing joint or separately ²	54.50	220.50	54.50	220.50	54.50	220.50	49.53	184.60	47.67	189.81
Head of household	15.35	49.45	15.35	49.45	15.35	49.45	10.61	36.00	21.36	61.31

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 modeled aggregate sum of the first and second rounds of Economic Impact Payments. SOI counts are the maximum of first- and second-round EIP aggregate counts, as the union of recipients is not separately tabulated. Counts are in millions. Amounts are in billions of dollars. Ratios in Table 2 are based on unrounded SOI statistics.

¹The 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.

²The 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.

Standard Errors

	Production Model		Upper Bound Model		Lower Bound Model		Survey Reported	
	Count	Amount	Count	Amount	Count	Amount	Count	Amount
Single or qualifying widow(er) ¹	0.55	1.00	0.55	1.00	0.49	0.86	0.37	1.09
Married filing joint or separately ²	0.29	1.25	0.29	1.25	0.29	1.25	0.28	1.55
Head of household	0.19	0.63	0.19	0.63	0.19	0.63	0.16	0.64

Source: U.S. Census Bureau, 2021 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the standard error of aggregate modeled sum of the first and second rounds of Economic Impact Payments to its corresponding IRS SOI benchmark. Counts are in millions. Amounts are in billions of dollars.

¹The 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.

²The 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.