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Inefficiency in Social Security Trust Funds Forecasts

Abstract

We examine forecast accuracy and efficiency of the Social Security Administration's projections for *cost rate*, *trust fund balance, trust fund ratio* made during 1980-2020 with horizons up to 95 years. We find that the reported deterioration in the accuracy of the forecasts during 2010's has reversed. The level of informational inefficiency was pervasive during 1990-2009, although it shows signs of improvement after 2010.

JEL-Codes: C530, E370, E660, H550, H680.

Keywords: social security trust funds, long-range solvency forecasts, Nordhaus test, forecast efficiency, fixed-event forecast revisions.

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1. Introduction

According to the Annual Report of the U. S. Board of Trustees (2021), the Social Security Old-Age and Survivors Insurance (OASI) Trust Fund, which pays benefits to 55.2 million retired workers and their survivors, will run short of money in 2034. As emphasized by Congressional Budget Office (2021), such dire forecasts call for a number of funereal policy options by the Congress including reduction of benefits by 22% and increase in payroll taxes for 157 million American workers. However, for these preemptive policy changes to be least disruptive, the forecasts for Trust Funds solvency should be trustworthy. Unfortunately, very little analysis of the Social Security Administration (SSA) forecasts has ever been conducted. The sole exception is Kashin et al. (2015) who found that the forecasts for up to 10-year horizons were roughly unbiased during 1980-2000, but since then they have become increasingly biased, leading policy makers in thinking that the financial health of the OASI program was better than the reality.

Since the decisions on the long run viability of the OASI trust funds is based on forecasts for 75-year actuarial balance, in this paper we analyze all forecasts reported annually during 1980 to 2020 with targets going as far as 2095. As Kashin et al. (2015) noted, currently no evidence exists on the accuracy of forecasts of all horizons. However, since the actual outturns of the long-range forecasts won't be known for many years in the future, the bellwether approach of studying forecasting errors will not work in this situation. We follow Nordhaus (1987) to examine the information efficiency of these forecasts by testing the martingale property of the forecast revisions that directly contributes to forecast accuracy. To be informationally efficient, fixed-event forecasts should have revisions that are independent of their own past values. Since this can be tested without using the actual values, we are able to evaluate short-term and as well as long-term forecasts comprehensively long before they are materialized.

We find that the over-optimistic trust fund forecasts during the 2010's, which was the main concern of Kashin et al. (2015), has reversed after 2010. However, in terms of forecast efficiency of near-term and long-term forecasts, we find overwhelming evidence that SSA forecasts do not incorporate the latest available information efficiently, even though during 2010-2019 the degree of inefficiency has declined.

2. Data

We examine three specific variables that best capture the funds' overall health: the *cost rate*, the *trust fund balance,* and the *trust fund ratio*. The cost rate measures the overall annual cost of the Social Security program, while the trust fund balance is the difference between the projected income and the cost of the funds for that year. Both the cost rate and the trust fund balance are reported as a percentage of the taxable payroll on an annual basis. The short-range adequacy of OASDI trust funds is judged by the so-called trust fund ratio that compares the fund asset reserves at the start of a year to projected costs in the ensuing year. When the trust fund ratio goes down to zero and not expected to be positive within 5 years, which is currently forecast to happen in 2034, the funds are depleted and indicates funds short-range insolvency.

Our main data set uses the "intermediate scenario" forecasts from the Trustees Reports from 1980 to 2020.[1] In each annual report, the actual values up to the previous year are included, as well as forecasts for the current and subsequent years. We compute forecast error as forecast minus actual, so that a positive (negative) error means over (under)-forecasting the outturn.

[1] In earlier years, forecasts were reported for every fifth year beyond the tenth. Since 2001, forecasts for every year are reported in the *Supplemental Single-Year Tables*, from which we collect our data. The actual values are subject to revisions, so are the forecasts. Wherever we use the actuals, we use the first vintage, i.e., the initial release. The longest forecast horizon changes from year to year. For example, in the reports from 2007 to 2011, forecasts were reported up to 2085. In 2012 to 2016, forecasts were reported until 2090, and subsequently 2095.

3. Empirical results

We start with an examination of the forecast errors. Figure 1 shows the errors (as a percentage of the actual value) by horizon and report year, i.e., the year when the forecast was reported. The smoothed line is estimated using the locally weighted scatterplot smoothing (LOESS) procedure as in Kashin et al. (2015).[2] As the authors correctly noted, the accuracy of these forecasts clearly deteriorated since 2000. However, as Figure 1 with additional data points shows, this trend largely reversed since around 2005 and trended steadily in the opposite direction. Over the whole sample period, the forecast errors are positively autocorrelated and seem to move in cycles of 10 years with increasing amplitude.

We now apply the Nordhaus (1987) forecast efficiency test to examine if the forecasts (and the models and data that generate them) incorporated all available information in real time. Since in each year during 1980-2020, the Trustees Reports include forecasts for the three variables for a number of horizons, by using two consecutive annual reports we can estimate the forecast revisions for same target years. We regress forecast revisions for the same target on its own lagged values from one-year ago and test for the statistical significance of the lagged dependent variable. Since forecast revisions should only reflect information not known at the time of the initial forecast, a positively predictable forecast revision implies partial use of available information, i.e., forecast inefficiency.[3]

We run the regressions using forecasts pooled across multiple target years. Since the regressions do not require the actual values, we consider forecasts with horizons up to 76 years without losing

[2] These plots are directly comparable to their Figures 5 to 7. The smoothed lines do not match exactly due to the expanded sample used for estimation.
[3] The Nordhaus test has been used successfully in many contexts, but it's appropriateness in testing the efficiency of very long-range forecasts whose outturns are unavailable for many years to come is less appreciated.

sample observations. The estimated coefficients and the associated p-values are reported in five panels of Table 1 grouped by forecast horizons.[4] For instance, in panel 1, we report test results using up to 10-year ahead forecasts, and in panel 5 we report results using all available forecasts that include horizons as far out as target year 2095. The forecasts from the 1980s are found to be efficient in all panels, while forecasts made in later years are generally not. Forecasts made during 1990-1999 and 2000-2009 are much less efficient (with the coefficient around 0.6 to 0.8) than those reported during 2010-2019.

The efficiency results with the long-range forecasts for cost rate made during 2000-2009 and 2010-2019 (see panels 2 – 5 of Table 1) show steady reductions in inefficiency compared with results in panel 1 that uses only near-term forecasts up to 10 years. The trust fund balance forecasts from 2010-2019 now suggest efficiency in all panels 2-5. For trust fund ratio, the coefficient estimates did not decline as much, and were statistically significant in all panels.

In order to understand the results using long-range forecasts, we examined the dynamics of forecasts and their revisions during 1980-2020 for all target years up to 2095. These plots are presented in Figure 2. [5] Forecasts for horizons up to 30 years (3 panels on row 1, Fig. 2) seem quite different from the rest of the plots on the last two rows that depict 40- to 80-year ahead forecasts. In the latter set of plots, the time profile of forecasts made during 2000-2020 were little affected by the forecast horizons of the target years 2050 to 2080. Most remarkably, the forecast revisions made during 2010-19 for these long-range targets seem small and random, independent of the target years.[6] At such long horizons, forecasters are uncertain about how much to revise

[4] We also examined cluster (by target year or horizon) standard errors and they displayed the same patterns of statistical significance.
[5] Note that unpredictable forecast revisions imply that fixed-target forecasts should look like a random walk - revisions should be spiky and not smooth, cf. Nordhaus (1987).
[6] The negative spike of 2020 for all target years 2030 and beyond are surely related to the COVID-19 pandemic and the sharp recession that followed.

because of possibly offsetting news in the future, and thus decide to stick to their original prior beliefs except for random adjustments. It is well known that in these cases the Nordhaus test coefficient can be zero or often negative suggesting efficiency or overreaction to news.[7] Thus, by adding the long run forecast revisions, the overall estimates of inefficiency are inadvertently diluted. In order to avoid this underestimation, we should not use the long-range forecasts beyond 40 years in the current context. These forecasts do not seem to have any redeeming value.

4. Concluding remarks

Trust fund forecasts generated during 1990-2009 exhibited signs of forecast smoothing, i.e., slow and gradual revisions that are positively autocorrelated, and predictable. The forecast errors are found to be highly autocorrelated with long strings of positive errors followed by a similar string of negative errors. However, since 2010 these forecasts have become close to being efficient.

References

Clements, M. P. (1997). Evaluating the Rationality of Fixed-event Forecasts, Journal of Forecasting, 16 (4), 225-239.

Congressional Budget Office (2021). Social Security's Funding Shortfall, In Focus. September 3.

Ericsson, N. R. (2017). How biased are U.S. government forecasts of the federal debt? *International Journal of Forecasting*, 33(2), 543-559.

[7] These Clements (1999) and Lahiri and Sheng (2007) have analyzed these possibilities.

Kashin, K., King, G., & Soneji, S. (2015a). Systematic Bias and Nontransparency in US Social Security Administration Forecasts. *Journal of Economic Perspectives*, 29 (2), 239-258.

Lahiri, K., and Sheng, X. (2007). Evolution of Forecast Disagreement in a Bayesian Learning Model", *Journal of Econometrics*, 144, 2008, 325-340.

Nordhaus, W. D. (1987). Forecasting Efficiency: Concepts and Applications. *The Review of Economics and Statistics*, 69(4), 667-674.

Social Security and Medicare Board of Trustees (2021). Status of the Social Security and Medicare Programs: A summary of the 2021 Annual Reports. Washington, D.C.

Table 1. Nordhaus test of forecast efficiency with heteroskedasticity robust standard errors

Report Year	Cost Rate			Trust Fund Balance			Trust Fund Ratio		
	Coeff.	p-value	N	Coeff.	p-value	N	Coeff.	p-value	N
Panel 1	Using up to 10 forecasts								
1980 to 1989	0.03	0.526	75	0.051	0.483	75	0.091	0.253	75
1990 to 1999	0.684	0	82	0.709	0	84	0.452	0	84
2000 to 2009	0.812	0	95	0.828	0	96	0.55	0	96
2010 to 2019	0.297	0.001	100	0.404	0	100	0.392	0	100
Panel 2	Using up to 20 forecasts								
1980 to 1989	-0.015	0.753	115	0.001	0.981	123	0.045	0.437	123
1990 to 1999	0.684	0	82	0.687	0	104	0.52	0	104
2000 to 2009	0.742	0	165	0.752	0	170	0.553	0	170
2010 to 2019	-0.051	0.425	200	0.042	0.54	200	0.255	0	188
Panel 3	Using up to 40 forecasts								
1980 to 1989	-0.019	0.693	128	-0.017	0.773	152	0.019	0.734	151
1990 to 1999	0.684	0	82	0.601	0	111	0.488	0	111
2000 to 2009	0.404	0	305	0.489	0	310	0.518	0	272
2010 to 2019	-0.181	0	400	-0.091	0.62	400	0.109	0.036	205
Panel 4	Using up to 60 annual forecasts								
1980 to 1989	-0.019	0.693	128	-0.017	0.773	152	0.019	0.734	151
1990 to 1999	0.684	0	82	0.601	0	111	0.488	0	111
2000 to 2009	0.171	0.001	445	0.196	0	450	0.518	0	272
2010 to 2019	-0.121	0.002	600	-0.021	0.6	600	0.109	0.036	205
Panel 5	Using all available forecasts								
1980 to 1989	-0.019	0.693	128	-0.017	0.773	152	0.019	0.734	151
1990 to 1999	0.684	0	82	0.601	0	111	0.488	0	111
2000 to 2009	0.076	0.09	550	0.092	0.042	555	0.518	0	272
2010 to 2019	-0.086	0.016	751	0.02	0.58	751	0.109	0.036	205

The coeff. is the estimated coefficient of lagged forecast revision. A constant term is included in the regression but omitted from the table. Under each sample, N is the maximum number of forecasts available in the Trustees Reports.

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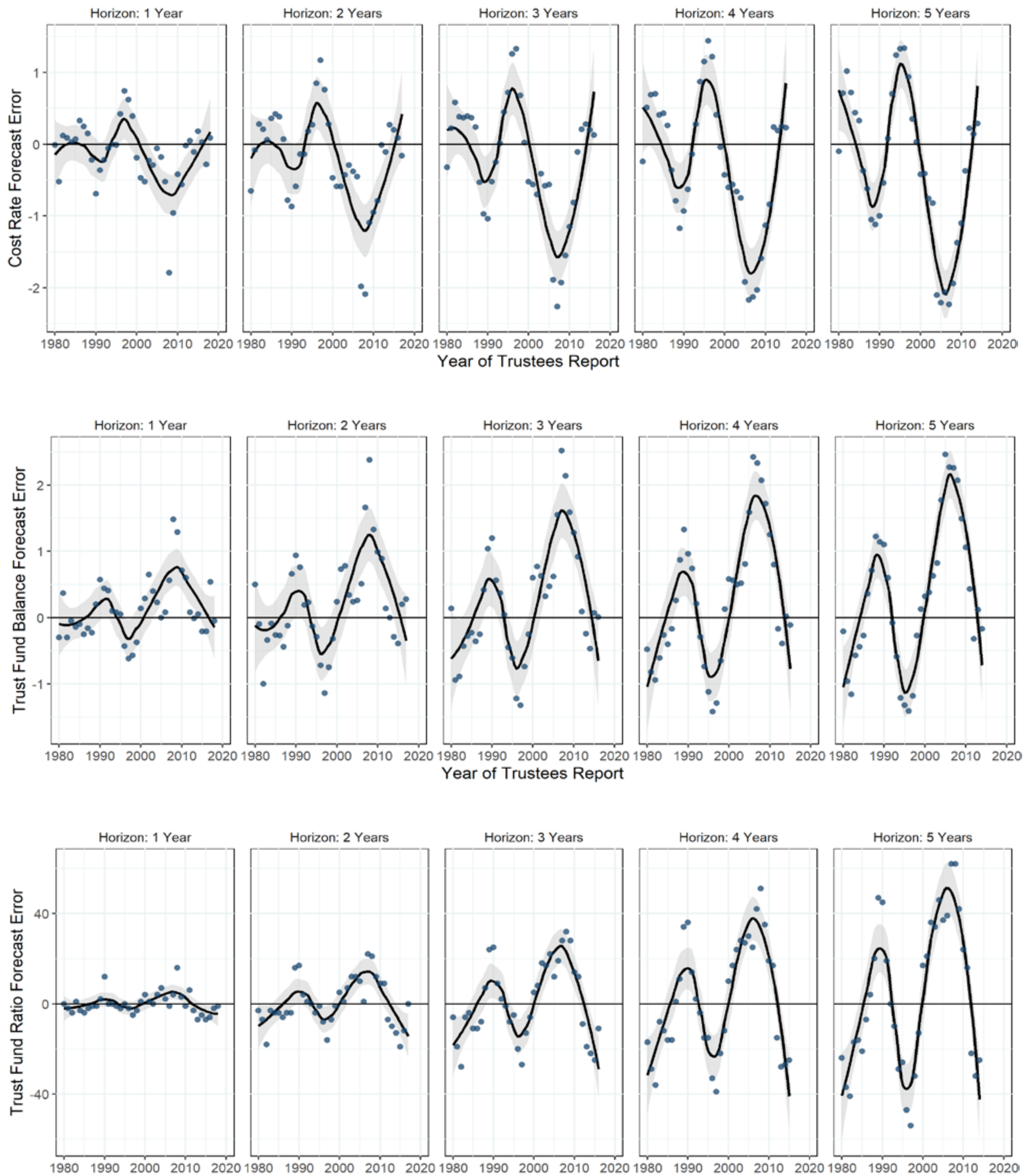
Figure 1. Forecast errors (Forecast – Actual) by horizon and report year (1980 to 2019)



This figure shows the forecast error (vertical axis) by report year (horizontal axis) and horizon (subplot). The smoothed line is estimated using the locally weighted scatterplot smoothing (LOESS) procedure as in Kashin et al. (2015), with half the data used in each regression. This figure is directly comparable to their Figures 5 to 7. From top row to bottom row: cost rate, trust fund balance, trust fund ratio.

Figure 2: Trust Fund Balance forecasts and forecast revisions including Long-range Targets