

Project 2

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Introduction:

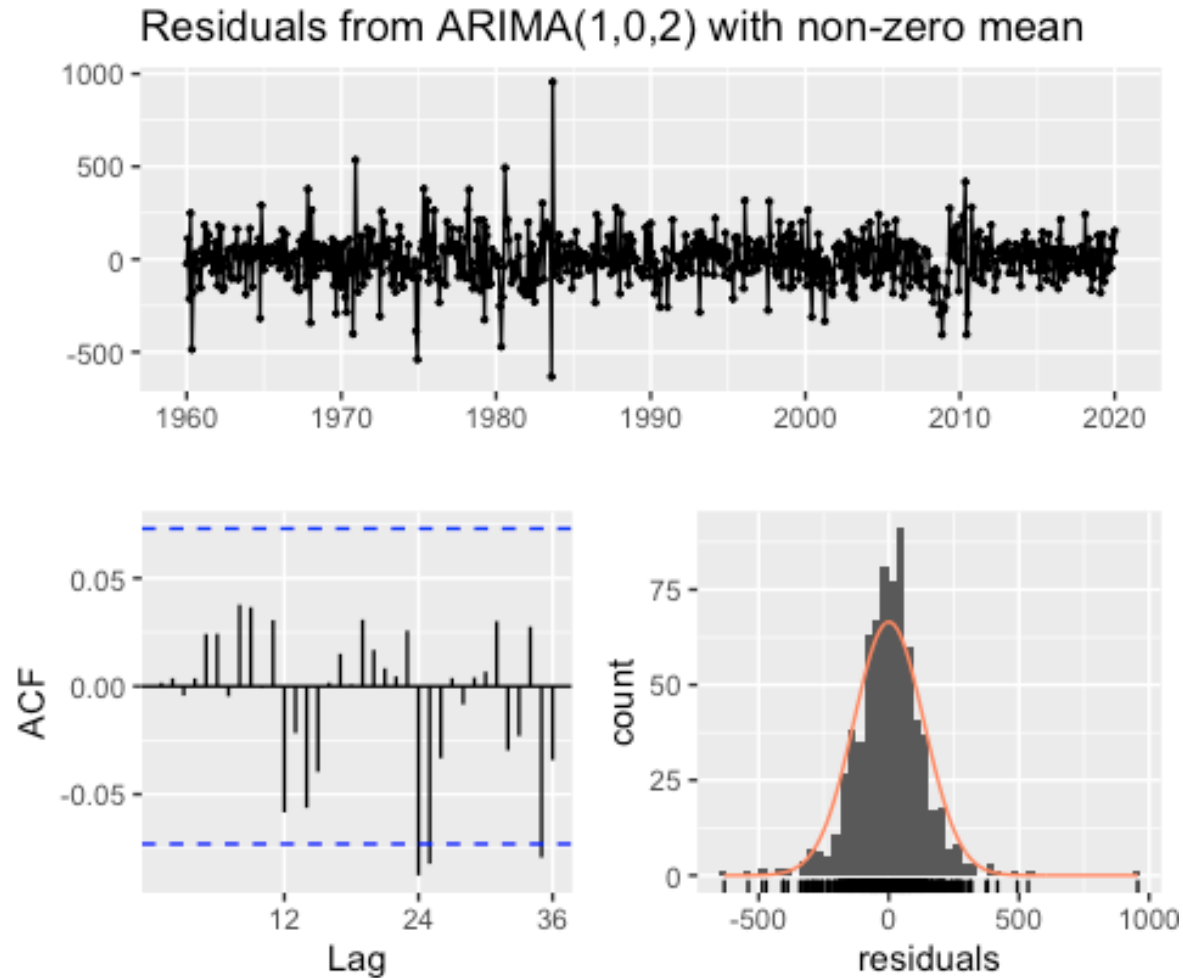
Since the onset of the pandemic in early 2020 and the dramatic initial drop in employment, the FED has pursued an accommodative policy in the hopes of encouraging business expansion, increasing job opportunities, and enticing people to re-enter the workforce. We have seen this policy work well in achieving these goals, and job growth has been exceptionally strong, especially in the last few months. A Wall Street Journal article published on February 4th announced that job growth had soared by 467,000 in January even as Omicron swept its way through the country. On top of that, the labor force participation rate rose to 62%, which is the highest it has been since the pandemic hit.

Chairman Powell, at the FOMC press conference on January 26, echoed this sentiment, announcing that strong job growth has given reason for the Committee to continue with accommodative policy, since they do not believe we have reached full levels of employment. On the other hand, higher than expected inflation, likely caused by the accommodative policy that has contributed to the strong job growth, has also given the Committee reason to consider increasing rates, but a timeline was not established, and for now the FED is keeping rates near the zero-bound. If job growth continues to persist, it is unlikely the FED will feel inclined to limit an expansionary phase of the economy by hiking rates. If job growth slows, the FED might take this as a sign that we have reached full levels of employment and start raising rates earlier than expected.

A 2016 economic research article from the Federal Reserve Bank of San Francisco found that the level of job growth needed to indicate full employment is dependent upon the labor force participation, so theoretically, if people continue to enter the workforce in the ensuing months, high levels of job growth could be sustainable for an extended period of time. That being said, when we reach full employment, the FED will restrict policy, and if intense job growth in the near term will result in us reaching full levels of employment sooner than anticipated, the FED will raise interest rates sooner as well. The goal of this memo is to predict job growth for the next 12 months. Knowing this will help inform us as to when interest rates will be raised.

Methods:

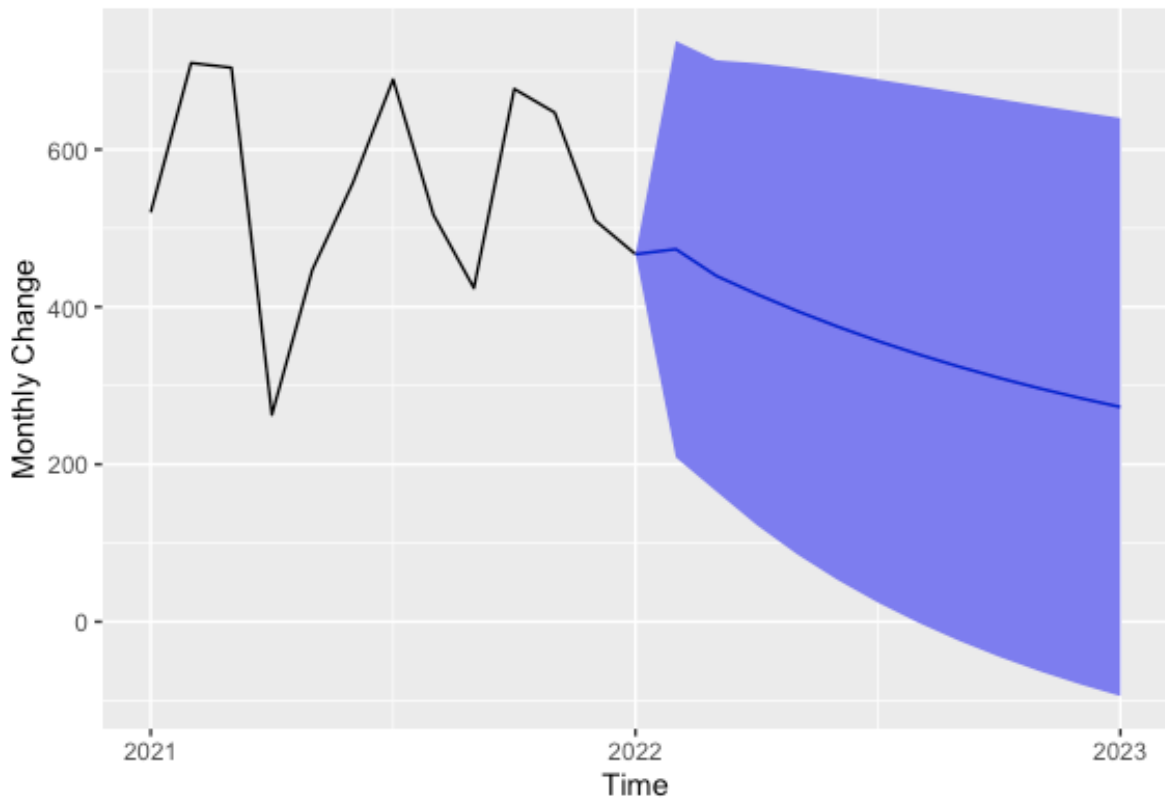
This forecast will rely upon the dataset "All Employees, Total Non-Farm", coded as "PAYEMS" on the FRED website. It is a seasonally adjusted measure of approximately 80% of all workers who contribute to the US GDP. Job growth was measured as the monthly change in jobs, or the current period minus the previous period. *All job growth numbers are in thousands of jobs.* The training data used to create the forecast was restricted to starting in 1960. This decision was based on the fact that 1960 was when women started entering the workforce in high numbers, changing the nature of job growth to be more rapid. The training data also had a restricted ending to the first quarter of 2020. This is because the loss of jobs during the pandemic was so severe that it would have skewed the forecast too dramatically to rationally interpret. In this way, pandemic data was treated as an outlier.



An ARMA (Auto-Regressive Moving Average) model with one Autoregressive and two moving average components was used to create the forecast. I chose this model because it had the lowest AIC and BIC, meaning it is the best model of all the ones I tested. An analysis of the residuals using the Ljung-box test revealed a p-value above .05, meaning autocorrelation was successfully extracted from the data. The residual graphs displayed above help confirm this, as the residual graph appears to look like white noise, the ACF graph is generally kept within the significance bounds, and the residuals appear to be close to normally distributed, although they still do not *perfectly* resemble white noise.

Results:

Monthly Job Growth Forecast



	Forecast	Lower (95%)	Upper (95%)
<i>Feb 2022</i>	473	209	738
<i>Mar 2022</i>	440	166	714
<i>Apr 2022</i>	416	123	710
<i>May 2022</i>	395	86	704
<i>Jun 2022</i>	375	53	697
<i>Jul 2022</i>	357	24	689
<i>Aug 2022</i>	340	-1	681
<i>Sep 2022</i>	324	-24	673
<i>Oct 2022</i>	310	-45	664
<i>Nov 2022</i>	296	-63	656
<i>Dec 2022</i>	284	-80	648
<i>Jan 2023</i>	273	-94	640

Employment levels are predicted to rise by about 4,283,000 jobs over the course of the next year, with a 95% chance that the real change in job growth falls in between 354,000 and 8,214,000. February job growth is predicted to be 473,370, with a 95% chance that the real

change in job growth will be between 208,757 and 738,001. The probability that job growth exceeds 300,000 in February is 90%.

Conclusion:

The general conclusion of this forecast is that job growth will be incredibly strong for the first few months of 2022 but will start tapering off over the course of the year. Based on the context described in the introduction of the memo, this would imply that the FED will start increasing interest rates, since they see indications that the economy is reaching full levels of employment.

This forecast has to be put into the context of the data that is being used to inform it, however. The job growth data that we used to train this model has FED policy built into it, meaning that we cannot separate the forecast from the actions of the FED. We might only be seeing a tapered forecast for job growth because in the past, the FED has combatted strong job growth with increases in interest rates. Therefore, our forecast might only be predicting decreased job growth because it expects the FED to increase rates. If the FED chooses not to increase rates, it is very likely we will continue to see strong job growth beyond where our forecast predicts.

This forecast should be interpreted as an indication of what levels of job growth have historically triggered the FED to increase rates. It is possible that history is not a good indication of the current situation, since the pandemic presents such a unique shock to the economy which is not represented in our data. However, if we believe history to be an indication of the present, we should expect the high job growth we are witnessing right now to trigger the FED to start raising rates in the near future.