Measurement Error in Estimates of the Participation Rate in Means-Tested Programs: The Case of the US Supplemental Security Income Program for the Elderly

Alexander Strand, Kalman Rupp and Paul S. Davies

U.S. Social Security Administration
Office of Retirement and Disability Policy
Office of Research, Evaluation, and Statistics
500 E St., SW
Washington, DC 20254

Corresponding Author: Alexander Strand, Alexander.Strand@ssa.gov

Abstract

We estimate that the Supplemental Security Income participation rate among the elderly is substantially higher than all of the previous estimates in the literature. For September, 2004, our estimate is 72.3 percent. This compares to previous estimates ranging from 38.8 percent to 62.4 percent. The difference between our estimate and previous estimates is due to the lack of full use of matched administrative data in almost all previous studies as well as increasing participation rates among the elderly over time. In addition to reducing measurement error through use of administrative data, we examine the impact of other potential sources of measurement error that affect estimates of eligibility. However, it is difficult to separate the effects of measurement error and selectivity bias on the estimates.

Introduction

Researchers often use microsimulation models to estimate the participation rate in social welfare programs, usually as a fraction of the eligible population. Policy makers use these participation rates as indicators of the reach of a given program and also to gauge the need for additional outreach to eligible nonparticipants (GAO 2005). The accuracy with which researchers can estimate program participation rates, therefore, is a subject of great importance. Measurement error can be associated with identifying program participants, estimating program eligibility, or both. This paper focuses on potential sources of measurement error in estimates of the participation rate among the elderly in the Supplemental Security Income (SSI) program.

The SSI program is administered by the U.S. Social Security Administration (SSA) and was designed to assure a minimum level of cash income for aged, blind, and disabled individuals who satisfy certain citizenship and residency requirements. Individuals applying for SSI face both an income and a resource test. In 2009, the maximum monthly SSI benefit is $674 for individuals and $1,011 for couples.[1] To determine the actual benefit payable, the maximum benefit is reduced by the amount of the individual's earned and unearned income, after certain sources of income are excluded and various earned and unearned income disregards are applied.[2] The resource test limits eligibility to individuals (couples) with no more than $2,000 ($3,000) in countable assets. As with income, certain assets are excluded in establishing resource eligibility, such as a home used as the principal residence, one automobile, and household goods and personal effects (Social Security Administration 2009b).

SSA developed the Financial Eligibility Model (FEM) to measure eligibility and participation in the SSI program and to simulate the impact of potential changes in SSI program eligibility rules as well as the impact of Social Security reform on the SSI program. The FEM utilizes the Survey of Income and Program Participation (SIPP) and is supplemented by matched administrative records from SSA. Matched administrative data include indicators of receipt of an SSI payment and the receipt and amount of an Old Age, Survivors, and Disability Insurance (OASDI, the official name of the Social Security program) payment, which has a direct impact on SSI eligibility and potential payment amounts.

There is evidence of substantial measurement error when estimating SSI participation rates for the elderly, stemming both from errors in measuring program participation and from errors in estimating program eligibility. Measurement error in participation can be readily addressed through the use of matched SSA administrative data on SSI payment receipt. Using administrative data instead of survey measures of SSI participation increases the estimated participation rate, indicating that SSI payment receipt is underreported in self-reported measures.

Measurement error in program eligibility stems from many sources and can be only partially addressed through the use of administrative data matched to survey data. More specifically, we use SSA administrative data on OASDI income to improve the measurement of one component of income used in computing SSI eligibility. However, we do not have access to matched administrative data on other income and asset items that are used to determine SSI financial eligibility. Therefore, our conclusions about the effects of measurement error in these items on program eligibility are more speculative. In addition to questions about sampling and non-sampling error in available data for measuring program eligibility, we also face the question of whether our eligibility algorithm accurately captures the nuances of the actual administration of the complex SSI eligibility rules.

In the remainder of this paper, we examine the impact of measurement error in both SSI participation and eligibility on estimates of the participation rate among the elderly. We begin to review the previous literature in the next section with a focus on measurement error in *participation*. In the following section, we continue reviewing the previous literature with a focus on measurement error in variables that affect estimates of *eligibility*. Following that, we describe our methodology in using SSA's FEM to analyze participation rates. The methodology has two main parts: first, we analyze the impact of using administrative data on estimates of the participation rate; second, we examine a series of comparison groups that the previous literature suggests would be less susceptible to measurement error.

We draw the following general conclusions from our analysis:

[1] Optional state supplements raise the federal income guarantee in most states, in some cases substantially.
[2] The first $20 of any income in a month is disregarded, as is the first $65 of monthly earnings and one-half of any remaining earnings. See Social Security Administration (2009b) for a detailed description of SSI program rules.

- Using administrative data to supplement a SIPP-based model of SSI participation and eligibility has an important and growing impact on the estimated participation rate of the elderly.
- The SSI participation rate among the elderly is increasing.
- Groups that the previous literature suggested would be less susceptible to measurement error have approximately the same SSI participation rates as elderly individuals overall.
- In making these comparisons, it is difficult to distinguish the effect of lower measurement error from the effect of selectivity bias.

Measurement error in participation

As a starting point for our analysis of measurement error in SSI participation, we briefly analyze patterns over time in participation rates from the existing literature. We summarize previous studies that use the SIPP with a scatter plot of participation rate estimates in Chart 1. Although these data points are not all independent of each other, they give the level of previous estimates and trends over time. Rather than a definitive trend, Chart 1 shows an increased dispersion of participation rate estimates as more published research results become available. The specific studies and estimates that underlie Chart 1 are listed in Appendix Table 1.

The increased dispersion of results shown in Chart 1 is partly due to differences in data sources. Although all these studies use the SIPP, they differ in their use of matched administrative data. The points in the graph represented by white squares are studies that do not use matched data. For these, there is a clear downward trend in participation rates. For the studies that use administrative data to indicate participation in the SSI program, represented by grey diamonds, there is a less dramatic downward trend.

One reason for the difference in trends is that SSI benefit receipt is underreported in the SIPP by 15 to 20 percent. Huynh, Rupp, and Sears (2002) find that SSA's Supplemental Security Record (SSR), which is the master file for administering the SSI program, provides an excellent source of data about actual SSI payment receipt. They find that 80 to 85 percent of people who have an SSI payment according to the SSR also self-report receipt of a payment in the SIPP. The most recent figures they report, for October 1998, are 82.8 percent for SSI only recipients and 84.2 percent for concurrent SSI and OASDI recipients.[3] Further, there is evidence that underreporting has become worse over time (Sears and Rupp, 2003).[4]

Measurement error in eligibility

Measurement error in program eligibility stems from many sources and can be only partially addressed through the use of administrative data matched to survey data. One important administrative data source for this purpose is OASDI payment amounts. OASDI payments count as unearned income for SSI eligibility purposes and reduce SSI payment on nearly a dollar-for-dollar basis. Rupp et al (2007) is the one previous study that we know of that uses this data source in addition to administrative data on SSI participation. The resulting participation rate is represented by a black triangle in Chart 1 and is the highest participation rate among the studies that use SIPP data.

While administrative OASDI benefit amounts are an improvement over self-reported measures, they are limited to one (albeit important) source of income for the elderly. Thus, we now review the literature about measurement error in other essential data elements for which there are no corresponding matched administrative data. There is a growing body of research pointing to measurement error in many SIPP variables that are critical to estimating SSI eligibility. For example, the SIPP variables for assets and income suffer from underreporting of financial asset and income steams as well as underreporting of the relevant dollar amounts. However, there is also evidence that the SIPP variables have less measurement error for our core target group of interest, the low-income population, which is oversampled by the SIPP. In some cases, the variables appear to contain overreporting for this group. We review the literature by each potential source of mismeasurement, including income, assets, imputations, attrition, eligibility changes after benefit award, and perceptions of eligibility.

[3] Huynh, Rupp and Sears (2002), Table 2.

[4] Approximate figures for the percentage of SSI payment recipients that report receipt in the SIPP can be calculated from Sears and Rupp (2003), Table A2. In 1996, 82.8 percent reported compared to only 77.4 percent in 2001.

Income

Measurement of SSI income eligibility is made easier by the availability of administrative data for earned income and income from SSI and Social Security. There are separate literatures about measurement error in earned income, income from SSI and Social Security, and pension income.

A considerable body of literature addresses the measurement error in reporting of earnings in the SIPP.[5] The central theme is that measurement error for earnings is not random. Measurement error is negatively correlated with true earnings. For this study, the main implication is that although people tend to underreport their earnings in general, those with low levels of earnings (those who are potentially eligible for SSI) tend to overreport their earnings in the SIPP. Also relevant to this study, is a finding by Gottschalk and Huynh (2005) that measurement error is not greater among those age 65 and older. Earnings are not the main source of income for the elderly who may be eligible for SSI, however, so we turn to other income sources.

OASDI benefits are a major source of income for the low-income elderly population. Huynh, Rupp, and Sears (2002) find the same result for OASDI benefits as in the literature for earned income, i.e. a negative correlation between reporting error and true benefit amounts. People with low benefit amounts tend to overreport on average and people with high benefit amounts tend to underreport on average. Interestingly, the cross-over point is around a benefit of $200-300 per month for the 1998 SIPP data. By comparison, the SSI benefit guarantee was $494 for individuals and $741 for couples in that year. Thus, one would expect both overreporting and underreporting of OASDI benefits in the range where the person may also be eligible for SSI payments.

For defined benefit (DB) pension income, it is difficult to evaluate the accuracy of SIPP self-reported amounts. Using information on plan rules and respondent-reported tenure with the firm in the Health and Retirement Study (HRS), Gustman and Steinmeier (2004) estimate the present value of DB pension accounts and compare the results to the present value implied by self-reported income or future income amounts.[6] Although this method is far from definitive, the results show underreporting of DB pension values at all parts of the distributions. The extent to which the underreporting of DB pension values in the HRS translates into underreporting of DB pension income in the SIPP is unclear.

The general theme in the literature is that measurement error in income is widespread. Elder and Powers (2004) go further and assert that all self-reported non-OASDI income should be treated as "infrequent" or "irregular" income. SSA excludes a small amount of such income and, thus, whether income is "infrequent" or "irregular" has an effect on potential SSI payment amounts.[7] The basis of their assertion is that they can better predict administrative SSI payment amounts using only OASDI income than using all income. The advantage is primarily due to a reduction in the number of SSI payment amounts that are underestimated using countable income amounts.

We are skeptical of this assertion for two related reasons. First, Elder and Powers (2004) use self-reported OASDI income amounts rather than amounts from the administrative records. As discussed above, self-reported OASDI benefit amounts from the SIPP contain overestimates of OASDI benefit amounts for people with very low OASDI benefits. As a result, estimated SSI payment amounts will be underestimated for these observations. Thus, the Elder and Powers technique may be merely removing some non-OASDI income to compensate for the overestimated OASDI income. Second, we are unable to reproduce their results using the 2004 SIPP and administrative OASDI benefit amounts.

Assets

There are several approaches to evaluating the quality of the SIPP data on assets and wealth. One approach is to compare aggregates from a household survey, such as the SIPP, to aggregates from the flow of funds data (see Avery et al 1988, for example). This approach has minimal usefulness for this study because the aggregate differences will be dominated by differences in large wealth holdings. This study addresses the population with very small wealth holdings. Also, the flow of

[5] See Cristia and Schwabish (2007) for a review of this literature.

[6] The DB pension value per se does not affect SSI eligibility; however, the income stream produced by a DB pension directly affects SSI eligibility and the potential SSI payment amount.

[7] The amounts are $60 of unearned income and $30 of earned income per calendar quarter (Social Security Administration, 2009a, §2137 and §2135).

funds data are calculated as a residual from other accounts and, thus, are subject to error from these sources (Antoniewicz, 2000).

Another approach is to use the quality of fit of various wealth models to reach conclusions about the quality of the underlying data (Curtin et al, 1989). This approach is also of minimal usefulness for this study because of the assumptions required to fit the models.

The most compelling evidence on the relative quality of SIPP wealth data comes from direct comparisons to the wealth data in the Survey of Consumer Finances (SCF), which is widely thought to be a standard to which other wealth data can be compared. Czajka et al (2003) have done an extensive comparison of wealth holdings in the SIPP to wealth holdings in the SCF and, to a lesser extent, wealth holdings in the Health and Retirement Study and the Panel Study of Income Dynamics. The central comparisons focus on wave 9 of the 1996 SIPP panel, which had reference periods in late 1998 and early 1999, and the 1998 SCF.

Czajka et al (2003) address the implications of the fact that the total and per household wealth measured in the SIPP is less than the total wealth measured in the SCF. The mean[8] household net wealth in the SIPP is 49.5 percent of that in the SCF.[9] This figure may be distorted, at least from the perspective of studying the low-income population, by the SCF's oversample of the high-income population. The SIPP, with an oversample of the low-income population, is not designed for accurate study of the high-income population. In fact, when households with more than 2 million dollars in net worth are excluded from the analysis, the relative household wealth figure from the SIPP rises to 75.0 percent of that from the SCF.[10]

While this figure still indicates an underestimate, the view is more encouraging for subgroups that are relevant to this study. For the low-income population,[11] mean net wealth in the SIPP is 89.5 percent of that in the SCF, and for the elderly population, mean net wealth is 80.0 percent of that in the SCF.[12] Part of the remaining difference is due to wealth items that are measured in the SCF but not in the SIPP. When these items are excluded, the figures become more comparable. Mean net wealth for the low income population becomes 100.2 percent of that in the SCF and mean net wealth for the elderly becomes 88.1 percent of that in the SCF.[13]

This evidence indicates that the aggregate amount of wealth measured in the SIPP is not a major limitation for study of at least the low-income population and possibly also the elderly population in general (but definitely the low-income elderly population). Even so, some more detailed comparisons performed by Czajka et al (2003) point to relative shortcomings of specific wealth items.

Comparison of particular asset items shows that, to the extent that SIPP estimates are lower than SCF estimates, the differences are concentrated in particular kinds of assets. The differences are concentrated in financial assets[14] rather than property assets such as housing and vehicles.[15] Specifically, the SIPP has notably lower amounts than the SCF for checking and savings account balances and also for IRA and Keogh account balances.

Limited comparisons to administrative data are possible for IRA and Keogh account balances. Using a methodology similar to the one described above for DB account present values, Gustman and Steinmeier (2004) compare reported defined contribution (DC) pension account balances[16] to amounts calculated from information about the plan gathered from the firms. The calculated amounts involve the firm's contribution rate and the respondent's (self-reported) work history and contribution

[8] It may be more informative to use the medians, but Czajka et al (2003) do not report the results using medians for all the comparisons that follow.
[9] Czajka et al (2003), Table II.3.
[10] Czajka et al (2003), Table II.16.
[11] This is measured as 200 percent of the poverty thresholds or less.
[12] Czajka et al (2003), Table III.6.
[13] Czajka et al (2003), Table III.7.
[14] See table II.17.
[15] There are large differences for one kind of property asset, business equity; however, this asset class is not likely to be important for those eligible for SSI.
[16] Unlike DB pensions, the value of a DC pension account directly affects SSI eligibility through the resource test. In addition, any income stream (e.g., annuity payments) derived from a DC pension account would affect SSI eligibility through the income test.

rates. As with DB accounts, the results suggest that DC account balances are underreported. For workers at a firm that indicates having a DC plan, 72 percent self report the existence of that plan. Among these people, the self-reported plan amounts are substantially lower at all points of the distribution except the bottom ten percent. Unfortunately, this part of the distribution is the part that may be eligible for SSI, so the implications for this study are unclear. Another component of DC pensions that can be compared to administrative records is the amount of tax-deferred contributions to such plans. Dushi and Honig (2008) find that respondents in the HRS systematically overestimate the amount of the contribution compared to the administrative records. Again, the implications for this study are unclear.

When describing the lower asset holding amounts in the SIPP relative to the SCF, Czajka et al (2003) note that the lower totals are due to a mix of lower reporting of the ownership of the item as well as reporting of lower account amounts. For example, for checking and savings account balances, 77.7 percent report a balance in the SIPP compared to 90.8 percent in the SCF. The median reported amounts are $3,200 in the SIPP and $4,320 in the SCF. Thus, according to Czajka et al (2003), the differences are not primarily due to either underreporting of ownership or underreporting of amounts, but rather a mix of the two.

A somewhat contradictory view is presented using more recent data in a subsequent study by Scholz and Seshadri (2007).[17] They report net wealth figures—rather than asset values— for 2003 SIPP data compared to 2004 SCF data. Confirming the trend found by Czajka et al (2003), they find a lower rate of ownership of wealth in the SIPP among a variety of disadvantaged groups. For the low income group,[18] this difference is growing across years and is around eight percentage points. Conflicting with the results of Czajka et al (2003), they find higher mean and median net wealth amounts in the SIPP rather than the SCF conditional on ownership of positive net wealth. Thus, Scholz and Seshadri (2007) attribute the underreporting of assets in the SIPP entirely to underreporting of ownership rather than underreporting of amounts.

Imputations

Item imputation rates can be very high in the SIPP. Czajka et al (2003) examined this in the 1996 SIPP. Again, checking and savings account balances attract attention as well as IRA and Keogh account balances. Of all non zero checking and savings account amounts, 30 to 68 percent are imputed, depending on type of account.[19] For IRA accounts, 43.5 percent of amounts are imputed and 61.5 percent are imputed for Keogh accounts.

In addition to the high incidence of imputation, there is some evidence that imputations may have a systematic effect on the measurement error for SSI eligibility and benefit amounts. Huynh, Rupp, and Sears (2002) compare OASDI benefit amounts as reported in the SIPP to administrative record amounts. Since a larger OASDI benefit amount leads to smaller SSI benefit amount on a nearly dollar-for-dollar basis, reporting of OASDI benefit amounts will, in itself, affect the accuracy of SSI payment estimates. Huynh, Rupp, and Sears (2002) report that OASDI benefit amounts that are imputed in the SIPP have administrative amounts that are 3 to 4 times higher on average than non-imputed amounts.[20] Further, the error implied by comparing self-reported amounts to administrative amounts is much higher for imputed amounts than non-imputed amounts. However, the sign of the average error changes for different years of analysis so one can not make a prediction about the direction of a systematic bias in the SSI participation rate due to errors in reporting OASDI benefit amounts. Further, the relatively high average administrative benefit amount for imputed observations indicates that many of these would not be eligible for SSI payments, so the impact for this study is again unclear.

Czajka et al (2003) compare reported and imputed amounts for a wide selection of asset holdings in the SIPP. They do not find a systematic difference in mean levels of asset holdings for the asset types that have high imputation rates, such as checking and savings account balances and IRA and Keogh account balances.

In summary, the evidence of a systematic effect of imputations in OASDI benefit amounts would apply only to SSI eligibility models that are estimated without use of administrative data for this income source. For the asset types that have been pointed out as being potentially problematic, imputation is very widespread in the SIPP. However, comparison of mean reported and imputed amounts does not lead to a prediction about the direction of the potential bias.

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[17] The 2008 version of this paper does not include the information cited here.
[18] This is measured as the lowest quintile of income.
[19] Czajka et al (2003), Table IV.11.
[20] Huynh, Rupp, and Sears (2002), Table 7.

Attrition

Considerable evidence suggests that attrition in the SIPP is not random. On the contrary, it is associated with assets and income. For assets, Czajka et al (2003) show that families with less than six thousand dollars in net worth in an early wave of the 1996 SIPP are more than twice as likely to attrit the survey than families with more than this amount. That is, attrition is negatively associated with wealth. For income, Huynh, Rupp, and Sears (2002) present evidence about the association between attrition and income from Social Security programs, including OASDI and SSI. For both programs, attrition is positively associated with income from the programs. That is, attriters have higher OASDI and SSI payments than people who stay in the sample. In addition, the error in reporting the payment amounts (compared to the administrative amounts) is higher for attriters than for those that stay in the sample. The inverse of this effect is observed when payment dynamics are analyzed in the administrative records and are compared to attriting behavior in the survey. Those who stay in the survey (who had lower payment amounts, on average) tend to have increasing payment amounts over time whereas those who leave the survey (who had higher payment amounts) tend to have decreasing payment amounts over time. Thus, although the overall effect is ambiguous, there is some association between SSI and OASDI benefits and attriting behavior in the SIPP.

Eligibility changes after benefit award

Some elderly payment recipients gain income or assets after the award of SSI payments that makes them ineligible. SSA checks continuing eligibility through a program of redeterminations and also a system of limited issue alerts established through linked data systems. For example, the data systems are linked to the Office of Child Support Enforcement's National Directory of New Hires so an alert would be generated if a SSI payment recipient started employment. The alert could call for resolving the particular issue of increased income without calling for a complete redetermination.

SSA investigates the issue of incorrect payment amounts annually through sampling the group of payment recipients and recalculating the payment amounts. The primary result is that overpayment (9.1 percent of recipients) is much more likely than underpayment (1.5 percent of recipients).[21]

Although somewhat more than four thousand payment recipients appear in the sample each year, the general population may have their eligibility or payment amounts recalculated through redeterminations and limited issue alerts. For both of these, elderly SSI payment recipients are less likely than working-age recipients to have their eligibility or benefit amounts recalculated. Redeterminations are scheduled based on a two-stage propensity scoring model that estimates the probability of overpayment and then the amount of possible overpayment. Recipients with a high propensity score are placed in a group that may have a redetermination every year (the actual number of redeterminations depends on the budget allocation). By contrast, the remaining population of recipients is scheduled for a redetermination every six years. Because the elderly have relatively consistent income, assets and living arrangements, they are less likely to be in the high propensity score category. In fiscal year 2008, 2.7 percent of elderly recipients were in this category compared to 6.9 percent of working-age recipients.[22] For redeterminations based on limited issue alerts, the percentage is also smaller for the elderly. Considering the different kinds of redeterminations and alerts together, 7.7 percent of elderly recipients had their benefits recalculated compared to 22.2 percent of working-age recipients.

The overall conclusion is that a large portion of elderly payment recipients have not had their benefits recalculated for up to six years. As a consequence, when some of these people appear in the SIPP sample, they may be giving accurate reports of their asset holdings and income even though it may not appear that way to a researcher. They may accurately report that their financial resources are over the applicable thresholds while the matched administrative records will indicate that they are payment recipients. Thus, a researcher may conclude that they have overstated their financial resources. However, this conclusion is not necessarily correct.

These results indicate that the accuracy of estimates of SSI eligibility may be correlated with how recently the person has had their benefits recalculated. This information is not currently available in the SSA administrative data that are matched to the SIPP. One alternative is to use the information in SSA's propensity scoring model to estimate which recipients would have a high risk of having an overpayment; however, this would be difficult. The predictive equations use a large number of independent variables; more than fifty of them are statistically significant. Because of this and also multicollinearity, it would be difficult to determine which variables are driving the results.

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[21] Social Security Administration (2008).

[22] The figures in this paragraph come from internal SSA documents.

One data element that stands out is an indicator for recipients who live in another's household. This may be worthy of further attention using the SIPP data. The direction of the impact, however, is indeterminate. On the one hand, recipients who live in another's household would be more likely to have out-of-date data because they are subject to changing financial circumstances in the household as well as changing individual circumstances. On the other hand, this makes them more likely to have had a recent redetermination and, thus, more likely to have up-to-date data.

Perceptions of eligibility

As discussed above, SSI eligibility may be incorrectly perceived by SSA for SSI participants because of the timing of changes in income or assets of the participant. The inverse of this is that SSI eligibility may be incorrectly perceived by nonparticipants. For example, although SSI eligibility is not affected by home ownership and the value of one vehicle, previous researchers have included these variables when predicting SSI participation. One possible explanation is that home or car ownership is correlated with other asset values that are not reported or underreported in the SIPP. If true, these variables would be acting as proxy variables for unmeasured assets. The corresponding participation rate estimate would be underestimated due to the inclusion of respondents whose reported assets falsely indicate that they are eligible.

Another explanation is explored by Hill (1990). He asserts that SSI participation is affected by being informed about eligibility and potential benefits. Using a question that asks survey respondents whether they believe they are eligible, he constructs a predictive equation that includes both home and car ownership. Although he does not provide a rationale for including these variables, one possibility is that ownership of these items contributes to a false perception of not being eligible for benefits. An alternative possibility is that car ownership indicates the ability to travel to the SSA office and, thus, is a proxy for the cost of participation.

Previous studies generally find that ownership of homes and cars is negatively associated with SSI participation, even when controlling for the potential benefit amount. However, many of the estimates are not statistically significant. McGarry (1996), Hill (1990), and Davies (2001/2002) find one but not the other of the two to be statistically significant, while Davies et al (2001/2002), Rupp et al (2003) and Davies et al (2004) find neither to be significant.

Methods

We examine the impact of measurement error using two approaches. First, we examine the impact of using administrative data on estimates of the SSI participation rate using a more recent panel of the SIPP than has been used previously. Then, we examine the subgroups that previous literature suggests would have lower measurement error. These subgroups are reviewed in the next section. After that, we address the question of whether the differences that are observed for the subgroups are due to differences in measurement error or whether they are due to differences in the characteristics of these subpopulations.

Comparison groups

The previous literature offers hypotheses and evidence about which subgroups may have lower measurement error in their survey responses. We review these subgroups here.

The first set of subgroups is related to the kind of survey responses. The evidence indicates that imputed responses contain more measurement error on average than direct responses. Also, respondents who are soon to leave the survey – that is, sample attriters – may also give responses with more measurement error.

Another set of subgroups is related to the kind of household that responds to the survey. Data about the survey respondent or the respondent's spouse may be more accurate than data about other household members. Further, the review of SSA's system of reviewing continuing SSI eligibility indicates that respondents living in another's household may give less accurate information about the items that are relevant to SSI eligibility.

The previous literature also indicates that particular response items have more measurement error than others. Among asset items, the higher error items tend to be financial assets rather than property assets. Particularly, checking and savings account balances and also IRA and Keogh account balances are thought to be measured with a high degree of error in the SIPP. We

include an additional asset item in this list, the cash value of life insurance, because it is newly measured in the 2004 SIPP and because our analysis shows some implausible values among SSI payment recipients.[23] One other possibility that is raised in the previous literature is that home ownership may be correlated with measurement error due to its effect on perceptions of eligibility. [24]

Among income items, the use of administrative data for OASDI income means that this part of total income will be more accurate. It follows that the accuracy of income measurement would increase with the proportion of income that comes from OASDI.

Using the issues and questionnaire items discussed here, we identify nine subgroups which may have lower levels of measurement error. We analyze the subgroups that have:

1. Checking and savings account balances that are not imputed;
2. IRA and Keogh account balances that are not imputed;
3. Life insurance type and face value that are not imputed;
4. All three of Checking and savings account balances, IRA and Keogh account balances and life insurance values that are not imputed;
5. No self-reported income;
6. At least two years of survey responses after the interview (no attrition);
7. Observations that did not come from a proxy interview, i.e. the respondent or spouse reported about themselves;
8. Home equity holdings that are less than $100,000; and
9. Their own household (do not live in another's household).

These comparison groups all have a direct correspondence to the issues discussed in the previous literature. The fifth subgroup, those with no self-reported income, is meant to represent the higher accuracy of administrative income measures. Those with no self-reported income either derive all their income from SSI or OASDI or have zero income. In either case, total income contains no self-reported income, which has a greater potential for measurement error.[25]

Data

This study primarily uses core and topical module data from wave 3 of the 2004 SIPP panel to estimate SSI eligibility. The rotation groups are arranged to have a reference period of September, 2004. Topical module 5 also is used for disability characteristics. The SIPP data are matched to extracts of SSA administrative records from the Supplemental Security Record and the Master Beneficiary Record.[26] The sample has 10,014 observations of which 588 are estimated to be eligible for SSI.

Financial Eligibility Model

Using SSA's FEM, we estimate SSI eligibility for each SIPP observation by simulating SSI program eligibility rules using self-reported asset and income amounts. Administrative data on OASDI benefit amounts are substituted for self-reported data where noted. SSI participation is defined from administrative records as receipt of a positive payment in September, 2004. We also calculated the potential SSI benefit amount for all eligible elderly individuals and modeled SSI participation among elderly eligibles using a predictive equation that closely follows Davies et al (2001/2002), Davies et al (2004), and McGarry

[23] See Czajka et al (2003) for a discussion of this. SSA provided funding to the Census Bureau to develop a questionnaire item for the cash value of life insurance in the 2004 SIPP panel.
[24] The imputation procedure for home equity was changed for the 2004 SIPP panel with the assistance of SSA funding to jointly impute home equity and liability.
[25] OASDI incomes of zero represent meaningful measures of the income level rather than a lack of information because each observation in our analysis data is matched to administrative records.
[26] The SIPP data are matched to the administrative records of the Social Security Administration and the SIPP population weights are adjusted by the inverse of the match rate across age categories. The Census Bureau matched the data based on probabilistic methods rather than the Social Security number that the respondent was asked to report. This is a change from previous panels that may affect the changes across time in the SSI participation rate that we discuss in this paper. The universe of the SIPP data is the noninstitutionalized population; thus, the estimates presented here do not apply to institutionalized SSI recipients and potential recipients.

(1996). The central feature is that the size of the potential SSI benefit is an important determinant of participation. The equation also controls for demographic characteristics, uncountable property assets, a measure of physical independence, citizenship and nativity status, and state of residence. The results of the predictive equation are given in Appendix Table 2.

Results

Measurement error in participation

Using administrative instead of self-reported participation data increases the estimated participation rate for 2004 by 8.1 percentage points, from 52.8 to 60.9 percent. This increase is shown in the first two sets of columns of Chart 2. We interpret this as confirming previous evidence of underreporting of SSI payment receipt in the SIPP. Comparing across SIPP panels, the increment due to using administrative participation data is larger for the 2004 panel than for the 1996 panel, 8.1 percentage points versus 2.6 percentage points, even though the resulting participation rates are very similar.

Looking ahead to the impact of measurement error in eligibility, the use of administrative participation data has a much larger impact when combined with use of administrative data for OASDI income. In this case, the increase is 14.5 percentage points, from 57.8 to 72.3 percent, as seen in the last two sets of columns in Chart 2. The increment is also larger for the 2004 panel versus the 1996 panel, 14.5 versus 5.6 percentage points.

In summary, use of administrative participation data has a meaningful impact on estimates of participation rates, and the impact is growing over time.

Measurement error in eligibility

As discussed above, measurement error in eligibility can be partly addressed through use of administrative data for OASDI income. We briefly discuss the impact of this and then analyze the remaining measurement error using comparison groups.

Administrative data for OASDI income. Using administrative data for OASDI income also has an impact on the estimated participation rate. Comparing column 3 and column 1 of Chart 2 shows a difference of 5.0 percentage points for 2004. As with the previous comparisons, this is larger than the difference in the 1996 panel of 0.2 percentage points.

When combined with administrative data on SSI participation, the impact is again much larger. Comparing the fourth column of Chart 2 to the third reveals a difference that is larger than for using administrative OASDI data alone. Also, this difference is increasing between the 1996 and 2004 panels.

In summary, using both available administrative data sources leads to an almost 20 percentage point increase in the estimated participation rate in the 2004 panel. This compares to only a 5.8 percentage point increase in the 1996 panel. Unlike comparing the results of different studies, this increase is based on a consistent methodology. Also, the participation rate making full use of administrative data for 1996, 62.7 percent, reproduces the result reported by Rupp et al (2007) that was used in Chart 1 (the black triangle) and Appendix Table 1. The participation rate for 2004, 72.3 percent, uses a very similar methodology but results in a much higher estimate.

Looking at these results in the light of previous studies, we confirm the trends that were previously observed and also establish a new trend. The data points in Chart 1 are reproduced along with the data points representing our new estimates in Chart 3. For previous studies that did not fully use administrative data, the trends are downward or inconclusive. Adding our data points that correspond to these data configurations continues theses trends. For self-reported data, the neutral or gradually declining trend clearly establishes the one estimate below 40 percent (Elder and Powers, 2006) as an outlier. For partial use of administrative data, the trend is neutral or may be gradually increasing. It is only in the estimates that fully use administrative data that a clear upward trend is visible.

Comparison groups that may have lower measurement error. The previous literature indicates particular subgroups that may have lower measurement error in the SIPP. We examine the participation rates for these subgroups with the goal of using the results to make inferences about the elderly population as a whole.

The scale of the subsetting is shown in Table 1. Column A shows the proportion of the elderly population that is represented by each subgroup. These numbers show that a high percentage of the elderly population lives in their own household. On the other end of the scale, a minority of elderly respondents have non-imputed values for the three kinds of assets that are examined, including checking and savings account balances, IRA and Keogh account balances, and the type and cash value of life insurance. Also, slightly less than half of elderly respondents do not attrit the sample within two years after September, 2004. A small fraction of elderly respondents have no self-reported income.

The SSI eligibility rate for each subgroup is given in column B of Table 1. The subgroups that have no self-reported income, reported all three of the asset types, or are without substantial home equity have particularly high eligibility rates. By contrast, the subgroup that lives in their own household has a particularly low eligibility rate.

The participation rate for each subgroup, defined as the percentage of eligible individuals in each group who receive an SSI payment, is given in column C of Table 1. In general, the participation rates are a few percentage points higher for the subgroups than for the elderly population overall.

Columns D and E of Table 1 present two views of the prevalence of SSI payment recipients among the elderly population and among subgroups. In column D, the conditional prevalence rate is defined as the number of SSI participants who are estimated to be eligible in the FEM as a fraction of all individuals in the subgroup. Column E gives the prevalence rate without regard to estimated eligibility (all participants as a fraction of all individuals in the subgroup). We interpret the figures in column E as being practically without measurement error. The numerator is participation as indicated in the administrative records, which is measured with very little error. The characteristics that define the denominators, the subgroup definitions, are also measured with very little error. For example, looking at the first subgroup, it is known with near certainty whether the checking and savings account balances were reported or imputed in the SIPP.

As a result, the difference between columns D and E can be interpreted as a measure of one of the two kinds of measurement error that are relevant to SSI eligibility. The errors in estimating eligibility can either be false negatives or false positives. False positives can be observations that are falsely estimated to be SSI eligible due to underreporting of income or assets. By contrast, false negatives are estimates of ineligibility for observations that are actually eligible. Some of these can be revealed by comparing administrative measures of participation to estimates of eligibility. Payment receipt is measured with very little measurement error, while eligibility is measured with error. Thus, the concurrence of payment receipt with estimated ineligibility would generally indicate measurement error in the estimates. However, there is also the possibility that SSA has mismeasured current eligibility through its eligibility review process. Thus, the false negatives that are revealed can be interpreted as a combination of measurement error in the SIPP and measurement error by SSA.

This construction of measurement error is shown in column F of Table 1. The figures are interpreted as the percentage of participants in each subgroup that are observed to be false negatives; that is, they are observed to be receiving a SSI payment while being estimated to be ineligible. For the subgroups, this measure of error is generally lower than for the elderly population as a whole.[27]

The participation rates for the subgroups are reproduced in Table 2, this time also with the participation rates for their mutually exclusive counterparts. For example, the group that had non-imputed values for checking and savings accounts, IRA and Keogh account balances, and life insurance (group 4) has a participation rate of 74.4 percent (while the remaining group that failed to report at least one of the items has a rate of 63.8 percent). The rates for the subgroups generally fall within the 95 percent confidence interval for the base estimate (group 0) (see chart 4).

In summary, the subgroups that are expected to be less likely to suffer from measurement error generally have higher rates of SSI eligibility, higher rates of SSI prevalence, and lower false negative rates than the elderly population overall. Despite these differences, the participation rates among eligibles for the subgroups are generally not significantly different from the base estimate.

Selectivity Bias. The previous comparisons may be affected by selectively bias. For example, the subgroup with no self-reported income may meaningfully differ from the remaining SSI-eligible population. These survey respondents will have lower income, ceteris paribus, and higher potential SSI payment amounts. Because the propensity to participate is directly related to the potential SSI benefit amount, this group will have a higher participation propensity on average. In this case, the

[27] We have not constructed a formal statistical test of the differences in magnitudes in column F at this point.

bias would tend to exaggerate the subgroup estimate in comparison to the base estimate, but the bias could be in either direction for the other subgroups.

To control for selectivity bias in a comparison would require that the two subsamples be similar in terms of the propensity for eligible elderly to participate in SSI. According to previous literature, the propensity to participate is affected by the size of the potential benefit and other factors. The size of the potential benefit is in turn affected by lifetime earnings which determines OASDI benefit eligibility and amounts and is correlated with other sources of retirement income.

We address the potential selectivity bias between the subgroups of interest and their respective comparison groups (i.e., the "yes" and "no" columns of Table 2) with two comparisons. First, we examine average predicted propensities to participate for eligibles within subgroups. Comparing the mean of a subgroup to the remaining population indicates whether the selection of a subgroup has captured a group with particularly high or low propensities to participate. This comparison is dependent upon estimates of eligibility, however, which are subject to all the measurement errors that have been analyzed in this paper. Therefore, we use a second comparison that is relatively devoid of measurement error. The second comparison is based on variables that are relatively free of measurement error but are related to eligibility or participation. Also, the second comparison looks at a broader part of the population rather than restricting the analysis to eligibles.

For the first comparison, we use the predicted participation propensities from the participation equation and we compare the subgroups that were analyzed in Tables 1 and 2. The results are shown in Table 3. The propensities that are used in this table represent the predicted tendency to participate based on the estimated potential benefit amount and the other factors described in Appendix Table 2. We can compare the predicted tendency across the different subgroups to determine whether they differ meaningfully and, thus, whether meaningful selection is occurring in the division of subgroups. The t-test of this difference is given in the last column.

For comparisons one through four, those involving imputation of financial asset amounts, the differences are not statistically significant. This indicates that the need for imputation is not systematically related to the propensity to participate in SSI. Thus, the potential selectivity bias, according to this comparison, is small. Comparison four tests the difference between the subgroup for which none of these items were imputed and the group where any of them were imputed. The difference is not statistically significant. Also, the subgroup indicating lack of attrition (respondent stays through wave 9) is also not statistically significant. The observed participation rates for these two groups given in Table 2 are 74.4 and 74.3 percent. By this comparison, these estimates are relatively free of selectivity bias.

For the other subgroups, those involving no self-reported income, proxy interviewing, and low home equity, the differences are all statistically significant. This indicates that the differences in participation rates that were observed in Table 1 are the result of the combination of observed differences and selectivity bias. Thus, we have less confidence in attributing the observed differences in Table 1 to measurement error alone.

The second comparison is shown in Table 4. The variables used here are all relatively free of measurement error: the OASDI benefit is measured by administrative data and age, sex and marital status are well-defined demographic characteristics. Lastly, a survey-response based estimate of the Barthel index (an index of physical independence) is included, which is based on relatively objective activity of daily living measures.[28] To avoid dependence on estimates of eligibility, the sample is restricted to the population with countable assets less than the median for all elderly individuals.[29] The median was roughly an order of magnitude higher than the SSI asset eligibility thresholds in 2004, thus, the second comparison will only be affected by very large measurement errors in assets.

The means and t-tests for these comparison variables are shown in Table 4. A statistically significant difference indicates that the comparison group differs from the remaining population for that variable. We are primarily interested in subgroups for which all of the differences are not statistically significant. The only such subgroup is the group of respondents that stay in the panel for two years after the reference period (wave 9). Because the mean predicted SSI participation rate difference for this subgroup also was not significant (Table 3), we conclude that this subgroup is the most free of selectivity bias of all the subgroups analyzed here.

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[28] For example, a SIPP question asks whether the respondent has trouble climbing stairs. The responses are weighted by the Barthel index criterion. See Mahoney and Barthel (1965).

[29] Median countable assets among the elderly was $29,800 in the 2004 sample.

In summary, we were searching for a subgroup or subgroups that did not differ from the remaining population in terms of the propensity to participate in SSI (among eligibles) and other important characteristics (among the elderly population). We found only one such subgroup – those who do not attrit from the SIPP within 2 years after the data point used in our analysis. The firmness of any resulting conclusion must be tempered by the results of previous studies which found attriting behavior to be associated with income and asset amounts. In general, the evidence points to substantial selectivity bias in the estimates.

Discussion and Conclusions

Our estimate of the SSI participation rate among SSI-eligible elderly is 72.3 percent. In addition, groups that the previous literature suggested would be less susceptible to measurement error have participation rate estimates that are similar to this level. However, it is difficult to separate the effects of measurement error and selectivity bias on the estimates.

We also find that the participation rate is increasing. One factor is that measurement error in the SIPP seems to be increasing over time. We base this conclusion on the divergence of trends for estimates that do and do not use administrative data: participation rate estimates that use administrative data increased substantially between 1996 and 2004 while similar estimates that do not use or partially use administrative data showed a mixed trend. This is compatible with evidence from previous studies that found increasing measurement error over time in SIPP measures of income and assets.[30] We add evidence that measurement error continues to increase into the time period covered by the 2004 SIPP. The use of administrative data allows us to assess measurement error for variables for which there is an administrative counterpart; whether measurement error is increasing in other variables remains an unanswered question.

Although measurement error seems to be increasing over time, our results indicate that there has also been a secular increase in participation rates over the same time period. Explaining the increase is beyond the scope of this study, but our cross-sectional results offer some clues about changes over time. Changes in SSI eligibility are affected by changes in the population's characteristics as well as program changes. One program feature that produces de facto changes over time is the lack of full indexing of SSI benefits. Although the benefit levels are indexed, the asset thresholds and the fixed parts of the income exclusions are not. Also, the state supplements are generally not indexed. Thus, the real value of the income guarantee is declining over time.

To illustrate the potential effects of the lack of full indexing, the relationships between potential benefit amounts and participation rates are shown in Chart 4. For eligible elderly, there is a bimodal distribution of potential benefit amounts. Looking at unmarried elderly (the left panel), the most common potential benefit amount is the federal SSI income guarantee amount which was $564 per month in 2004. The next most common potential benefit amount was around zero. A lowess smoothing line is shown which estimates the participation rate across the points of the distribution of potential benefit amounts. This illustrates the positive relationship between potential benefit amounts and participation that is found in the literature. Similar results are seen for married elderly.[31]

The likely effects of the lack of full indexing can be seen in this juxtaposition of potential benefit amounts and participation rates. Concerning income thresholds, a decline in the real value of the income guarantee would affect those on the left of the charts, that is, those who have income that is reducing their potential benefit in the status quo. One can imagine the effect as moving the left axis to the right and eliminating those with the lowest potential benefit amounts. This is the group with the lowest participation rate and, thus, the remaining eligible population would have an increasing participation rate.

Chart 4 also illustrates a central dilemma in estimating participation rates, however. The people near the left axis of the charts are also the people for whom a small amount of measurement error in income could affect their estimated eligibility status because their income is near the thresholds. Thus, it is difficult to distinguish between secular changes and changes due to changes in measurement error. In future research, we plan to investigate other causes of changes in participation rates as well

[30] See Czajka et al (2003) and Sears and Rupp (2003) for evidence about increasing measurement error in asset items and OASDI income respectively.

[31] For married couples, the federal SSI income guarantee was $846 per month in 2004. In Chart 3, this is shown on a per capita basis. The most common potential benefit is around the maximum of $423 per month, again followed by very small amounts. A small number of potential payment recipients also have amounts above the maximum because their spouse is not categorically eligible and, thus, they are treated as unmarried. Most of these cases are an aged husband with a non-aged wife.

as causes of changes in the size the eligible population. In addition, we plan to explore econometric methods of accounting for measurement error.

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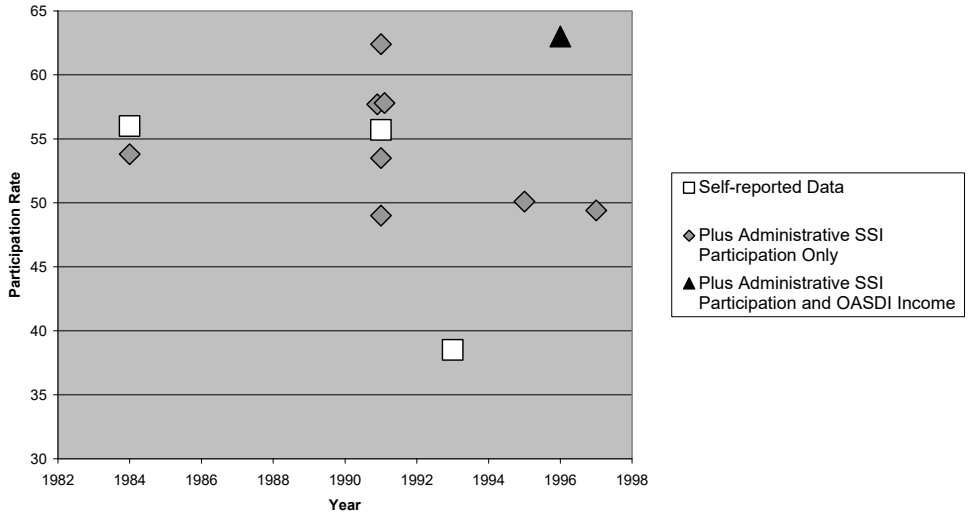
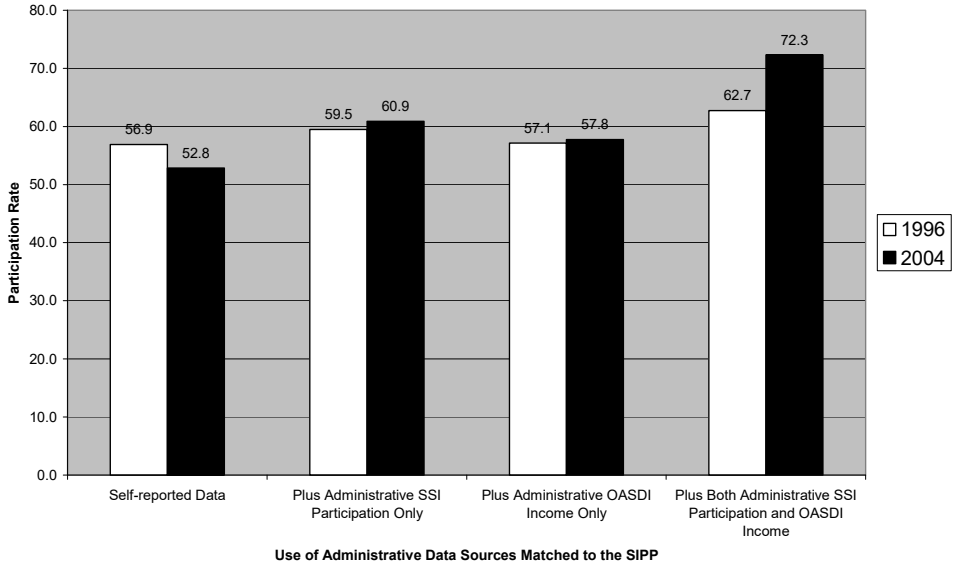
Chart 1: SSI Participation Rates for the Elderly by Year and Data Source - Previous Estimates



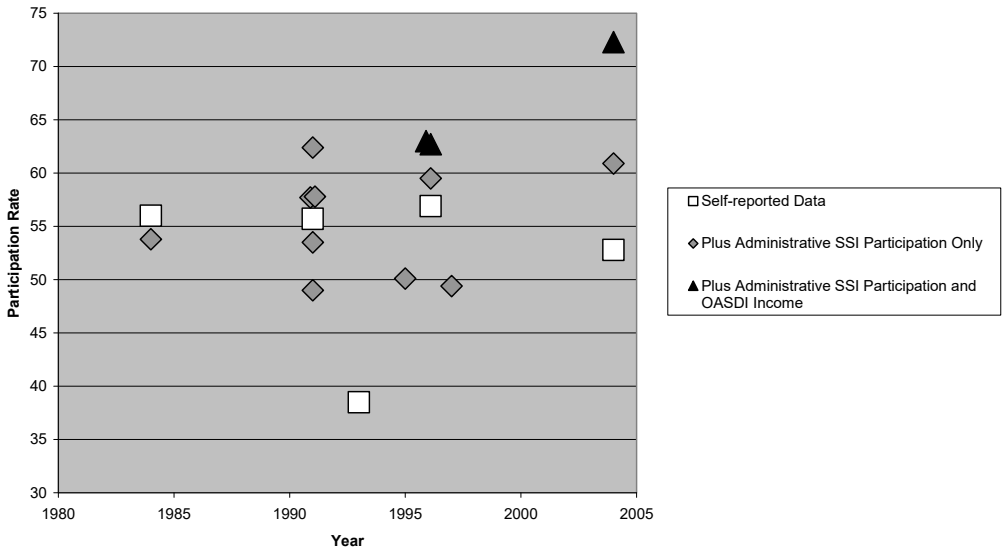
Note: All studies use the Survey of Income and Program Participation. See Appendix Table 1 for identification of source studies and exact data points.

Chart 2: SSI Participation Rates by Data Source, 1996 and 2004



Source: Authors' calculations from SSA's Financial Eligibility Model (1996 SIPP and 2004 SIPP matched to SSA administrative records).

Chart 3: SSI Participation Rates for the Elderly by Year and Data Source - Including New Estimates



Note: All studies use the Survey of Income and Program Participation. See Appendix Table 1 for identification of source studies and exact data points.

Chart 4: SSI Participation Rate Estimates and Confidence Intervals for Subgroups

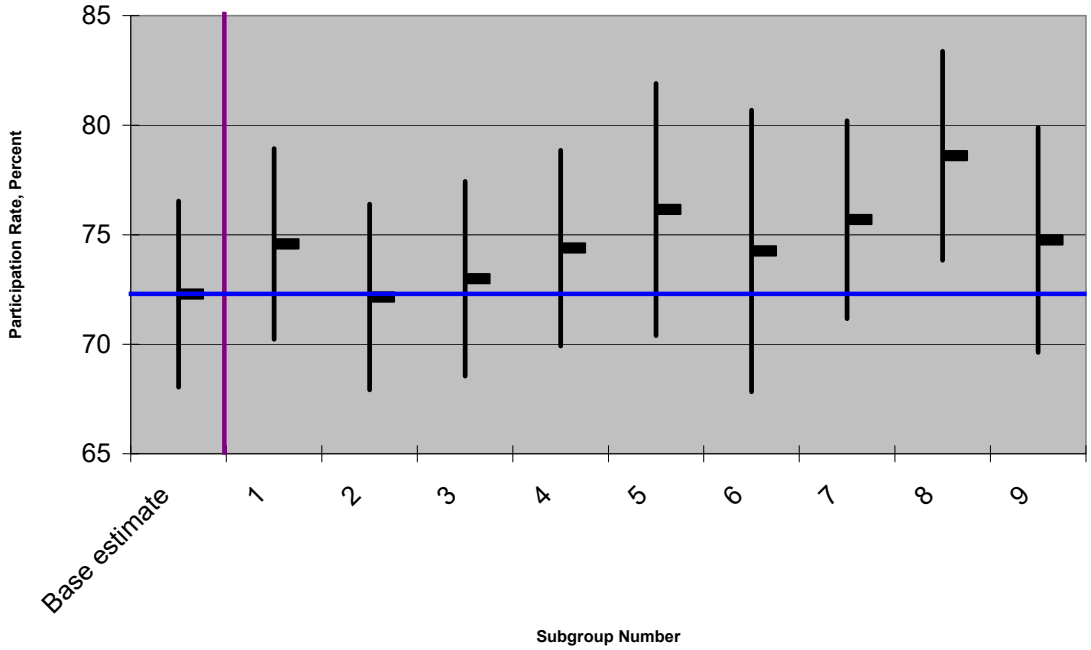
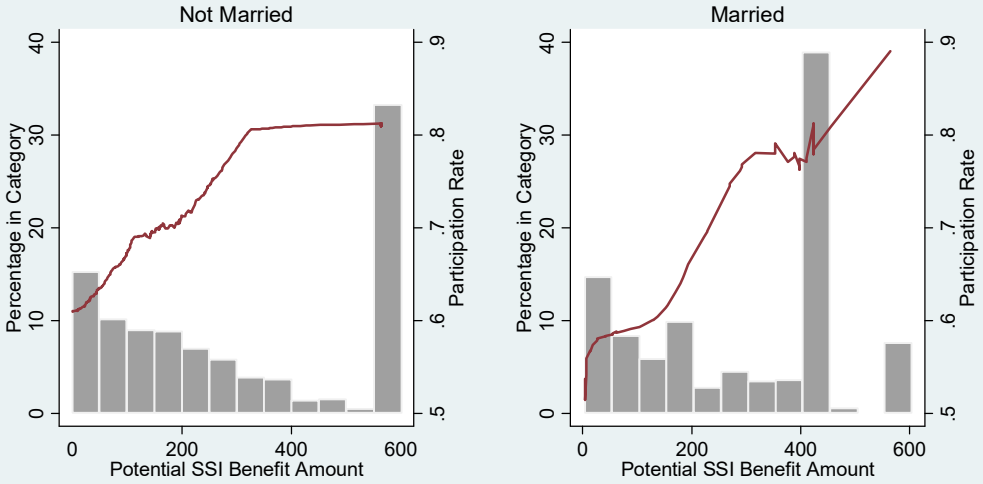


Chart 5: SSI Participation Rates among Elderly Eligibles by the Size of the Potential Benefit, Overlaid with the Distribution of Potential Benefit Amounts, by Marital Status



Source: 2004 SIPP
Lines use Lowess smoothing.

Table 1: SSI Eligibility, Participation and Prevalence Rates for the Elderly by Subsample

Number	Characteristics of Potential SSI Unit (self and spouse, if one exists)	Percent of Elderly Population	Eligibility Rate within Subgroup	Participation Rate Conditional on Eligibility	Prevalence Rate in Subgroup, Conditional on Eligibility	Prevalence Rate, Unconditional	Percentage of Participants that are Ineligible
		A	B	C	D=B*C	E	F=(E-D)/E
0	Base estimate	100 (N.A.)	5.9 (0.2)	72.3 (1.9)	4.2 (0.2)	5.0 (0.2)	16.0
1	Checking and savings accounts reported (not imputed)	55.4 (0.5)	9.4 (0.4)	74.6 (1.9)	7.0 (3.4)	8.0 (3.6)	12.5
2	IRA and Keogh accounts reported (not imputed)	91.3 (0.3)	6.4 (0.3)	72.2 (1.9)	4.6 (0.2)	5.4 (0.2)	14.8
3	Life insurance type and amounts reported (not imputed)	71.5 (0.4)	7.5 (0.3)	73.0 (2.0)	5.4 (0.3)	6.1 (0.3)	11.5
4	All three above reported (not imputed)	43.8 (0.5)	11.0 (0.5)	74.4 (2.0)	8.1 (0.4)	9.0 (0.4)	10.0
5	No self-reported income	13.3 (0.3)	19.4 (1.1)	76.1 (2.6)	14.7 (0.9)	16.7 (1.0)	12.0
6	No attrition	46.6 (0.5)	6.4 (0.4)	74.3 (2.7)	4.7 (0.3)	5.5 (0.4)	14.5
7	Not a proxy interview	72.0 (0.4)	5.7 (0.3)	75.7 (2.1)	4.3 (0.2)	5.0 (0.3)	14.0
8	Home equity less than $100,000	42.8 (0.5)	10.4 (0.5)	78.6 (1.9)	8.1 (0.4)	9.5 (0.4)	14.7
9	Live in own household	93.5 (0.2)	4.5 (0.2)	74.6 (2.1)	3.4 (0.2)	4.0 (0.2)	15.0

Notes: Standard errors are in parentheses. Standard errors are not adjusted for the SIPP's complex sample design.
Source: Authors' calculations from SSA's Financial Eligibility Model (2004 SIPP matched to SSA administrative records).

Table 2: SSI Participation Rates for SSI-Eligible Elderly by Subsample Characteristics

Number	Characteristics of Potential SSI Unit (self and spouse, if one exists)	Yes	No
0	Base estimate	72.3 (2.2)	N.A.
1	Checking and savings accounts reported (not imputed)	74.6 (2.2)	54.7 (7.2)
2	IRA and Keogh accounts reported (not imputed)	72.2 (2.1)	100.0 (0.0)
3	Life insurance type and amounts reported (not imputed)	73.0 (2.2)	65.5 (6.4)
4	All three above reported (not imputed)	74.4 (2.3)	63.8 (4.8)
5	No self-reported income	76.1 (2.9)	69.3 (3.0)
6	No attrition	74.3 (2.9)	70.2 (3.0)
7	Not a proxy interview	75.7 (2.3)	64.6 (4.3)
8	Home equity less than $100,000	78.6 (2.2)	52.4 (5.1)
9	Live in own household	74.8 (2.3)	65.9 (4.5)

Notes: Standard errors are in parentheses and are calculated using the methods of Fay (1984 and 1989).
Source: Authors' calculations from SSA's Financial Eligibility Model (2004 SIPP matched to SSA administrative records).

Table 3: Mean Predicted SSI Participation Propensities for Elderly Eligibles, by Subsample Characteristics

Number	Characteristics of Potential SSI Unit (self and spouse, if one exists)	Yes	No	t-Statistic for the Difference in Means[32]
0	Base estimate	72.3	N.A.	N.A.
1	Checking and savings accounts reported (not imputed)	72.8	70.8	0.50
2	IRA and Keogh accounts reported (not imputed)	72.4	N.A.	N.A.
3	Life insurance type and amounts reported (not imputed)	73.1	67.3	1.85
4	All three above reported (not imputed)	73.0	70.3	1.06
5	No self-reported income	75.4	68.8	2.89*
6	No attrition	74.6	70.3	1.65
7	Not a proxy interview	75.7	65.2	3.58*
8	Home equity less than $100,000[33]	74.6	65.6	2.99*
9	Live in own household	75.9	63.6	4.40*

* indicates significance at the 5 percent level.
Source: Authors' calculations from SSA's Financial Eligibility Model (2004 SIPP matched to SSA administrative records).

[32] The standard errors are calculated using the methods of Fay (1984 and 1989).
[33] The logarithm of home equity values is usually included as an independent variable in the predictive probit equation but it is dropped for this case.

Table 4: Means for the Elderly Population with Countable Assets below the Median, by Subsample Characteristics

The cells contain information for these variables:

Social Security (OASDI) Benefit
Age
Female
Married
Barthel Index

Number	Characteristics of Potential SSI Unit (self and spouse, if one exists)	Yes	No	t-Statistic for the Difference in Means[34]
0	Base estimate	792 75.9 63.3 37.0 89.4	N.A.	N.A.
1	Checking and savings accounts reported (not imputed)	762 75.3 64.0 32.4 88.6	857 76.7 62.4 46.1 91.2	-7.30* -4.22* 1.26 -6.77* -4.17*
2	IRA and Keogh accounts reported (not imputed)	792 75.9 63.7 36.8 89.3	954 70.0 48.4 58.1 97.2	-2.97* 9.81* 3.09* -3.45* -10.05*
3	Life insurance type and amounts reported (not imputed)	781 75.9 64.2 33.9 89.1	837 75.6 61.2 47.3 90.6	-3.85* 0.78 2.06* -6.66* -2.18*
4	All three above reported (not imputed)	747 75.4 64.8 30.6 88.3	849 76.3 62.0 44.5 90.8	-7.86* -3.26* 2.29* -8.08* -4.11*

* indicates significance at the 5 percent level.

[34] The standard errors are calculated using the methods of Fay (1984 and 1989).

Table 4, continued

Number	Characteristics of Potential SSI Unit (self and spouse, if one exists)	Yes	No	t-Statistic for the Difference in Means
5	No self-reported income	784 76.2 65.3 29.2 86.5	798 75.7 62.9 39.6 90.3	-1.03 1.86 1.37 -5.98* -5.34*
6	No attrition	789 75.9 62.6 36.4 89.6	800 75.7 64.2 37.9 89.3	-0.81 0.73 -1.31 -0.77 0.36
7	Not a proxy interview	802 75.9 69.5 28.3 89.9	774 75.4 46.2 62.4 88.1	1.71 2.10* 13.47* -21.45* 2.48*
8	Home equity less than $100,000	748 75.8 65.6 33.0 88.2	866 75.9 60.3 43.4 91.4	-8.41* -0.37 4.27* -4.91* -5.23*
9	Live in own household	811 75.6 61.9 40.4 90.0	650 77.8 76.8 9.8 84.8	6.46* -5.40* -6.66* -14.56* 4.65*

* indicates significance at the 5 percent level.
Source: Authors' calculations from SSA's Financial Eligibility Model (2004 SIPP matched to SSA administrative records).

Appendix Table 1: Studies utilizing the Survey of Income and Program Participation (SIPP) that report a SSI participation rate for the elderly

Study	Reference Period	Use Administrative SSI Participation Data?	Use Administrative Old Age and Survivors Income Data?	Participation Rate (percent)
McGarry (1996)	1984	No	No	56
Davies et al (2001/2002)	1991	Yes No	No No	62.4 55.7[35]
Rupp et al (2003)	1991	Yes	No	57.8[36]
Davies et al (2004)	1991	Yes	No	57.7
Elder and Powers (2004)	1984 1991 1993 1995 1997	Yes	No	53.8[37] 53.5 49.0 50.1 49.4
Elder and Powers (2006)	1991	No	No	38.5
Rupp et al (2007)	1996	Yes	Yes	63

[35] This is an approximation calculated from table 3 using unweighted data.
[36] This figure is for elderly women only.
[37] These figures are unweighted; the authors do not report weighted figures.

Appendix Table 2: Probit results for the SSI participation equation among elderly eligibles, September, 2004

Probit regression — Number of obs = 588
Wald chi2(39) = 127.22
Prob > chi2 = 0.0000
Log pseudolikelihood = -266.07191 — Pseudo R2 = 0.2364

Variable	Coefficient	Standard error	t		Marginal effect on probability of participation
Potential SSI Benefit	0.001733	0.000456	3.80	**	0.0005
State Supplement	0.005656	0.003965	1.43		0.0017
Age	-0.01942	0.010685	-1.82	*	-0.0057
Married	-0.1089	0.186828	-0.58		-0.0327
Female	-0.05531	0.145027	-0.38		-0.0161
Hispanic	0.173605	0.265521	0.65		0.0490
Black	0.022524	0.227003	0.10		0.0066
High School Graduate	0.216677	0.208257	1.04		0.0667
Metropolitan Area	-0.20956	0.174038	-1.20		-0.0586
Log of Car Value	-0.01457	0.022861	-0.64		-0.0043
Log of Home Value	-0.08156	0.014834	-5.50	**	-0.0239
Native Born	-0.85689	0.240904	-3.56	**	-0.2366
Citizen	1.066119	0.272795	3.91	**	0.3710
Independence index	-0.0096	0.00432	-2.22	**	-0.0028
Alabama	0.56482	0.386276	1.46		0.1302
California	-1.2618	0.741956	-1.70	*	-0.4452
Colorado	0.025493	1.073195	0.02		0.0074
Connecticut	-2.11664	1.749371	-1.21		-0.6935
Florida	0.463721	0.332489	1.39		0.1148
Georgia	0.497454	0.468323	1.06		0.1182
Illinois	-0.45462	0.311001	-1.46		-0.1528
Indiana	-1.75473	1.037212	-1.69	*	-0.6185
Iowa and North Dakota	-1.66327	1.395248	-1.19		-0.5940
Kentucky	-1.14524	1.14145	-1.00		-0.4233
Louisiana	0.525219	0.67929	0.77		0.1221
Maryland	-0.22095	0.765555	-0.29		-0.0701
Massachusetts	-0.98559	0.373584	-2.64	**	-0.3605
Minnesota	-1.35606	0.939222	-1.44		-0.4993
Mississippi	0.614618	0.565355	1.09		0.1373
Missouri	-1.03754	0.964385	-1.08		-0.3818
New Jersey	-0.34218	0.292142	-1.17		-0.1121
New York	-0.48048	0.366806	-1.31		-0.1585
North Carolina	-2.03458	1.617875	-1.26		-0.6855
Oklahoma	0.37498	0.430413	0.87		0.0936
Pennsylvania	0.660093	0.469006	1.41		0.1471
South Carolina	-1.22593	1.126339	-1.09		-0.4533
Texas	0.699893	0.369857	1.89	*	0.1561
Virginia	-1.19517	0.908304	-1.32		-0.4415
Washington	-2.92032	2.052032	-1.42		-0.7723
Constant	2.367982	0.969828	2.44		0.0005

* = significant at the 10 percent level; ** = significant at the 5 percent level

Appendix Table 2 Continued: Variable Descriptions

Variable	Description
SSI benefit	Individual potential SSI benefit amount – amount divided by 2 for couples where both are categorically eligible
State supplement	Average state supplement benefit amount – weighted average of federally administered and state administered if the state has both
Age	Age in the Summary Earnings Record
Married	Married, spouse present
Female	Female
Hispanic	Spanish, Hispanic or Latino
Black	Identified as black alone
High School	High school graduate
Metro	Metropolitan area
Car	Log of gross value of vehicle
Home	Log of gross value of home
Native	Born in the U.S.
Citizen	U.S. Citizen
Independence index	Barthel index[38] of independence among the elderly based on activities of daily living scores: 100=independent, 0=dependent
State	Dummy variables for residence in a state[39]

[38] Mahoney and Barthel (1965).

[39] State dummy variables are included in the estimation equation if there are at least 40 observations for that state and the coefficient can be estimated.