

# Estimating the Change in Total Social Security Filers



BOISE STATE UNIVERSITY

Henry Johnson, Economics

## Using OLS to estimate the effect of financial data on social security filers

### INTRODUCTION

Many Americans rely on Social Security benefits for their retirement. Due to this, it's important for policymakers to have realistic expectations of the total amount of social security filers in order to better-allocate resources for the future.

Through using readily-available financial data on the Dow Jones Index, S&P 500, federal funds rate, the labor force participation rate of individuals at least 55 years old, and social security benefits, I estimate the number of social security filers in the United States.

### METHODOLOGY

The model I decided on was a linear regression model using the total number of social security filers as the dependent variable and regressors for the average amount paid by social security in real terms, a synthetic variable generated from the S&P 500 and the Dow Jones Index (DJI) in real terms, the federal funds rate, and the labor force participation rate for the population over 55 years old.

This model provided statistical significance for all the regressors and an R-squared of 63.85%, indicating that about 63% of the variation in the total number of social security filers is explained by the model.

### DATA ANALYSIS

Using python and the numpy and pandas libraries, I retrieved data via APIs and by directly downloading and cleaned the data to ensure that date formats were consistent. After cleaning each of the datasets, I created synthetic variables such as real instead of nominal values, monthly changes in total and rates, and binary variables indicating the direction of the change.

I merged all the data into one dataset, which resulted in 347 observations, and exported the tabular data as an excel file. Then I conducted linear regressions and statistical tests in Stata to validate that the relationships between the data points and the total number of social security were statistically significant and the model appropriately represented the relationships.

When I included both the DJI and S&P 500 as independent regressors, the model had multicollinearity issues. This is likely due to how these variables affect one another. In order to reduce the multicollinearity issue, I transformed the datapoints into a new datapoint and used that synthetic variable that captures changes in both the S&P 500 and the DJI.

After including the average amount paid out for social security, the sign on the coefficient for the S&P 500, DJI, and the synthetic variable all became negative. This is the result of the greater economic impact the average amount paid in benefits has on the decision to retire than the S&P 500 or DJI.

### CONCLUSION

Policymakers could use linear regressions to evaluate the changes in the number of people who file for social security. Each of the models demonstrated that the S&P 500 or Dow Jones Index was statistically significant in estimating the effect of the financial market on the number of social security filers.

This research demonstrates that we can predict the effect of changes in financial markets on social security—though I remain skeptical as to the magnitudes of these effects, I feel confident that with these datapoints, policymakers can estimate the change in the total number of social security filers.

```
. reg ssa_total_number ssa_average_amount_r sqrt_gspc_x_dji federal_funds_rate lfpr, r
```

ssa_total_number	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
ssa_average_amount_r	582.2413	65.56898	8.88	0.000	453.2721 711.2106
sqrt_gspc_x_dji	-27.00238	3.494136	-7.73	0.000	-33.87509 -20.12968
federal_funds_rate	8228.676	2370.645	3.47	0.001	3565.796 12891.56
lfpr	8386.378	1110.611	7.55	0.000	6201.89 10570.87
_cons	-436444.2	66931.05	-6.52	0.000	-568892.5 -304795.9

### DATA SOURCES

- Federal Reserve Bank of St. Louis (FRED)
  - Consumer price index, federal funds rate
- Social Security Administration
  - Total number of filers, average benefits paid
- Bureau of Labor Statistics
  - Labor force participation rate for 55+
- Yahoo Finance
  - Dow Jones Index, S&P 500

