

The Mechanics Behind Fed's Soft-Landing Policy:
A Fight Against Demand-Pull Inflation

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I. ABSTRACT

As of April 2022, inflation measured by the 12-month consumer price index (CPI) has increased by 8.3% from year earlier - slightly lower than the previous month's 40-year-high record (*Appendix: Graph 1*).

This rate of inflation, according to Federal Reserve Chair Jerome Powell, is "much too high", more than quadrupling the Fed's 2% price stability target. This paper first analyzes the excess demand-supply shortage dynamics behind the current inflation situation, then moves on to explain both realistically and hypothetically the motivation and mechanics behind the Fed's monetary policy tools in combating inflation. We found that inflation is mostly driven by demand, and the Federal Reserve, determined to reduce demand through raising interest rates, is facing great challenges in their efforts to engineer a "soft landing" - cooling inflation without triggering a recession or stalling economic growth.

I. INTRODUCTION

Background & Significance

Inflation, or the increase in prices of goods and services, has a corrosive effect on the purchasing power of the average American people. As long as it is positive, inflation is "priced" into every purchase we make, every dollar we earn. Earlier in February 2022, national hourly wages, after adjusted for inflation, fell 2.5% from year earlier, which marked the 11th straight monthly drop. There are "extraordinarily fast-paced increases in pricing in the basics of life, however household and individual incomes are not keeping pace with that", quoted Glenn Williams, Primerica CEO. But perhaps no one will feel the impact of inflation quite as strongly as 42.5 million Americans living below the poverty line, who don't have much access to financial markets or diverse options to preserve their money's value like the high-income population. Inflation is the most regressive tax, and these lower-earning people bear the brunt of skyrocketing living costs. Acknowledging the urgency of preventing inflation from getting entrenched in the economy, our paper addresses the following research questions:

1. What are the root causes and factors contributing to the current inflationary situation?
2. How is the Fed working to achieve a "soft landing" from high inflation - what measures are they taking; what are their visions, goals and expected challenges?

Data & Resources

We use mostly time series and panel data from FRED (Federal Reserve Economic Data) and BLS (Bureau of Labor Statistics). Our Port Statistics dataset is from Port of Los Angeles website. The main response variable is monthlyCPI, and predictors are divided into 3 main categories: Demand side (ecom_sales, real_GDP), Supply side (port_stats, hourly_wages), and Policy (fed_funds, m0_base, ue_rate). Full list and details of our variables can be found in *Appendix: Table 1*.

II. METHODOLOGY

Data Visualization

We started out with basic line plots to visualize trends over time. To compare different periods, we added shaded areas and text, making the plot informative and self-explanatory. Later, as we worked with more dimensional panel data, we created stacked bar plots colored by industry, overlaid with trendlines, bars intentionally placed close to each other to visualize trends. To accurately judge the contribution of each industry, we also transformed the y-axis to percent scale. As the final culmination of all our line and bar plots, we made a streamgraph which simultaneously showcases overall time trends and the share of each category.

Statistical Method

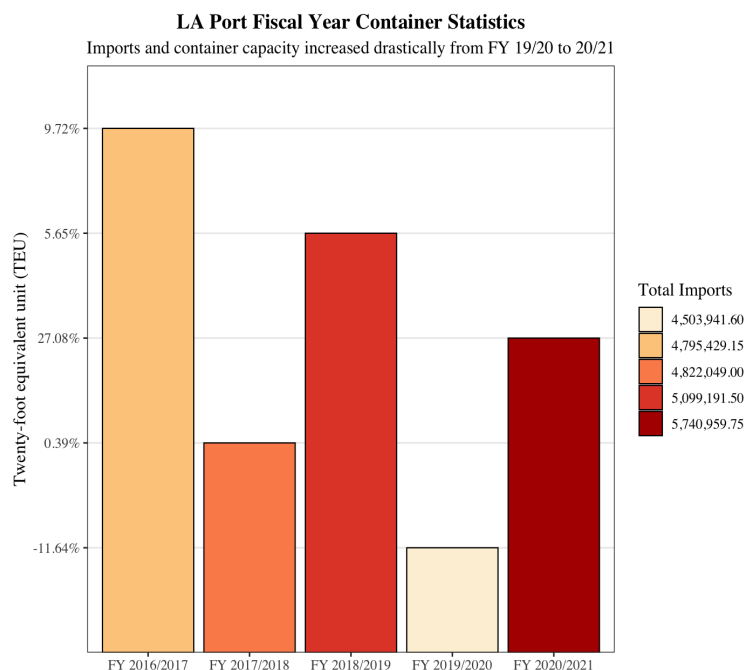
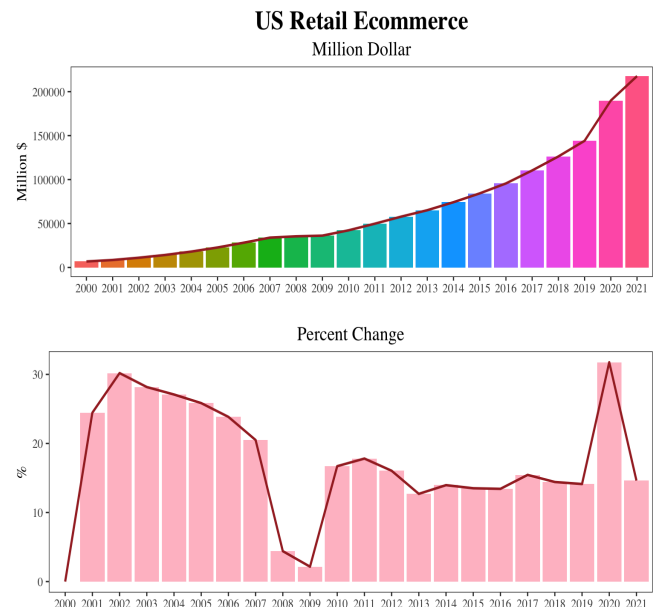
To observe the difference in impact on inflation (response variable) between predictors, we ran a multiple linear regression with 5 predictors: m0_base, hourly_wage, consumption, fed_funds, ue_rate. After checking for multicollinearity using a correlation matrix and pinpointing the confounding factors, we reduced our final model to only 3 predictors: fed_funds, m0_base, ue_rate. To check for linearity, homoscedasticity, normality assumption and influential observations, we looked at the diagnostic plots and conducted statistical tests including ANOVA, BP, Tukey Test.

III. RESULTS & CONCLUSION

1. Inflation driven by demand

The US economy bounced back from the Covid pandemic at a recovery rate faster than forecasted by economists, and along with that comes robust consumer spending. 2021 saw strong real GDP growth at a rate of 12.2%, in contrast to a decrease of 9.1% in 2020 (*Appendix: Graph 2*). According to the New York Fed, Americans currently hold a total of \$2.6 trillion in extra savings, a large portion of which is spent on traveling, revenge shopping or dining due to pent-up demand from lockdowns and physical store

reopenings. Mid 2020, e-commerce retailers saw sales skyrocketing at 30% change, double the rate of the previous 10 years, which shows a shift in consumer spending to online marketplaces. The heightened demand for goods and services in turn raises demand for labor, increasing openings to levels higher than can be accommodated: by 2021, for every 100 job openings, there are only 69 unemployed workers (BLS Statistics). This tight labor market pushes wages up to an “unsustainably high level that’s inconsistent with low inflation” (J.Powell).



Moreover, insufficient human resources contributes to unprecedented supply chain bottlenecks, where COVID-induced shortage of workers led to decreased production capacity and manufacturing delays; sharp rises in transportation and freight cost, growing port congestion and extremely low storage. Particularly, from the drastic jump in total imports and container capacity from fiscal year

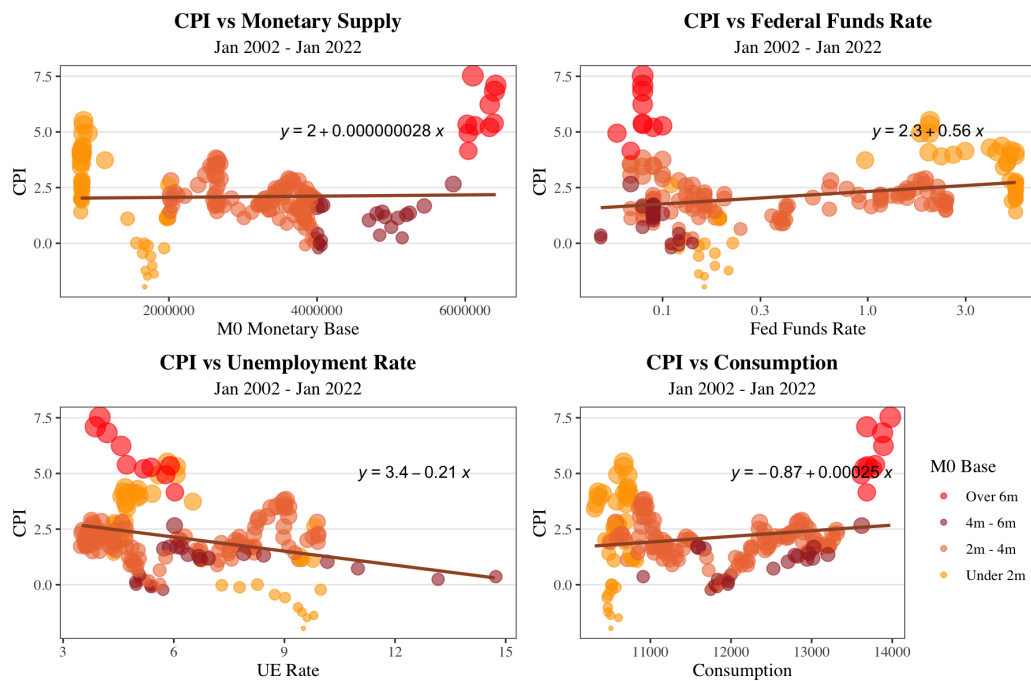
19/20 to 20/21, we can see the extent to which supply and inelastic goods production are struggling to keep up with demand.

2. *Soft landing from inflation?*

The Federal Reserve’s main duty as US central bank is to conduct monetary policy, upholding a dual mandate: price stability and maximum employment. Their tool kit includes adjusting interest rates and controlling the economy’s money supply. The results of our multiple linear regression lends credibility to

this, with `fed_funds` and `m0_base` being the two statistically significant predictors with lower than 0.05 p-value (*Appendix: Table 2*).

During the onset of Covid-19 pandemic in March 2020, unemployment rate peaked at 14.8% with stores closing, businesses laying off in the face of national lockdown. In response to this breach of “maximum employment”, the Fed lowered interest rates to near zero, injected money into the economy through buying long-term securities (quantitative easing) to stimulate demand. Their strategy was proven successful by the subsequent bounceback of the economy.



Scatterplots of individual relationships between CPI and 4 macroeconomic indicators

We see signs of upward inflationary pressures reflected in the above graph (*top left scatterplot*), where US monetary base after the easy money policy is over \$6 million at the higher inflation range. What the Fed can control is demand, not supplies, and so they chose a demand-focused policy and officially took action to combat inflation in early 2022. As of May, they have raised interest rates by 75 basis points (0.75%) - their most aggressive rate hikes since 2000 - in hopes of reducing overall consumer spending, slowing labor market hiring, thus narrowing the gap between demand and supply. However, the main challenge is that interest rates have to be raised so gradually, yet exactly on time with moving indicators and new data, that it doesn't spike heavy unemployment and tip the economy into recession. The Fed curated the term “soft landing”, referring to their goal to “get inflation back down to 2% without having the economy go into recession, or with the labor market remaining fairly strong”. Given the low unemployment rate

(3.6%), tight labor market and high inflation (*bottom left scatterplot*), it is not only difficult to reverse this situation and achieve a “soft landing”, but there are also fears of stagflation - a combination of stagnant growth and persistent high inflation. Moreover, Chair Powell himself has acknowledged that “whether we can execute a soft landing or not may actually depend on factors that we don’t control”, which include geopolitical events or external factors like the Ukraine-Russia crisis or China’s zero-Covid shutdowns. There is no guarantee that the Fed can win this fight against inflation without triggering a recession, even history has proven against their favor. Nevertheless, this is a good-natured central bank attempt at restoring economic well being; and if done right, it will be a great accomplishment made out of both luck and effective strategy.

3. Conclusion

The current persistently high inflation rate has been driven mostly by demand factors, which led to a wide gap between demand and supply. In an effort to bring the economy back to equilibrium, the Fed is tentatively tightening monetary policy, with a view to taming inflation and restraining demand without reversing the economic recovery. Given myriads of uncontrollable global factors: supply shocks, an ongoing war, and an unfinished pandemic, it will be very tricky for the Fed to engineer a so-called soft landing from inflation highs. According to Daniel Zhao, senior economist at Glassdoor, “The Fed does have to walk a tightrope, and in some ways, they’re walking that tightrope blindfolded because the environment is changing so rapidly.” Nonetheless, it does not hurt to hope for the best.

IV. DISCUSSION

For future work, we would like to expand on our sets of variables and include relevant measures such as commodity prices, job openings or total American checking balances in our regression model. Since the CPI index is updated monthly, we would make sure to keep track of any changes and reflect those onto our analysis. In terms of exploratory data analysis, we’re also interested in creating a US map and pie chart to better represent the share of categories by region.

V. REFERENCES

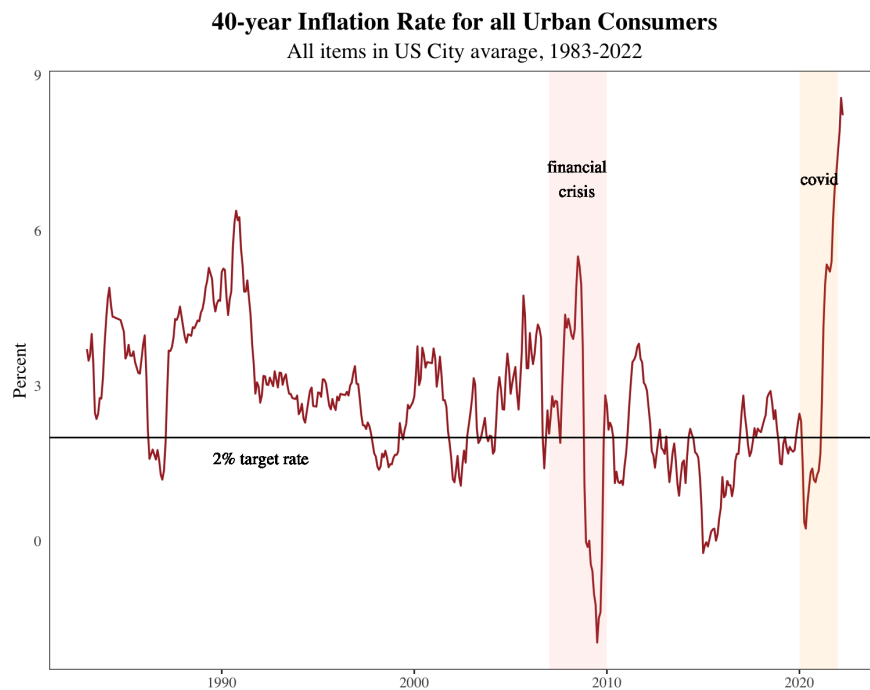
- Ryssdal, Kai. “Fed Chair Jerome Powell: ‘Whether We Can Execute a Soft Landing or Not, It May Actually Depend on Factors That We Don’t Control.’” *Marketplace*, 13 May 2022.
- Furman, Jason. “This Inflation Is Demand-Driven and Persistent.” *Project Syndicate*, 17 May 2022.

VI. APPENDIX

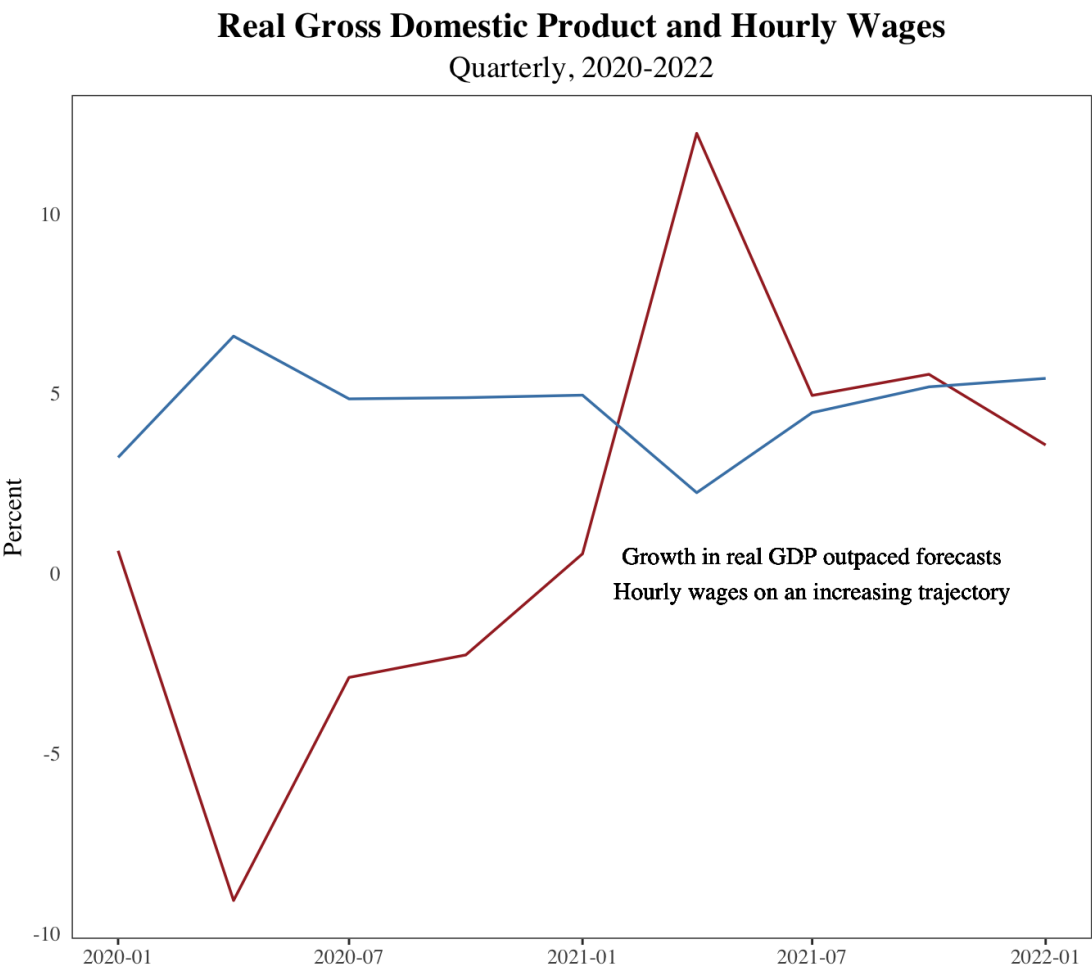
Table 1: Variable List

Variable	Meaning	Units	Frequency
monthly_CPI	Consumer Price Index (CPI), a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services	Percent change from year ago	Monthly
m0_base	Monetary Base, total amount of a currency that is either in general circulation in the hands of the public or in the form of commercial bank deposits held in the central bank's reserves	Millions of dollar	Monthly
ue_rate	Unemployment rate, the share of workers in the labor force who do not currently have a job but are actively looking for work	Percent	Monthly
fed_funds	Federal funds rate, the interest commercial banks charge when they lend money to one another overnight	Percent	Monthly
ecom_sales	Ecommerce retail sales	Millions of dollar	Annually
real_GDP	Real gross domestic product, adjusted for inflation	Percent change from year ago	Quarterly
hourly_wages	Average Hourly Earnings of All Employees	Percent change from year ago	Quarterly
port_stats	LA Port Fiscal Year Container Statistics	Percent change from year ago	Annually

Graph 1: Inflation Rate (Monthly CPI) from 1983 to 2022



Graph 2: Real GDP and Hourly Wages (Quarterly) from 2000 to 2022



Graph 3: Correlation Matrix

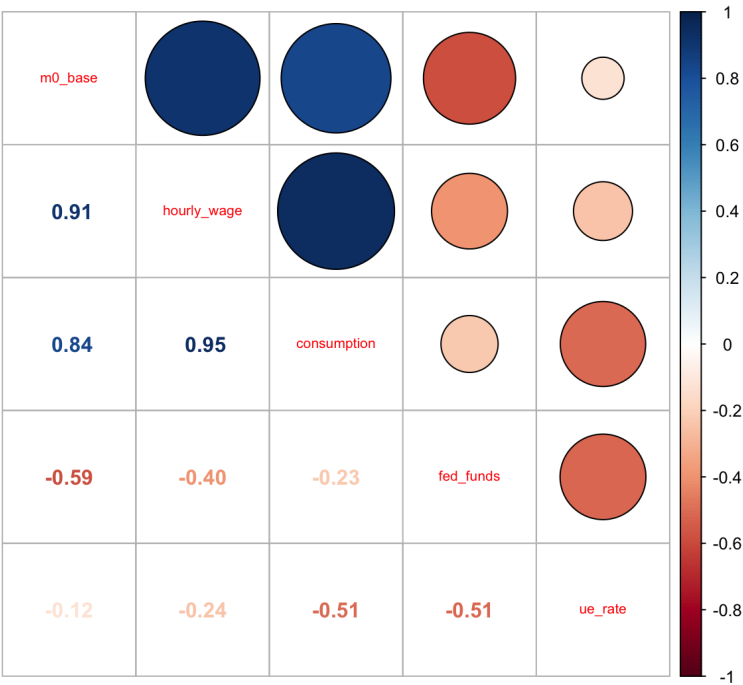


Table 2: Final Multiple Linear Regression

Call:

```
lm(formula = combined_with_response$cpi ~ combined_with_response$fed_funds +  
    combined_with_response$m0_base + combined_with_response$ue_rate)
```

Residuals:

Min	1Q	Median	3Q	Max
-3.1520	-0.9281	-0.2243	0.6502	4.8961

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.9196786617	0.8257812338	1.114	0.266834
combined_with_response\$fed_funds	0.4116515577	0.1166526167	3.529	0.000525 ***
combined_with_response\$m0_base	0.0000002944	0.0000001136	2.592	0.010298 *
combined_with_response\$ue_rate	-0.0300133738	0.0706406251	-0.425	0.671417

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.439 on 187 degrees of freedom

Multiple R-squared: 0.1449, Adjusted R-squared: 0.1312

F-statistic: 10.57 on 3 and 187 DF, p-value: 0.000001885

Table 3: ANOVA Test

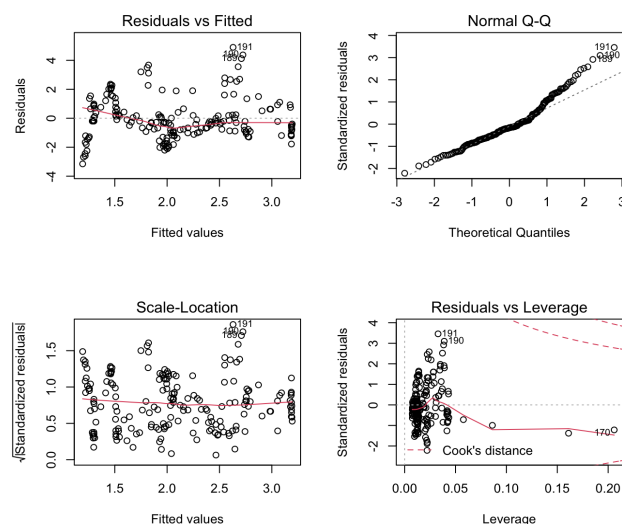
Analysis of Variance Table

Response: combined_with_response\$cpi

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
combined_with_response\$fed_funds	1	38.36	38.364	18.5196	0.00002708 ***
combined_with_response\$m0_base	1	26.92	26.920	12.9950	0.0004005 ***
combined_with_response\$ue_rate	1	0.37	0.374	0.1805	0.6714169
Residuals	187	387.38	2.072		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Graph 4: Diagnostic Plots



Graph 5: Tukey Test

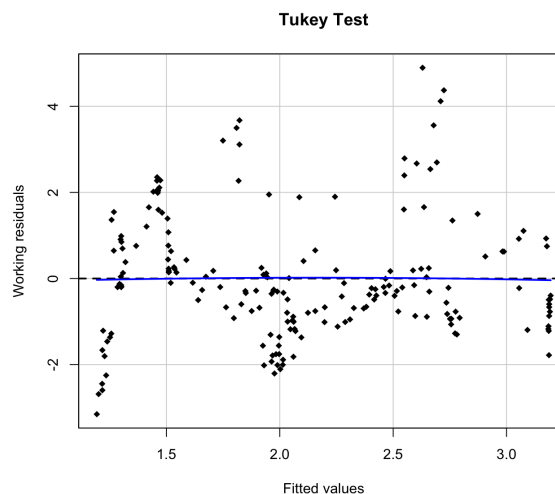


Table 4: BP Test

studentized Breusch-Pagan test

data: multi_reg2

BP = 5.4483, df = 3, p-value = 0.1418