



Evaluation of Payroll Information Exchange (PIE) Wage Data Accuracy

A COMPARISON OF PIE WAGE REPORTS TO SSI RECIPIENT SUBMITTED PAYSTUBS

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Description of Study

The purpose of this analysis is to determine the accuracy of the Payroll Information Exchange (PIE) data. The Social Security Administration (SSA) uses gross earnings for entitlement and benefit determinations, as such we define accuracy as an exact match of gross earnings between a large sample of SSI recipients from the SSA Mobile Wage Report application (SSAMWR) and the PIE data. The analysis is not intended to reflect conclusions unrelated to this purpose.

The SSAMWR sample contains the self-reported earnings from SSI recipients and spans the dates from March 2022 to September 2022. Since the objective of this analysis is to determine the accuracy of the PIE data regardless of entitlement program, the SSAMWR data is sufficient for this purpose.

The sources of data for comparison are:

- **Payroll Information Exchange (PIE):** Authorized¹ Social Security Disability Insurance (SSDI) beneficiaries' and Supplemental Security Income (SSI) recipients' monthly paystub earnings data received from Equifax and their participating employers.
- **SSA Mobile Wage Report (SSAMWR):** Reporting mechanism by which SSI recipients upload images of paystubs via a mobile application. Optical Character Recognition (OCR) technology converts the images to machine-encoded text for use in benefit determinations.

After data are entered, the SSAMWR application allows for the SSI recipient to overwrite data fields if OCR technology is unable to read the image. To avoid data contamination, such as mistyping of certain data variables, we did not include overwritten SSAMWR reports in the analysis. We used only the non-overwritten OCR converted image reports.

¹ SSDI beneficiaries' and SSI recipients may voluntarily sign an SSA-8240 authorizing SSA to obtain wage and employment information from payroll data providers.

Variable and Value Descriptions

The following section includes definitions of the variables and values that SSA used in the study that are common in both the SSAMWR and PIE data.

Variable Name	Label	Description	Values	Value Description
WG_ERNR_SSN	Wage Earner Social Security Number	SSN of Wage Earner	9-character string	SSN
WG_SRC_CD	Wage Source Code	Indicates which database the paystub was pulled from	2-character string	Indicates whether data originated from PIE database or Mobile Wage Report database
PAYPRD_STDT	Pay Period Start Date	First date of the pay period indicated on the paystub	10-character string in MM/DD/YYYY format	Date
PAYPRD_ENDT	Pay Period End Date	Last date of the pay period indicated on the paystub	10-character string in MM/DD/YYYY format	Date
WG_PAID_DT	Wage Paid Date	Date the employee receives payment from employer	10-character string in MM/DD/YYYY format	Date
GRSERN_AMT	Gross Earnings Amount	Payment amount before deduction indicated on the paystub	8-character string in \$\$\$\$\$.¢¢ format	Dollar amount
NETERN_AMT	Net Earnings Amount	Payment amount after deduction indicated on the paystub	9-character string in \$\$\$\$\$.¢¢ format	Dollar amount

Description of Comparison

We pulled data containing the above variables from both the PIE and SSAMWR databases.

To ensure a one-to-one match from each source we followed a two-step process. First, we sorted the data by SSN. Reports with the same SSNs in both data sets were retained.

Second, we then matched the records in PIE to SSAMWR based on SSN and pay periods as

identified by the variables Pay Period Start Date², Pay Period End Date, and Pay Date³. We present the full matching criteria in the next section.

There were initially 193,663 PIE reports and 68,658 SSAMWR reports by SSN within both datasets. This SSN and pay period matching process produced 40,749 matched records which formed the basis of our analysis.

Comparison of PIE vs. SSAMWR

The following section includes descriptions of the categories used to compare the gross earnings and dates in the PIE and SSAMWR.

Category	Category Description of PIE and SSAMWR Matches
1	All dates match, gross earnings match
2	All dates match, gross earnings match net earnings
3	Two out of three dates match, gross earnings match
4	Two out of three dates match, gross earnings match net earnings
5	Dates match, earnings do not match

Comparison Results

The matching of PIE data and SSAMWR data produced the following counts and percentages by description categories:

Category	Description	Count	Percentage*
1	All dates match, gross earnings match	32,773	80.43%
2	All dates match, SSAMWR net earnings match Equifax gross earnings	276	0.68%
3	2-out-of-3 dates match, gross earnings match	2,226	5.46%
4	2-out-of-3 dates match, SSAMWR net earnings match Equifax gross earnings	34	0.08%
5	Dates match but earnings do not match	5,440	13.35%

Total: 40,749 100.00%

* Percentages may not sum to 100% due to rounding.

² Pay period start date was used to match records from Equifax and SSAMWR to ensure we were evaluating duplicate periods of earnings. Pay period start date is a variable received in PIE and this study evaluates the accuracy of all data. However, as it pertains to SSDI and SSI benefit determinations, the pay period start date does not factor into the determination.

³ At least two-out-of-three date variables had to match to deem the paystub a duplicate in both PIE and SSAMWR.

Only cases in Category 1 are considered exact matches on both earnings and dates, representing 80.43 percent of the data. Categories 2 through 4 appear as partial matches, with category 2 partially matching on earnings at 0.68 percent. Categories 3 and 4 partially match on earnings and dates at 5.46 percent and 0.08 percent, respectively, and Category 5 appear to be complete mismatches on earnings.

Based on the predetermined criteria for determining PIE data's accuracy, Categories 2 through 5 (representing 7,976 cases) were deemed mismatches. An initial manual review of a small sample of these cases found the OCR images constructed from SSAMWR data contained errors.⁴ As a result, the data in Categories 2 through 5 required a larger scale manual review to confirm the accuracy of the initial matches.

Manual Analysis: Categories 2 through 5

We identified a 4 percent random sample of the 7,976 cases from Categories 2 through 5 and assigned them to 13 analysts within SSA's Operations component for manual review. The workgroup of analysts conducting the manual review were tasked with retrieving and reviewing the submitted paystub images for the following variables:

- Pay Period Start Date
- Pay Period End Date
- Wage Paid Date
- Gross Earnings Amount

The workgroup returned data for 341 paystub images, which we compared against the PIE data.

Result from Manual Review of Categories 2 through 5

The following section includes definitions of the categories used to compare the earnings on the PIE database to the earnings on paystub images.

We categorized the results of all manually reviewed cases in 6 categories in the following table.

⁴ An example of an error found in the SSAMWR OCR converted data is incomplete gross earnings totals due to tips or bonuses being unaccounted for. Wages in addition to regular hourly pay may create multiple lines of earnings on a paystub, which OCR sometimes overlooked and did not include in the gross earnings amount.

Manual Review Results

Category	Type	Amount	Percent*
1	All dates match, paystub gross earnings match Equifax gross earnings	264	77.4%
2	2-out-of-3 dates match, paystub gross earnings match Equifax gross earnings	38	11.1%
3	All dates match, paystub gross earnings do not match Equifax gross earnings	34	10.0%
4	2-out-of-3 dates match, paystub gross earnings do not match Equifax gross earnings	3	0.9%
5	Less than 2-out-of-3 dates match, paystub gross earnings match Equifax gross earnings	1	0.3%
6	Less than 2-out-of-3 dates match, paystub gross earnings do not match Equifax gross earnings	1	0.3%
<i>Total:</i>		341	100.0%

* Percentages may not sum to 100% due to rounding.

Using the same accuracy criteria as we did for our initial analysis, only Category 1, representing 77.4 percent of the randomly selected 341 manually reviewed cases, are exact matches. Despite Category 2 having nearly exact matches representing 11.1 percent of the manually reviewed cases, the cases in Categories 2 through 6 are not exact matches, and thus, do not fit the predetermined conditions for being contributors to the accuracy of the PIE data.

Manual review findings and implications

The 341 manually reviewed cases are a large enough random sample from the population of 7,976 original mismatch cases to produce reliable estimates for each category. Put simply, the findings from the manual review are a good estimate of what would be expected if the entire 7,976 cases were manually reviewed. As a result, the 77.4 percent exact matches from the manual review suggest that about 6,173 of the 7,976 mismatches from the SSAMWR image data are estimated to be exact matches to the PIE data.⁵

⁵ This component of the analysis is an estimate based on a sample from the universe of 7,976 cases and is subject to sampling error. The 95 percent confidence interval for this estimate has a lower bound of 73.0 percent and an upper bound of 81.8 percent.

Conclusion

We determined that the PIE data are accurate based on exact matches to the gross earnings reported to SSA through the SSA Mobile Wage Report application. An initial analysis of PIE, that compares imaged paystub data submitted via the SSAMWR application to PIE's gross earnings data, revealed that PIE data were 80 percent accurate with 20 percent of cases being mismatches. Upon further review of a significant sample of the 20 percent mismatched cases, 77.4 percent of the mismatches were due to image conversion mistakes and were actually exact matches to the PIE data. As a result, after correcting for the image conversion mistakes, the Payroll Information Exchange data is deemed 95.6 percent accurate on all variables.⁶

However, all variables evaluated for accuracy in this study are not equal regarding their impact on benefit determinations, for both programs. SSDI performs benefit determinations based on when wages are earned, making the pay period end date and gross earnings most important. SSI performs benefit determinations based on when wages are paid and therefore, pay date and gross earnings are of most value. Neither title relies solely on a pay period start date when determining eligibility to benefit payments. As such, when we remove the pay period start date as an evaluating factor for accuracy in this study, the accuracy rating improves to 97.1 percent. This rating is more representative of SSA's ability to perform accurate benefit determinations using PIE data.

⁶ This estimate is based, in part, on a sample from the universe of 7,976 cases and is subject to sampling error. The 95 percent confidence interval for this estimate has a lower bound of 94.7 percent and an upper bound of 96.5 percent.