Presidential Vote Predictions Using Stochastic Simulation and Estimated Probability of a Recession Before the Election: 0.045

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January 30, 2020

Presidential Vote Predictions and Estimated Standard Errors

The latest version of my presidential vote equation is discussed in Fair (2018b). The website is *fairmodel.econ.yale.edu/vote2020/index2.htm*. The equation that is used to predict the 2020 presidential election is

$$VP = 45.60 - .673G + .721P - 0.792Z$$

where VP is the Democratic share of the two-party presidential vote in 2020, G is the growth rate of real per capita GDP in the first 3 quarters of 2020 (annual rate), P is the growth rate of the GDP deflator in the first 15 quarters of the Trump administration, 2017:1–2020:3, (annual rate), and Z is the number of quarters in the first 15 quarters of the Trump administration in which the growth rate of real per capita GDP is greater than 3.2 percent at an annual rate. Z will be called the "good news" variable.

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The latest prediction of VP on my website uses predictions of G, P, and Z from my US economic model dated January 30, 2020. The predictions are 2.2, 2.0, and 0 respectively. The predictions for P and Z use actual values as well as predicted values. For P the actual values of the GDP deflator are known through 2019:4, and these values are used along with the predicted values for 2020:1–2020:3 to get the predicted value of P. For Z none of the three predicted quarters has a per capita growth rate greater than 3.2 percent. Also, no quarter between 2017:1 and 2019:4 has this, so the predicted value used for Z is 0. Using these three economic values, the predicted value of VP is 45.56. The estimated standard error of the vote equation adjusted for degrees of freedom is 2.95. So conditional on the three economic predictions, this is the estimated standard error of the vote prediction.

Ten ex ante vote predictions of VP have been made by me, the first one for the 1980 election. The ex ante errors are presented in Table 5 in Fair (2018b). The mean of these ten errors (actual minus predicted) is 2.64, and the root mean squared error (RMSE), not adjusted for degrees of freedom, is 4.15. The equation has thus on average underpredicted the Democratic share of the two-party vote by 2.64 percentage points for the ten elections. If one uses this mean as the error in the vote equation (rather than zero, which is by construction the mean of the 26 ex post errors), the prediction of VP is 48.20. The estimated standard error of this prediction is 4.15 if one uses the ex ante RMSE.

The above analysis is conditional on the specific predictions of G, P, and Z. These predictions are based on setting the error terms in the US model to zero and solving the model. There is, however, uncertainty in these predictions. This uncertainty can be estimated using stochastic simulation, and it can be incorporated into the uncertainty of the vote prediction. This is done as follows.[1]

[1]The US model is discussed in Fair (2018a): Macroeconometric Modeling: 2018—abbreviated MM. I have put most of my macro research, including the empirical results, in MM. It includes chapters on methodology, econometric techniques, numerical procedures, theory, empirical specifications, testing, and results. The results in my previous papers have been updated through 2017 data, which provides a way of examining the sensitivity of the original results to the use of additional data. Stochastic simulation is one of the techniques discussed in MM—Section 2.6.

There are 25 stochastic equations in the US model, estimated by two-stage least squares over the 1954:1–2019:4 period—264 quarterly observations. In addition, for the present exercise three extra equations were estimated for three exogenous variables, exports (EX), the price of imports (PIM), and the ratio of housing prices to an aggregate price deflator ($PSI14$). For each variable X, $\log(X/X_{-1})$ was regressed on a constant term for the 1954:1–2019:3 period. This then gives 28 equations in the model. From the estimated residuals, there are 264 28-dimensional vectors of residuals, which are used for the error draws.

The stochastic simulation is as follows. The simulation was off the base forecast made on January 30, 2020.[2] It was for the three-quarter period, 2020:1–2020:3. The model was solved 100,000 times for these three quarters. For each solution, three 28-dimensional vectors were drawn with replacement from the 264 vectors. Given these errors, the US model was solved. Each solution gives values of G, P, and Z, which were then used to get a predicted value of VP using the above equation.[3] There were thus 100,000 predictions of VP, from which a mean and standard deviation can be computed.

Given the linearity of the VP equation, the mean prediction of VP can also be computed using the means of the 100,000 predictions of G, P, and Z. These means are 2.2568, 2.0234, and 1.4244 respectively. These means compare to the predicted values from the deterministic simulation of the US model of 2.2, 2.0, and 0 respectively. The differences for G and P are small, but the mean for Z is noticeably larger from the stochastic simulation. This is because Z, the good news variable, is asymmetric. Draws that result in a strong economy can lead to good news quarters, whereas draws that result in a weak economy don't affect it. As noted above, for

[2]The "actual" data for 2020:1–2020:3 are the forecast (predicted) data, so the errors (actual minus predicted) in the 25 equations are zero for this period. This is not true for the three added equations because the three equations were not used for the forecast. Values of EX, PIM, and $PSI14$ were chosen ahead of time. Therefore, before the stochastic simulation, errors were added to the three equations to have the predicted values from the equations equal the chosen values. These errors were then taken to be exogenous, and the error draws were on top of these errors.

[3]Remember that some actual values are used in the predictions of P and Z.

the base path there were no good news quarters. For the stochastic simulation there were on average 1.4244 good news quarters out of the three. (Remember that there are no known quarters that are good news quarter.) Since Z has a negative effect on VP (good news is good for the Republicans), the predicted value of VP is smaller using the stochastic simulation economic means. The prediction is 44.41 compared to 45.56 using the deterministic economic predictions.

The 100,000 predictions of VP are needed to get the standard deviation of the VP predictions, which is 1.73. This uncertainty is solely from the uncertainty of the economic predictions from the US model. It was noted above that the ex post standard error of the VP equation is 2.95. The error in the VP equation is independent of the errors in the US model, and so the total standard error is just the square root of the sum of 1.73 squared and 2.95 squared, which is 3.42. So the mean is 44.41 with an estimated standard error of 3.42.

Using the ex ante RMSE of 4.15 and the standard error of 1.73 from the economic predictions, the total standard error is 4.50. If the mean of the ex ante errors of 2.64 is added to 44.41, this gives a mean prediction of VP of 47.05. So in this case the mean is 47.05 with an estimated standard error of 4.50.

To summarize:

1. Deterministic economic predictions, assuming no uncertainty in the VP equation:
   $\hat{VP}$ = 45.56, SE = 0.00.

2. Deterministic economic predictions, using the ex post standard error in the VP equation:
   $\hat{VP}$ = 45.56, SE = 2.95.

3. Deterministic economic predictions, using the ex ante mean error of the ten VP predictions and the ex ante RMSE:
   $\hat{VP}$ = 48.20, SE = 4.15.

4. Stochastic economic predictions, assuming no uncertainty in the VP equation:
   $\hat{VP}$ = 44.41, SE = 1.73.

5. Stochastic economic predictions, using the ex post standard error in the VP equation:
   $\hat{VP}$ = 44.41, SE = 3.42.

6. Stochastic economic predictions, using the ex ante mean error of the ten VP predictions and the ex ante RMSE:
   $\hat{VP}$ = 47.05, SE = 4.50.

For cases 3 and 6 the predicted value of VP is within one standard error of 50 percent.

Regarding the stochastic simulation, it has the advantage that no probability distributions have to be estimated. The draws are from the estimated historical errors. If future shocks are like past shocks, this is appropriate. Because of the three added equations, the probability estimate includes the historic variability of exports, the price of imports, and housing prices. It also includes the historic variability of stock prices. There is an equation in the model explaining the change in stock prices—equation 25—but this equation explains very little of the change, and it is more or less an equation with just a constant term, like the three added equations. The estimated probability thus takes into account the historic variability of the change in asset prices, both financial and housing. The estimated probability does not, however, include the variability of any other exogenous variables, like exogenous government spending and tax rate variables. Also, errors were not drawn from the estimated interest rate rule of the Fed. The estimated rule is included in the simulations, so the Fed is responding to the shocks, but error terms are not drawn from this equation. The Fed is not stochastic in this sense.

Estimated Probability of a Recession Before the Election: 0.045

The 100,000 simulations from the US model can be used to estimate the probability of a recession between now (2020:1) and the last quarter before the election (2020:3). A recession is defined as two consecutive quarters of negative growth. The January 30, 2020, forecast, which is used as the base for the stochastic simulation, has annual growth rates of real GDP in the next three quarters of 3.5, 2.8, and 2.4, respectively. There is thus no recession forecast. Of the 100,000 simulations, 4,495 had at least two consecutive quarters of negative real GDP growth, so the estimated probability of a recession before the election is about 4.5 percent. This estimate is small because the base growth rates are not close to zero and there are only three possible quarters.

The estimated recession probability obviously depends on the base path used. Stock (2019) shows using linear VAR models with Gaussian errors the sensitivity of estimated recession probabilities to different base paths. The base path used here is somewhat more optimistic than the current consensus forcast.

References

[1] Fair, Ray C., 2018a, *Macroeconometric Modeling: 2018*, *fairmodel.econ.yale.edu/mmm2/mm2018.pdf*.

[2] Fair, Ray C., 2018b, "Presidential and Congressional Vote-Share Equations: November 2018 Update," *fairmodel.econ.yale.edu/rayfair/pdf/2018b.pdf*.

[3] Stock, James H., 2019, "The Business Cycle is Alive and Well," *Business Economics*, 79–84.