The Impact of US-China Trade Tariffs on Stock Returns: Evidence from the Electric Vehicle, Solar Panel, and Washing Machine Sectors

Mariano De Martino

Abstract

This paper investigates the impact of the US-China trade war on the stock returns of three key sectors: electric vehicles, solar panels, and washing machines. By employing regression analysis with tariff-related dummy variables and a range of control factors, I identify the effects of trade tariffs on each sector's performance. My findings indicate that the solar panel sector experienced significant negative returns following the introduction of tariffs, reflecting its high sensitivity to global supply chain disruptions and cost increases. In contrast, the automotive and washing machine sectors showed no statistically significant response, suggesting their greater resilience or ability to mitigate tariff impacts.

1 Introduction

The escalating trade tensions between the United States and China, started in 2018, marked a pivotal shift in global economic relations. As two of the world's largest economies imposed tariffs on each other's goods, uncertainties proliferated across international markets, disrupting trade flows and altering consumer and investor expectations. In this paper, I examine a critical aspect of this geopolitical conflict: how expectations of reduced consumption by U.S. consumers, driven by the introduction of tariffs, influence the stock returns of Chinese companies. Specifically, we focus on three strategically important sectors—electric vehicles, solar panels, and washing machines. These sectors were chosen because they produce finished goods targeted directly at final consumers, making them particularly relevant for understanding the effects of tariffs on consumer behavior. By analyzing these industries, we can better capture how changes in consumer demand, induced by tariff-related price increases, are reflected in the stock prices of Chinese companies.

This question is particularly timely and significant for several reasons. First, the tariffs imposed during the US-China trade war highlight the tangible consequences of protectionist policies on globalized industries. Moreover, with the potential reelection of Donald Trump on the horizon, whose campaign prominently features promises of imposing new tariffs, particularly targeting China, the issue of trade restrictions and their economic implications has regained relevance. The electric vehicle and solar panel sectors, in particular, are emblematic of China's industrial and export strategies, aligning closely with global sustainability goals and the transition to clean energy. Assessing how tariffs impact stock returns in these sectors offers a lens into the intersection of global trade, economic policy, and corporate performance.

Second, understanding these dynamics is crucial in anticipating how companies respond to external shocks in an interconnected economy. The stock market, a forward-looking mechanism,

encapsulates the aggregated expectations of investors regarding trade policies and their downstream effects. By analyzing stock returns, we can derive insights into market sentiment, sectoral resilience, and the broader economic implications of reduced consumer demand.

Lastly, the research carries practical relevance for both global investors and policymakers. Investors need to gauge the risks associated with geopolitical instability and its effect on international equities. Policymakers, on the other hand, can better understand how trade policies reverberate across industries, potentially destabilizing economies that rely on external demand. This analysis, therefore, sheds light on the unintended consequences of protectionist measures and equips stakeholders with the tools to anticipate and mitigate economic disruptions.

Our analysis reveals notable differences in how Chinese sectors respond to tariff introductions. The solar panel sector, being highly exposed to international markets and reliant on global supply chains, exhibits a marked sensitivity, with tariffs contributing to significant negative impacts on stock returns. Conversely, the automotive and washing machine sectors show limited or negligible reactions, indicating that their market structures or adaptive strategies may have mitigated the adverse effects of tariffs. These findings underscore the varying degrees of resilience across industries and highlight the importance of sector-specific dynamics in understanding the broader economic consequences of trade policies.

2 Literature Review

The relationship between trade policies and stock market performance has been extensively studied in the economic literature. Amiti, Kong, and Weinstein (2020) examine the broader impacts of trade policy announcements on equity prices and investment behavior. Using a decomposition method, they demonstrate that tariff announcements during the US-China trade war led to significant reductions in aggregate stock returns and the cost of capital, ultimately reducing investment. While their work focuses on aggregate equity markets and macroeconomic effects, my research differs by narrowing the scope to sector-specific impacts on Chinese companies, using a weighted index methodology to capture the nuances of industry responses to tariff impositions.

Similarly, Greenland, Ion, Lopresti, and Schott (2020) employ an event study methodology to analyze firm-level exposure to trade policy changes, utilizing abnormal stock returns as proxies for firms' sensitivities to trade liberalizations. Their approach is rooted in identifying the "wisdom of the crowds" through market responses, effectively capturing firm-specific exposures, including supplier and customer linkages. While their study focuses on US firms during episodes of trade liberalization, my analysis extends this framework to Chinese companies, incorporating event dummies tied to specific tariff announcements to evaluate sectoral performance during the US-China trade war.

Unlike previous research, which primarily centers on aggregate market effects or firm-level responses in developed economies, my study introduces a sectoral perspective using indices constructed from company-level data. This approach allows for a granular analysis of how tariffs under Section 201 and Section 301 affect industries with varying dependencies on international trade.

By focusing on Chinese firms and sectoral impacts, this research complements existing studies while contributing new insights into the transmission of trade policies to international stock markets and their differential effects across industries.

This research aims to contribute new insights into the transmission of trade policies to interna-

tional stock markets and their differential effects across industries. With the recent introduction of new tariffs under Donald Trump's administration, future analyses can leverage additional data to refine these findings. In particular, utilizing high-frequency data may help capture immediate price reactions in the short term, as my broader time horizon may have diluted some of the tariff effects observed in this study.

3 Data

To address the research question, I collected daily closing price time series data for a selection of companies from three key sectors: electric vehicles, solar panels, and washing machines. My objective was to include the companies with the highest market capitalization within each sector to ensure they effectively represented the broader market trends. However, due to data limitations, I had to exclude certain companies whose price data was unavailable for the entire period of interest. These sectors were chosen for their strategic relevance to the US-China trade relationship and their varying degrees of exposure to tariff impacts. The data spans the period from January 3, 2017, to September 30, 2024, encompassing key events during the trade war period.
The following companies were chosen based on their market capitalization within each sector, ensuring a representative and robust analysis of sector trends:
Electric Vehicles: BYD CA, Evergrande, BAIC Motors;
Solar Panels: Risen Energy, JA Solar, LONGi Solar;
Washing Machines: Midea, Haier, Hisense.
Due to data availability, I utilized price quotations from the Beijing Stock Exchange for the solar panel and washing machine sectors and from the Hong Kong Stock Exchange for the electric vehicle sector. Although I initially intended to analyze data from US-listed American Depository Receipts (ADRs), the lack of available data for these companies during the selected timeframe led to the adoption of this alternative approach.
As indicated in the research question, we analyze stock returns, for this reason, we calculate them using log stock returns.

$$r_{it} = \ln P_{i,t} - \ln P_{i,t-1}$$

Where $P_{i,t}$ is the price of the stock i at time t.
We construct the index of the j-th sector at time t as:

$$I_t^j = \frac{\sum_{i=1}^{N} r_{it} C_{it}^j}{\sum_{i=1}^{N} C_{it}^j}$$

Where r_{it} is the log return of the stock i at time t, C_{it}^j is the market capitalization of the stock i within the sector j at time t, and N is the number of stocks that I have chosen in the sector.
The construction of the index is additive across individual stock returns. This property allows us to decompose the sector's overall performance into contributions from each constituent stock. Consequently, we can assess the differential impact of tariffs on individual stocks, providing a more granular understanding of their effects within each sector.
Having defined the dependent variables, we can now assess the independent variables. In order to capture the effect of the introduction of tariffs I created a dummy variable for each tariff. The

variables have the following structure:

$$D_i = \begin{cases} 0, & \text{for } t < t_i \\ 1, & \text{for } t \geq t_i \end{cases}$$

Where t_i represents the date in which the tariff i was introduced.
As part of the analysis, we introduced dummy variables to capture the effects of tariffs on each sector. These tariffs fall under two distinct legal frameworks in U.S. trade policy: Section 201 and Section 301 of the U.S. Trade Act.
Section 201: These tariffs are designed to protect U.S. industries that claim to be harmed by foreign imports. They are intended to provide relief to domestic producers facing significant injury due to surges in imports. Within this framework, the tariffs imposed on solar panels and washing machines fall under Section 201. These products were specifically targeted as part of measures to safeguard U.S. manufacturers and mitigate the effects of international competition on key domestic industries.
As reported by the Tariff Tracker, the tariffs under Section 201 include:

- **tariff_dummy_1_201**, introduced by President Trump on January 22, 2018, imposing new taxes on washing machines and solar panels to protect domestic producers from import surges.
- **tariff_dummy_2_201**, enacted by President Biden on February 4, 2022, extending the tariffs on solar panels to further support U.S. solar manufacturers.
- **tariff_dummy_3_201**, announced by President Trump on January 14, 2021, extending the tariffs on washing machines just six days before leaving office.

Section 301: These tariffs are trade sanctions imposed on foreign countries that violate U.S. trade agreements or engage in acts deemed "unjustifiable" or "unreasonable," which burden U.S. commerce. In the context of this analysis, the tariffs affecting the electric vehicle sector are categorized under Section 301. These measures were introduced as part of broader retaliatory actions during the U.S.-China trade war, aimed at addressing what the U.S. government identified as unfair trade practices, including intellectual property theft and forced technology transfers.
The tariffs under Section 301 are designed to address unfair trade practices, such as violations of trade agreements or acts deemed unreasonable and harmful to U.S. commerce. These tariffs specifically targeted imports from China, including those in the electric vehicle sector. The following tariffs fall under Section 301:

- **tariff_dummy_4_301**, which became effective on July 6, 2018, marking the first round of tariffs imposed on imports of electric vehicles.
- **tariff_dummy_5_301**, implemented on May 10, 2019, representing a second escalation that increased tariff rates from 10% to 25%.

To ensure that the dummy variables capture only the effect of the tariffs, I introduced control variables into the model to account for the general trends that may influence the dependent variables. These control variables were chosen to reflect broader economic and financial dynamics that could potentially impact stock returns. Common across all sectors, I considered variables such as the USD/CNY exchange rate, the Chinese market index CSI 300, Chinese inflation, Chinese

interest rates (SHIBOR 3M), and the Chinese GDP growth rate. These variables are critical in capturing the macroeconomic environment in which the companies operate, providing a baseline against which the effects of the tariffs can be measured.

For the electric vehicle sector, I incorporated the price of crude oil as a sector-specific control variable. Oil prices are a key determinant in the competitiveness of electric vehicles compared to traditional combustion-engine vehicles, as fluctuations in oil prices directly influence consumer preferences and production costs. While my initial intention was to include additional sector-specific control variables—such as steel prices for the washing machine sector and silicon prices for the solar panel sector—I was unable to find consistent and reliable data for these commodities.

All control variables were converted to percentage changes to maintain consistency with the log returns of the dependent variables, ensuring that the model's outputs are comparable and interpretable. By integrating these controls, the analysis isolates the specific impact of the tariffs, minimizing the influence of broader economic trends on the results.

4 Methodology

To address the research question, I employ a linear regression model designed to analyze the impact of tariff introductions on the stock returns of sector indices. The dependent variable in this model is the sector index for each of the three industries analyzed: electric vehicles, solar panels, and washing machines. The independent variables include dummy variables that capture the introduction of tariffs, alongside control variables that account for broader economic and market dynamics.

The regression model for the *j-th* sector is as follows:

$$I_j = \alpha + D\beta_1 + X\beta_2 + \epsilon_t$$

Where:

- β_1 is a $k \times 1$ column vector, and D is a $T \times k$ matrix, with k representing the number of tariffs introduced and T the number of observations over the time horizon.
- β_2 is a $n \times 1$ column vector, and X is a $T \times n$ matrix, with n representing the number of control variables included in the model and T the number of observations over the time horizon.

The inclusion of dummy variables allows us to capture structural breaks in the data caused by tariff introductions. These variables enable the isolation of tariff effects on stock returns, independent of other external factors. For instance, in the case of Section 201 tariffs, which target solar panels and washing machines, the corresponding dummy variables measure the extent to which these trade policies influence sectoral performance. Similarly, Section 301 tariffs applied to the electric vehicle sector are captured by their respective dummies.

Control variables ensure that the regression accounts for general economic conditions and sector-specific drivers. By including these variables, the model minimizes omitted variable bias and ensures that the coefficients on the dummy variables reflect the unique impact of the tariffs.

This regression framework enables a systematic analysis of how tariffs influence stock returns in different industries. By comparing the coefficients across sectors, we can identify differential effects and assess sector-specific vulnerabilities to trade policy changes. This methodology provides a clear path to answering the research question by quantifying the economic significance of tariffs on the Chinese stock market.

5 Results

To evaluate the factors driving the performance of sector indices, I first analyzed the models using only control variables, excluding tariff-related dummy variables. This approach allows us to establish a baseline for understanding how broader economic and market factors influence stock returns in each sector.

Table 1: Regression Results Without Dummy Variables

Variable	**Solar Panels**	**Washing Machines**	**Electric Vehicles**
Intercept	-0.0002 (0.0008)	0.0007 (0.0005)	0.0012 (0.0009)
logret_USDCNY	0.0528 (0.1480)	-0.1287 (0.0981)	-0.2087 (0.1660)
logret_SHIF3M	-0.0090 (0.0701)	0.0686 (0.0465)	-0.0300 (0.0784)
logret_CSI300	1.1424 (0.0410) ***	1.0682 (0.0272) ***	1.2109 (0.0462) ***
logret_BRENT	—	—	0.0369 (0.0158) *
ts_inflation	0.0007 (0.0004) .	-0.0002 (0.0002)	-0.0002 (0.0004)
ts_gdp	-0.0175 (0.0157)	0.0108 (0.0104)	-0.0104 (0.0176)
Residual Std. Error	0.02046	0.01357	0.02289
Multiple R-squared	0.2875	0.4475	0.276
Adjusted R-squared	0.2857	0.4461	0.2738
F-statistic	162.4	326.1	127.8

Note: Standard errors are reported in parentheses. Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$.

Table 1 shows that the regression for the solar panel sector indicates that the CSI 300 index has a strong and statistically significant relationship with the sector's returns ($\beta = 1.1424, p < 0.001$). This suggests that the sector's performance is closely aligned with overall market trends, reflecting its sensitivity to macroeconomic conditions and investor sentiment.
Inflation exhibits a marginally significant positive effect ($\beta = 0.0007, p \approx 0.05$), implying that slight increases in inflation may have a modestly positive impact on solar panel returns. This could be due to the sector's reliance on stable economic growth, which often coincides with moderate inflation levels. However, other variables, such as GDP growth and exchange rate fluctuations, do not exhibit statistically significant relationships, indicating that sector performance is less directly tied to these broader economic indicators. The model achieves an R^2 of 0.2875, indicating that approximately 28.75% of the variability in solar panel returns is explained by the included variables.

For the washing machine sector, the results similarly highlight the dominant role of the CSI 300 index, which shows a highly significant and positive coefficient ($\beta = 1.0682, p < 0.001$). This finding underscores that the sector's returns are strongly correlated with the overall performance of the Chinese stock market, reflecting the broader market trends' influence on consumer goods sectors.
Other control variables, including GDP growth, inflation, and the exchange rate, are not statistically significant, suggesting that the sector's stock returns are less sensitive to these macroeconomic variables. The model's R^2 value is 0.4475, indicating that the control variables explain nearly 45%

of the variation in returns for this sector, a relatively high explanatory power compared to the solar panel sector.

In the electric vehicle sector, the CSI 300 index again demonstrates a strong positive relationship with sector returns ($\beta = 1.2109, p < 0.001$). Additionally, the price of crude oil ($\beta = 0.0369, p = 0.0198$) is statistically significant and positively correlated with stock returns, highlighting the importance of oil prices in shaping demand dynamics for electric vehicles. This result suggests that rising oil prices, which increase the cost of operating traditional vehicles, positively affect the relative competitiveness of electric vehicles, boosting investor sentiment in the sector.
Other variables, including the exchange rate, short-term interest rates, inflation, and GDP growth, do not show significant impacts on the sector's returns. The model explains 27.6% of the variability in returns ($R^2 = 0.276$), comparable to the solar panel sector but lower than the washing machine sector.

Table 2: Regression Results with Tariff Dummies

Variable	**Solar Panels**	**Washing Machines**	**Electric Vehicles**
Intercept	0.0012 (0.0014)	0.0019 (0.0009) *	0.0023 (0.0014) .
logret_USDCNY	0.0661 (0.1480)	-0.1235 (0.0982)	-0.2047 (0.1661)
logret_SHIF3M	-0.0164 (0.0704)	0.0628 (0.0467)	-0.0352 (0.0786)
logret_CSI300	1.1412 (0.0410) ***	1.0665 (0.0272) ***	1.2115 (0.0462) ***
logret_BRENT	—	—	0.0367 (0.0158) *
ts_inflation	0.0004 (0.0004)	-0.0002 (0.0002)	-0.0002 (0.0004)
ts_gdp	-0.0175 (0.0157)	0.0105 (0.0105)	-0.0104 (0.0176)
tariff_dummy_1_201	-0.0002 (0.0014)	-0.0012 (0.0009)	—
tariff_dummy_2_201	-0.0022 (0.0011) *	—	—
tariff_dummy_3_201	—	-0.0006 (0.0007)	—
tariff_dummy_4_301	—	—	-0.0020 (0.0019)
tariff_dummy_5_301	—	—	0.0007 (0.0017)
Residual Std. Error	0.02045	0.01356	0.02289
Multiple R-squared	0.2891	0.4484	0.2765
Adjusted R-squared	0.2866	0.4465	0.2736
F-statistic	116.8	233.5	96.02

Note: Standard errors are reported in parentheses. Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$.

When tariff dummies are included in the regression for the solar panel sector, the results in **Table 2** show that tariff_dummy_2_201, representing the second tariff on solar panels under Section 201, has a statistically significant negative effect on returns ($\beta = -0.0022, p < 0.05$). This finding suggests that the introduction of this specific tariff adversely impacted the performance of the solar panel sector, potentially due to increased production costs or disrupted trade flows.

In contrast, tariff_dummy_1_201, representing the first tariff under Section 201, does not exhibit a significant impact on sector returns ($\beta = -0.0002, p = 0.8963$). This may indicate that the initial tariff announcement had been anticipated by the market or that its economic effects were mitigated by industry adaptation.

For the washing machine sector, neither tariff_dummy_1_201 ($\beta = -0.0012, p = 0.1924$) nor

tariff_dummy_3_201 ($\beta = -0.0006, p = 0.3682$) exhibit statistically significant effects. These results suggest that the tariffs under Section 201 may not have had a direct measurable impact on the returns of this sector during the analyzed period.

The lack of significance could reflect the ability of washing machine manufacturers to pass on increased costs to consumers or mitigate the effects of tariffs through operational adjustments. It may also suggest that the market had already priced in the effects of these tariffs before their introduction.

In the regression for the electric vehicle sector, the results show that neither of the tariff dummies under Section 301—tariff_dummy_4_301 ($\beta = -0.0020, p = 0.2990$) and tariff_dummy_5_301 ($\beta = 0.0007, p = 0.6910$) have significant effects on sector returns. This suggests that the tariffs targeting the electric vehicle sector did not result in immediate or pronounced changes in stock performance.

However, the logret_BRENT variable remains significant ($\beta = 0.0367, p = 0.0205$), reinforcing the finding that oil prices are a key driver of returns in the electric vehicle sector. This highlights the ongoing importance of market dynamics related to traditional energy prices, which may overshadow the effects of tariffs in influencing sector performance.

6 Conclusions

The results of these regressions indicate that the tariffs imposed by the United States did not, except for the solar panel sector, have a significant negative impact on the returns of Chinese stocks. This finding is further confirmed when we run regressions using dummy variables that capture only the short-term effects of the tariffs. Specifically, the dummy variable is set to 1 only for the 7 trading days following the introduction of the tariff. Even in this case, the effect of tariffs on our indices is insignificant, and, in fact, the previously significant effect on the solar panel sector loses its significance. Thus, it is not only that the effect of these tariffs is not persistent on returns, but there appears to have been no effect at all.

Several explanations could account for this phenomenon:

- One plausible reason is that the market had already priced in the tariffs before their actual implementation. Investors often react to expectations rather than to concrete events, and preliminary announcements of tariffs may have led to portfolio adjustments and price realignments well before the tariffs were introduced.
- Another possible explanation lies in the elasticity of demand for these goods.

For washing machines and electric vehicles, demand appears to be relatively inelastic with respect to price, which could explain why the introduction of tariffs did not significantly impact stock returns.

- **Washing Machines:** Washing machines are durable goods that, while not essential, have relatively long purchase cycles. Consumers tend to replace these goods only when necessary, and not frequently. This could mean that, even in the presence of a price increase due to tariffs, consumers simply postponed their purchases rather than abandoning them altogether, keeping demand stable in the medium-to-long term. Moreover, the presence of alternative producers or incentives to purchase local products (both in the U.S. and China) might have mitigated the effect of tariffs on the prices perceived by end consumers.

- **Electric Vehicles:** Electric vehicles, while not essential, are often perceived as aspirational goods, tied to motivations such as sustainability, technological innovation, and social status. This makes their demand less sensitive to price changes, as consumers willing to invest in an electric vehicle tend to be less price-sensitive. Additionally, government incentives for the purchase of electric vehicles, particularly in China, may have offset the cost increases due to tariffs. The availability of direct subsidies, tax breaks, or exemptions likely protected demand and, consequently, the returns of companies in this sector.

In contrast, **solar panels** appear to exhibit more elastic demand with respect to price. This result can be attributed to several factors:

- **Investment-Driven Demand:** Unlike washing machines or electric vehicles, solar panels are often purchased as part of investment projects (residential or industrial). Investors tend to be more sensitive to cost variations, as a price increase can significantly reduce the expected return on investment. The introduction of tariffs likely increased the costs of solar energy projects, reducing the economic attractiveness of new installations and causing a contraction in demand.

- **Global Supply Chains:** The solar panel sector is highly globalized, with complex supply chains that include critical components such as polysilicon. Tariffs imposed on solar panels or associated materials may have directly increased production costs, which were harder to absorb or pass on. Unlike washing machines, where producers can diversify suppliers or pass costs to consumers, the high specialization in the solar sector makes these adjustments more challenging.

This analysis highlights that demand elasticity does not solely depend on whether a good is essential but is also influenced by the economic context, consumer motivations, and market dynamics. While solar panels, being investment-driven and globally integrated, showed a higher sensitivity to tariffs, more resilient and protected sectors, such as washing machines and electric vehicles, were less affected. This underscores the importance of considering not only price elasticity but also the role of government policies and business strategies in shaping the response to trade policy changes.

Although the results of this research did not yield the definitive answers initially sought—namely, significant impacts of U.S.-imposed tariffs on the returns of Chinese sectoral indices—the study opens the door to new questions and areas of exploration. The absence of consistent and persistent effects suggests that factors such as market anticipations, sectoral resilience, and policy mitigations may play a larger role than previously assumed. The key question moving forward is: how can this model be refined to capture more nuanced responses? One potential improvement lies in leveraging high-frequency data, which may better reflect immediate market reactions to tariff announcements. Such data could provide insights into the short-term dynamics of price adjustments, which are less visible in analyses spanning longer time horizons. Moreover, with the reelection of Donald Trump and his renewed focus on imposing tariffs, there is an opportunity to expand the dataset with new trade measures that could shed light on the evolving impacts of protectionist policies. These future analyses may further validate or challenge the findings presented here, contributing to a deeper understanding of the intersection between trade policies and financial markets. The ultimate aim of this research is not only to provide answers but also to inspire new questions that

push the boundaries of our understanding. By doing so, we can continue to improve the models and methodologies used to analyze the complex interplay of geopolitical decisions and market behaviors.

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