The Potential Impact of Implementing Tariffs on Imports on US Inflation Rates

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Abstract

This research examines the potential impact of implementing tariffs on inflation. The study hypothesizes that a tariff war will lead to inflation and hurt the economy. However, the Trump administration is pursuing such a policy. This research will allow us to better assess whether the actions taken by President Trump are reasonable or not. To examine this, the study conducts a regression analysis with the inflation rate as the dependent variable. The independent variables will include tariff rates, interest rates, and stock market indices.

Introduction

This research examines the potential impact of implementing tariffs on imports on inflation rates in the United States. Since the United States is one of the biggest importers of the world, worth approximately $3.8 trillion (CIA), imposing tariffs on their imports could have significant economic consequences. Tariffs, by increasing the cost of imported goods, may contribute to higher consumer prices, leading to inflationary pressures.

The impact of tariffs on consumer prices and overall economic welfare has been a widely debated topic in the economics literature. Amiti, Redding, and Weinstein (2019) analyzed the effects of the 2018 U.S. tariffs and found that they resulted in increased prices for American consumers. Their study provided empirical evidence that the costs of tariffs were largely passed on to consumers, leading to higher prices without substantial benefits to domestic producers. This supports the argument that tariffs, when imposed on major trading partners, can have inflationary effects by raising the overall cost price of goods.

Further supporting this argument, Peters & McKay (2018) examined the specific impact of tariffs on the plastic surgery industry, finding that increased tariffs on imported medical-grade plastics led to higher costs for essential materials. This sector-specific analysis demonstrates how tariffs can disrupt industries reliant on imported components, further contributing to inflationary pressures in the economy. Their findings underscore how tariffs can impact specific industries that underlie broad economic indicators and identify variation in inflation across different sectors. Furceri et al. (2018) also discusses the effects imposed by the tariff alongside other macroeconomic impacts of tariff such as interest rates, productivity and welfare. The study was conducted using impulse response functions from local projections on a panel of annual data spanning 151 countries over 1963-2014. While he asserts that the change in trade volume was unlikely due to offsetting exchange rate appreciations, he concludes that tariffs have significant negative impact on output and productivity while also contributing to unemployment and higher inequality, thereby reducing welfare. This provides additional evidence that tariffs are associated with higher inflation.

However, Batra (2001) provides a counterargument, questioning the direct inflationary effects of tariffs. His study examined historical tariff implementations and found that in certain cases, tariffs did not result in inflation but instead led to price stabilization or even a decrease in inflation. He argued that historically in the U.S., tariffs have led to a shift in labor force from low-wage agriculture into high-wage manufacturing which led to strong output growth. This increase in supply then led to deflation. He used production functions and built on them to support his theory and observations. This historical perspective suggests that the inflationary impact of tariffs is not universally applicable and depends on specific economic conditions; in this case the economy was highly agrarian and was yet to industrialize. Additionally, the inflationary impact of tariffs is highly context-dependent, influenced by factors such as supply chain structures and monetary policy which may change the effect that tariffs have on an economy today compared to the 1800s.

Beyond the U.S., the effects of tariffs extend to international economies as well. Aba (2021) investigated the consequences of the U.S.-China trade war on economies of countries belonging to the Association of Southeast Asian Nations, particularly Indonesia, Vietnam, and Cambodia. The study found that institutional strength such as political stability of the country and a strong legal framework played a crucial role in determining how these economies responded to the trade war. While some countries faced economic downturns due to trade disruptions, others were able to capitalize on the shifting trade dynamics. This highlights the broader global implications of tariff policies, demonstrating that such measures not only affect domestic inflation but also create economic ripple effects across international markets.

Lechthaler (2017) provides additional insight into the role of monetary policy in determining optimal tariffs. His research suggests that the interaction between tariffs and monetary policy is crucial in shaping economic outcomes. Lower interest rates, for example, can reduce the inflationary impact of tariffs by stimulating domestic demand, while restrictive monetary policies may necessitate higher tariffs to protect domestic industries. This highlights the importance of a balanced policy approach in managing the effects of tariffs on inflation but also introduces the possibility of limiting the inflationary pressure from tariffs using other monetary tools. For instance, during the U.S.-China trade war, the Federal Reserve's decision to lower interest rates in 2019 helped counteract some of the economic slowdown caused by increased tariffs, demonstrating how monetary policy can be used to offset tariff-induced inflationary pressures.

Based on the existing literature and economic theory, this research hypothesizes that implementing tariffs on imports will lead to inflationary pressures in the United States. Given the significant trade volumes with these countries, tariffs are likely to increase production costs, reduce supply chain efficiency, and ultimately raise consumer prices. Furthermore, a prolonged tariff war with key trading partners is expected to exacerbate these inflationary effects, reinforcing the argument that these policies can have unintended economic consequences. This study aims to provide empirical evidence supporting this hypothesis and offer policy recommendations to mitigate potential adverse effects. The next section describes the data sources and regression methodology, which is followed by presentation of descriptive statistics and empirical results, and the article concludes with discussion of findings and limitations.

Methods

This research employed a quantitative empirical analysis to investigate the relationship between tariffs imposed by the U.S. and inflation rates in the United States. The paper hypothesized that the tariffs would lead to an increase in the inflation rates.

The study tested the hypotheses using the following model:

$$Inflation\ Rate_t = \beta_0 + \beta_1(Tariff\ Rate_t)^2 + \beta_2(Tariff\ Rate_t)$$

$$+\beta_3(Interest\ Rate_t) + \beta_4(Stock\ Market\ Index_t)$$

$$+\beta_5(Trade\ Volume\ Change_t) + \beta_6(Year) + \epsilon_t$$

This analysis used annual data from 1955 through 2024, resulting in 70 observations. All variables were measured annually. A multiple linear regression model with time series data was estimated. The dependent variable is the inflation rate (Inflation Ratet), measured as the year-over-year percentage change in the Consumer Price Index (CPI) from the U.S. Bureau of Labor Statistics. Independent variables include: (1) Average tariff rate in percent (Tariff $Rate_t$) from the United States International Trade Commission; (2) Federal funds effective rate (Interest $Rate_t$) in percent from FRED; (3) Annual S&P 500 return in percent (Stock Market $Index_t$) from MarketWatch; (4) Year-over-year change in import volume in billions of dollars (Trade Volume $Change_t$) from the U.S. Census Bureau; and (5) Year (Year) as a time trend variable. The β_0 represents the y-intercept, indicating the predicted inflation rate when all independent variables equal zero based on the model, while ϵ_t represents the error term capturing unaccounted factors affecting inflation rate.

These datasets were merged using year (time-series variable) to create a structured dataset for analysis.

After the dataset was constructed, descriptive statistics, graphs of the relationships between key variables, and a test for multicollinearity first with a correlation matrix and variance inflation factors were provided. Since the proposed regression was a time series model, Newey West standard errors were used because statistical tests found there was autocorrelation in the error terms.

Table I. Descriptive Statistics

Statistic	Inflation Rate	Tarrif Rate	Interest Rate	Stock Market Index	Trade Volume Change
Mean	3.63	3.67	4.65	8.89	8.69
SD	2.78	2.10	3.60	16.45	9.16
Min	0.09	1.20	0.07	-38.49	-13.20
Max	13.29	7.60	18.90	38.06	38.39
Count	70.00	70.00	70.00	70.00	70.00

Results and Discussion

Table I shows the basic descriptive statistics for variables included in the regression analysis. Data consist of 70 yearly observations from 1955 to 2024. In this period, the U.S. had a mean Inflation Rate of 3.63% and a standard deviation of 2.78 indicating high variability. This is supported by the minimum and maximum values, since in this period the minimum Inflation Rate is 0.09 whereas the maximum Inflation Rate is 13.29.

The mean Tariff Rate imposed by the U.S. was 3.67% on all products while the standard deviation is 2.1%. The minimum is 1.2% while the maximum is 7.6%. Tariffs had less variability than the inflation rate for this time period. As for interest rates, the mean Interest Rate was 4.65% with a standard deviation of 3.6%. The minimum Interest Rate in this time period was 0.07% while the maximum was 18.90%. The range seems to be quite high, probably because of various historical economic crises (e.g., interest rates during the 2008 financial crisis and some years after that were less than 1%).

For the final two variables (Stock Market Index and Trade Volume Change), the mean and the standard deviation of annual returns of the S&P index were 8.89 and 16.45, respectively, with a minimum of –38.49 and a maximum of 38.06. Similarly, the mean and the standard deviation of annual change in import volumes was $8.69 billion and $9.16 billion, respectively. The minimum annual change was $–13.20 billion while the maximum was $39.29 billion.

Based on the time series graph in Figure 1, some spikes in inflation rates during the late 1970s and post-COVID years (early 2020s) can be seen. However, for tariffs there does not seem to be a significant spike in any of the years, but it seems to follow the trend of inflation rate after 1970s. In general, the trend line for both inflation rates and tariff rates seems to follow

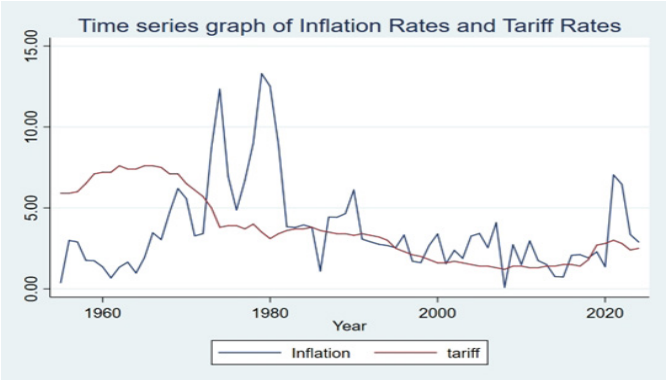

Figure 1. Time series of U.S. inflation rates (blue) and tariff rates (red) from 1955 - 2024

each other after 1970s (Post World War Era). Both inflation and tariff rates went up during COVID-19 era (Around 2020).

Based on the graph there is not a clear relationship between these two variables, however, it seems that the inflation rate was high when the tariff rate was moderate (3-5%). While this does not provide any conclusions, it might be something to note (causation indeterminant). The graph is concave, suggesting that it may be appropriate to include a tariff rate squared term in addition to the tariff rate, to capture the nonlinear effect observed in the graph.

The correlation data in Tables II and III provided a preliminary test of the strength and direction of the relationship between pairs of independent variables. Multicollinearity was not an issue for the tariff variable since it was squared. There was a slight concern of multicollinearity between inflation rate and interest rate (Coefficient = 0.7539), however, the Variance Inflation Factor (VIF) for the Interest Rate variable ruled out the possibility of multicollinearity. Since the paper tested for autocorrelation separately, VIF for year variables was not a concern.

Table II. Correlation Matrix

	Inflation Rate	Year	Tariff Rate	Interest Rate	Stock Market Index	Trade Volume Change
Inflation Rate	1					
Year	-0.1656	1				
Tariff Rate	0.0383	-0.873	1			
Interest Rate	0.7539	-0.3632	0.1835	1		
Stock Market Index	-0.1930	0.0842	-0.0502	-0.0390	1	
Trade Volume Change	0.4684	-0.2720	0.1872	0.3488	-0.1556	1

Table III. Correlation Parameters

Variable	VIF	1/VIF
Tariff Rate	48.03	0.020822
(Tariff Rate)^2	41.08	0.024342
Year	5.27	0.189658
Interest Rate	1.766	0.566778
Trade Volume Change	1.21	0.826654
Stock Market Index	1.06	0.943819
Mean VIF	16.40	

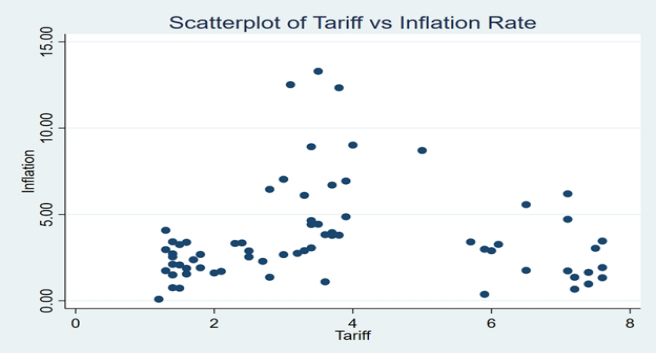

Figure 2. Scatter plot illustrating the relationship between U.S. inflation rates and average tariff rates imposed by the U.S. from 1955 to 2024

Test of autocorrelation

The Durbin-Watson statistic resulted in 1.048 indicating positive autocorrelation in the residuals, meaning that errors in one year were correlated with errors in subsequent years. To address this, the study used Newey-West standard errors, which adjusted the standard errors for autocorrelation and heteroskedasticity, making statistical inference more reliable in time series settings.

Regressions

Due to the concern of autocorrelation present in the dataset, the study used regression with Newey-West standard errors to address the autocorrelation.

First, a standard ordinary least squares (OLS) regression was conducted to evaluate the general model. The results are shown in Table IV.

Since the R-squared or adjusted R-squared does not change when Newey-West standard errors are used, the model was able to explain around 64.97% of the variability in inflation (Adj. R^2=0.6497).

Upon conducting the regression analysis with Newey-West standard error, the overall regression was significant as indicated by the p-value < 0.0001 (F=15) for the F-test (Table

Table IV. OLS Results

Number of observations	70
F(6, 63)	22.33
Prob > F	0.000
R^2	0.6801
Adjusted R^2	0.6497
Root Mean Square Error	1.6448

Table V. Regression with Newey-West Standard Errors

Regression with Newey-West standard errors	Number of Observations	70			
	F(6, 63)	15.00			
	Prob > F	0.000			
Inflation	Coefficient	Newey-West Standard Error	t	P > |t|	90% confidence interval
Year	0.0316912	0.0254075	1.25	0.217	-0.0107241 ; 0.0741066
Tariff Rate	1.269832	0.6978111	1.82	0.074	0.1049042 ; 2.434759
(Tariff Rate)2	-0.1346223	0.0700836	-1.92	0.059	-0.25162 ; -0.0176246
Interest Rate	0.4961906	0.089529	5.54	0.000	0.3467307 ; 0.6456505
Stock Market Index	-0.0282113	0.0124735	-2.26	0.027	-0.0490346 ; -0.0073879
Import Volume Change	0.0678373	0.0336114	2.02	0.048	0.0117263 ; 0.1239482
constant	-64.32882	51.56627	-1.25	0.217	-150.4137 ; 21.75602

V). Based on the 0.1 significance level, only the Year variable was not significant in the model. The coefficients of the significant variables would be interpreted as follows. First, the tariff variables showed a nonlinear relationship with inflation. Higher tariffs were associated with increased inflation at a decreasing rate, as indicated by the positive coefficient on the linear tariff term and negative coefficient on the squared tariff term. Second, a 1 percentage point increase in the interest rate was associated with approximately a 0.50 percentage point increase in inflation, holding other variables constant ($t = 5.54$, $p < 0.001$). Thirdly, a 1 percentage point increase in S&P 500 annual returns was associated with approximately a 0.03 percentage point decrease in inflation ($t = -2.26$, $p = 0.027$). Finally, a $1 billion increase in import volume change was associated with approximately a 0.07 percentage point increase in inflation ($t = 2.02$, $p = 0.048$).

Conclusion

The analysis supported the hypothesis that tariffs increase inflation, showing a positive non-linear relationship between tariff rates and inflation rates. The observed positive non-linear relationship between tariff rate (as the explanatory variable) and inflation rate indicated that while higher tariffs do contribute to rising inflation, the impact lessens at higher levels.

These findings were consistent with the literature, particularly the work of Amiti, Redding, & Weinstein (2019), who found that tariffs imposed on major trading partners tend to raise the overall price of goods, contributing to inflation. Additionally, the analysis highlighted other potential influences on inflation such as movements in the S&P 500 index and changes in import volume, suggesting that inflation is a multifaceted issue influenced by both policy and market dynamics.

Limitations

It is important to acknowledge several limitations of this analysis. First, while the original hypothesis was supported, this type of analysis does not demonstrate causality. Secondly, the original intent was to focus exclusively on the United States' major trading partners: namely Canada, Mexico, and China. However, constructing country-specific tariff series for the full sample period would require substantial time to compile manually relative to the scope of this project, so the aggregated U.S. tariff measures were used instead, which still captured the broad trend in trade policy over time. Additionally, due to limited availability of historical data for some model variables prior to 1955, the final dataset included only 70 observations, falling short of the initial target of at least 100 observations. The model also omits potentially important variables such as oil prices and money supply growth, which may influence inflation. Future research incorporating these controls and country-specific tariff measures would strengthen these findings.

Areas for Future Research

Future research could examine the effects of tariffs on a country-specific basis, allowing for a comparative analysis of their impact on major trading partners such as China versus smaller partners like Australia. Additionally, further studies may explore the broader economic implications of tariffs, including their influence on global stock markets or their role in shaping the growth of domestic industries.

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