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The Personal Saving Rate: Data Revisions and Forecasts

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Abstract

Revisions to the U.S. personal saving rate are very large and may be predictable. We decompose the revisions of the personal saving rate into those caused by revisions to income and those caused by revisions to household outlays. We use our findings to explore the forecastability of future revisions of the personal saving rate.

Keywords: data revisions, saving, real-time data
JEL codes: E01, E21

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1. Introduction

The personal saving rate in the United States tends to be revised significantly. However, revisions to this variable have not been examined in much detail except by Nakamura and Stark (2005), Nakamura and Stark (2007), and Nakamura (2008). The authors use the personal saving rate and its revisions in several different contexts, with a focus on forecasting. They document that the personal saving rate is revised dramatically over time and suggest that its use in forecasting other variables is questionable. This unreliability of data on the personal saving rate might create significant issues for economists, policy-makers, and households. Improving our measures of the personal saving rate may yield substantial benefits to society, as Gokhale et al. (1996) and Ferguson (2004) suggest.

Our focus in this paper is on the nature and sources of the data revisions themselves, and whether an analyst might be able to forecast revisions to the personal saving rate. We begin by examining the data and illustrating the size of the revisions. Then we show how revisions to the personal saving rate can be broken down into revisions to income and to outlays. Finally, we investigate whether the revisions are forecastable.

2. Data

The Bureau of Economic Analysis (BEA) defines the personal saving rate (expressed as a percentage) at date t as

$$PSR_t = \frac{I_t - O_t}{I_t} \cdot 100 \tag{1}$$

where I_t is income at date t, defined as disposable personal income, and O_t is personal outlays (outlays, for short).

Data on PSR, I, and O are available from the Real-Time Data Set for Macroeconomists (RTDSM) at the Federal Reserve Bank of Philadephia.[1] We use quarterly vintages of the quarterly variables for these three variables. Additionally, we deflate income and outlays using the PCE price index, putting these variables in real terms. The variables are all seasonally adjusted at annual rates.

Figure 1 plots the personal saving rate from 1965Q3 to 2021Q2, both as it was initially reported (initial) and as it is reported in the data set of 2021Q3 (final). The personal saving rate is revised substantially from its value when it is first released to the final value. Indeed, in some cases, the revision is much larger than the initial release.

[1] www.philadelphiafed.org/surveys-and-data/real-time-data-research/real-time-data-set-for-macroeconomists

Figure 1: Personal Saving Rate Initial versus Final

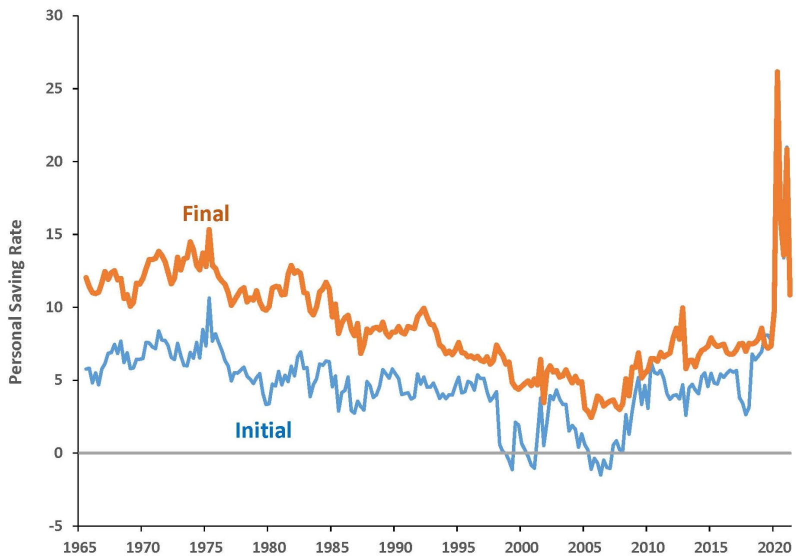
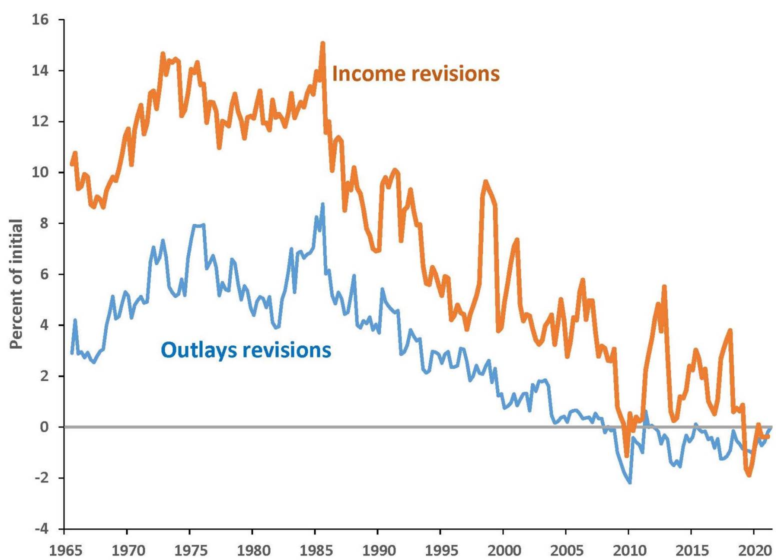


Figure 2: Revisions to Income and Outlays as a Percentage of Initial Release



To determine why the personal saving rate is revised so much, we investigate revisions to income and to outlays. Both real income and real outlays are revised up substantially, especially from 1965 to 2003 for outlays and 1965 to 2010 for income, as Figure 2 shows. However, the percentage upward revision to real income is substantially larger than the percentage upward revision to real outlays, suggesting that income revisions likely play a more important role than outlay revisions in affecting the personal saving rate.

Standard news, noise, and bias statistics for the three variables are shown in Table 1. The noise test regresses the revision of a variable from initial to final on a constant and the final value, testing the null hypothesis that both coefficients are zero, using HAC standard errors.[2] The news test regresses the revision of a variable on a constant and the initial value, testing the null hypothesis that both coefficients are zero, using HAC standard errors. The bias test regresses the revision on just a constant. As Figures 1 and 2 suggest, the bias is likely to be significant, which Table 1 confirms; in addition, the bias to income is over twice the size as that for outlays. For the news and noise tests, both hypotheses are rejected for all three variables, so revisions to the variables are neither pure news nor pure noise, as described in Jacobs and van Norden (2011).

Table 1: News, Noise, and Bias Tests of Revisions

Measure	Noise			News			Bias
	constant	final value	test	constant	initial value	test	constant
PSR	0.00779	0.380	[0.00]	0.0387	0.0329	[0.00]	0.0401
	(0.00718)	(0.0683)		(0.00412)	(0.106)		(0.00297)
O	0.0299	0.0155	[0.00]	0.0304	0.0156	[0.00]	0.0283
	(0.00223)	(0.00155)		(0.00228)	(0.00159)		(0.00514)
I	0.0718	0.0248	[0.00]	0.0736	0.0253	[0.00]	0.0715
	(0.00314)	(0.00213)		(0.00323)	(0.00222)		(0.00809)

Table 1 notes: Sample: 1965Q3 to 2019Q4 (end date chosen to allow time for revisions to occur); Newey–West HAC standard errors in parentheses; p-values of Wald (F) tests between square brackets.

To illustrate the contributions of revisions to income and outlays, we create counterfactual graphs of the personal saving rate. First, we calculate a counterfactual personal saving rate, using final outlays with rescaled initial income. We plot that counterfactual personal saving rate against both the initial personal saving rate and the final revised version in Figure 3. Second, we calculate a counterfactual personal saving rate, using final income with rescaled initial outlays, shown in Figure 4.

Using final outlays with initial income shows a lower PSR than for either initial or final, thus going the wrong way. Using final income with initial outlays shows a higher PSR than for either initial or final, thus going too far. Therefore, both income revisions and outlays revisions matter, in opposite directions, but income revisions likely dominate. To investigate this further, in the next section we modify the statistics developed by Jacobs and van Norden (2016) and call them the JvN statistics. Jacobs and van Norden note that if we calculate the overall noise-signal ratio (where noise means revisions, and signal

[2] For more details, see Jacobs and van Norden (2016).

Figure 3: Counterfactual Personal Saving Rate with Final Outlays and Initial Income

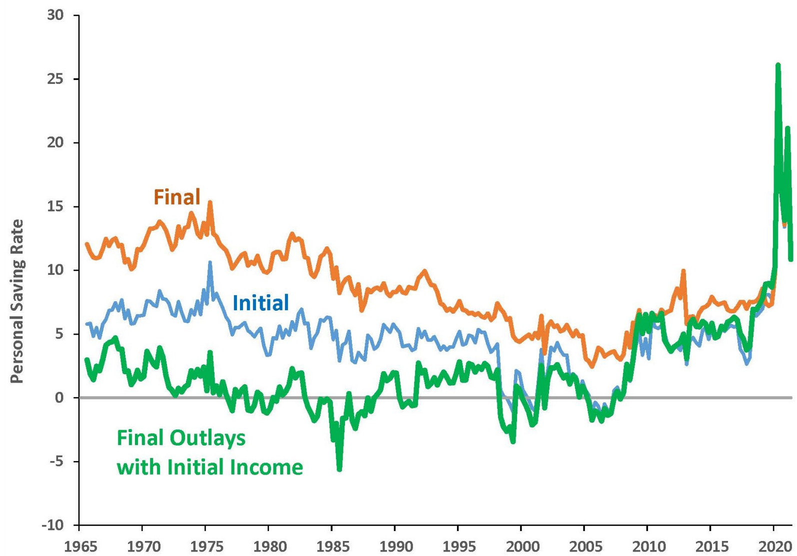
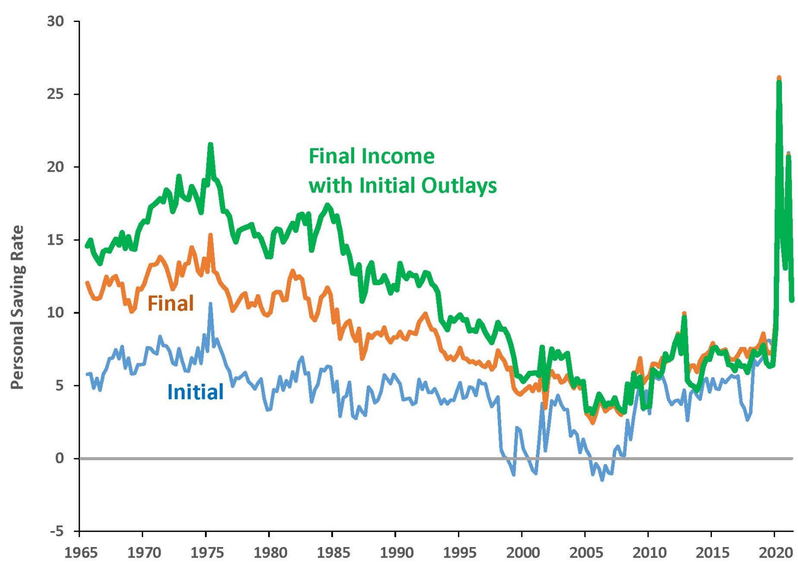


Figure 4: Counterfactual Personal Saving Rate with Final Income and Initial Outlays



means variance, as measured using the latest vintage) of one variable, we can decompose it into the contribution of its two component variables. We modify their statistics to allow for removal of the trend in the income and outlays series (see the working-paper version of Croushore and Santos (2022) for details).

Why are income revisions so important in determining the personal saving rate? According to the BEA, personal interest received is often revised upward, which could explain a significant portion of the revisions to income. Investigating this in greater detail is a topic for future research.

3. JvN Statistics

To generate the statistics developed by Jacobs and van Norden (2016), we calculate $ln(1 - PSR)$, $ln(OUTL)$, and $ln(DPI)$, where PSR is the personal saving rate, $OUTL$ is real outlays, and DPI is real personal income. Define PSR_{JvN} as $ln(1-PSR)$. De-trend outlays and income, which both have a long-term growth rate of 3% per year, to create variables $OUTL_{JvN}$ and DPI_{JvN}.

Next, we calculate the noise-to-signal ratios.

$$\text{Noise-to-signal ratio of outlays} = \frac{\text{Var}(\text{Revisions}_{OUTL_{JvN}})}{\text{Var}(OUTL_{JvN})}$$

$$\text{Noise-to-signal ratio of income} = \frac{\text{Var}(\text{Revisions}_{DPI_{JvN}})}{\text{Var}(DPI_{JvN})}$$

As in Jacobs and van Norden (2016), the noise-to-signal ratio of PSR_{JvN} equals

$$\frac{\text{Var}(\text{Revisions}_{OUTL_{JvN}})}{\text{Var}(PSR_{JvN})} + \frac{\text{Var}(\text{Revisions}_{DPI_{JvN}})}{\text{Var}(PSR_{JvN})} + \frac{\sum \text{Cross-Product of Revisions}}{\text{Var}(PSR_{JvN})}$$

Intuitively, the first two terms represent the direct contribution of $OUTL_{JvN}$ or DPI_{JvN} revisions (respectively) to PSR_{JvN} revisions, while the third term represents the contribution of the interaction between $OUTL_{JvN}$ and DPI_{JvN} revisions to PSR_{JvN} revisions.

Over the full sample, PSR_{JvN} has a noise-to-signal ratio of 2.19, income has a noise-to-signal ratio of 5.87, and outlays have a noise-to-signal ratio of 0.53. Our measure of the direct contribution of income revisions to PSR revisions is 6.75, significantly more than the corresponding metric for outlay revisions, 1.47. This is consistent with our hypothesis that income revisions are more significant than outlay revisions in driving revisions to the personal saving rate.

4. Forecast Improvement Exercises

Given what we have found so far, we proceed to test the bias in the personal saving rate with simulated real-time out-of-sample forecasting exercises, which we call "Forecast Improvement Exercises". In each of the forecasting exercises below, we use only data that an analyst would have had in real time to simulate whether it would have been possible to forecast revisions to the PSR.

Forecast Improvement Exercise Based on Bias in PSR

Table 2 shows $RMSFEs$ of two forecasts of the final value of PSR. "$RMSFE$ initial" uses the initial release of PSR as a forecast of the final value, implicitly assuming that the revisions to PSR are not forecastable. "$RMSFE$ bias" is based on a forecast using the average bias in the PSR over the previous ten years. We find an 18 percent reduction in $RMSFE$ by using the past bias to forecast revisions to the initial PSR. The DM row shows the p-value of the Diebold-Mariano test, showing a significant reduction in $RMSFE$ from using the past bias. Therefore, PSR revisions are forecastable.

Table 2: Out-of-Sample Results for Using Bias to Forecast Revisions, 1976Q1 to 2016Q4

$RMSFE$ initial	4.11
$RMSFE$ bias	3.42
Percent difference	-17%
DM	0.00

Forecast Improvement Exercise Based on Bias in Income and Outlays

Now consider the same type of exercise, but suppose we forecast revisions to income and outlays first, then use those forecasts to estimate the revised PSR. Results are shown in Table 3.

Table 3: OOS Results Based on Income and Outlay Revisions, 1976Q1 to 2016Q4

$RMSFE$ initial	4.11
$RMSFE$ using I & O	4.16
Difference	+1%
DM	0.30

In this case, using bias in the income and outlays series to forecast the revision to PSR fails to reduce the $RMSFE$, though the differences are not statistically significant.

5. Conclusions

In this paper, we have shown that data on the personal saving rate, disposable personal income, and personal outlays all tend to be revised upward. The bias in the initial estimates of the personal saving rate is so strong that we can use the average of past revisions to forecast future revisions. Both income and outlays also tend to be revised up over time, but we are not able to use forecasts of those revisions to forecast revisions to the personal saving rate.

These results have implications for current policy analysis and future research. Policymakers may place too much emphasis on the signal coming from recent data on the personal saving rate but they need to understand that the data are likely to be revised in the future. Researchers may find these results of interest and may wish to explore the broader implications of revisions to the personal saving rate. For example, if initial releases of personal income are consistently biased down, then why is gross domestic income, of which personal income is the main component, considered to be useful in estimating revisions to GDP, as in Nalewaik (2010)?

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