

# Research the Impact on Stock Index and Stock Index Future under the Trade Policies Adjustment -- Based on China and the US

*Sihan Le*\*

Hefei University of Technology, School of Economics, 230601 Hefei, China

**Abstract.** In reset years, many international uncertainties emerge, especially in trade policies. The US announced a higher tariff on imported commodities manufactured in China, Mexico, and Canada on 1 February 2025. The higher trade barrier gives a hint to explore how the uncertain trade policies affect the spot and future market under the case that most countries' economies are connected tightly in the global market. This research estimates the impact of trade policy uncertainty on the stock index and stock index future. Fitting the VECM model during the influence persisting in the spot and future market and the whole period the research is conducted to test the return spillover effect between the CSI 300 index and the CSI 300 index future. After examining the return of spot and future, there is a spillover effect in the spot and future market, meanwhile, the price discovery of the future still works under the dynamic changes.

## 1 Introduction

On 10 February 2025, the US announced to rise in the tariff on the products imported from Canada, Mexico, and China. As the trade fractions between different countries never stop and once the tariff is adjusted, it is essential to trace the influence of tariff policy. As the traditional international trade theory shows there is cross-market influence between the commodity market, foreign exchange market and the asset market.

Also, the fact states that once the information that the US was about to raise the tariffs on the imported products produced in China was announced on March 23, 2018, the CSI 300 index fell by 3%, and the influence persisted for several months. For the tariff adjustment and other restricted regulations continuously published, finding the impact of these policies on the spot and future market is critical. Even if in the US, the stock index futures have a long history, in the Chinese financial market, stock index futures just started to grow. CSI 300 index future came up in 2010, and both SSE 50 index future and CSI 500 index future came up in 2015. Although the stock index future in China is incoming, the future has been in the market for a long time, especially commodity futures. With the advantages that locking the delivery price in advance, high leverage and costing less, and less counterparties risk, the future is a vital tool in risk management and hedging.

---

\* Corresponding author: 2022212718@mail.hfut.edu.cn

Future pricing is usually based on a no-arbitrage strategy. According to the pricing method, the price of the future is the present value of the cash flow at maturity. The research conducted by Chang et al. shows that the stock index future enlarges the volatility of the stocks which is a component of the stock index but has no effect on the stock excluded from the stock index [1]. Also, Frino and West found that price discovery usually happens on the market with the lowest cost, for the information-based trade occurs in the market has the largest potential for arbitrage [2]. Jia and Kang further explored the mechanism of future price prediction [3]. Also, it has been proven by Diebold and Yilmaz that there is a spillover volatile effect between the spot market and the future market [4]. CSI 300 index, as the underlying asset of the CSI 300 index future, is different from the other commodity underlying assets. CSI 300 index is volatile for taking numerous factors into account. The cross-market effect, significant announcement issue, and economic cycle are dominant factors. Arshanapalli and Doukas studied the cross-market influence when there was a market crash in 1987. The conclusion they gave is that the crash in 1987 originated in the US and spread out the world. In the past decade, COVID-19 is an event with lots of impacts[5]. Indicators concerning the macroeconomic policies have a greater effect on the stock index and volatility, as stated by Ayadi et al., supporting the statement on a fundamental basis [6]. Go and Lau reveal how information transformation is affected by financial crises [7]. In recent years, Shi et al., and Zhou et al. have contributed their effort to research how the spot and the future market act under the Russia-Ukraine conflict in the crude oil market and agriculture commodities future market [8,9]. Chen and Tongurai contributed their efforts to finding how price discovery was affected by the China and US trade policies changes in several future markets [10].

Even if current research contributes a lot to exploring the influence of risk events and unexpected incidents on the stock index and the stock index future, there is a gap that few scholars focus on the impact of frequent changes on trade policies. This paper will make up the margin. As stock price is a random walk and no trend, to mine the information included in the time series, the research fitting the VECM model to estimate whether the risk exposures in both spot and future markets are enlarged by the increased tariff acts, the influence of implement the higher tariff policies is cross-market spillover.

## **2 Data and Methods**

### **2.1 Data selection**

CSI 300, consisting of 300 securities in the Shanghai Security Exchange and Shenzhen Security Exchange, with the largest scale and best liquidity, as the most effective reflects the performance of the Chinese equity market. CSI 300 future, deriving the value from the CSI 300, having four contracts as the maturity of each contract is different. Since the momentous information was released in 2018, the dataset started in 2018 and ended in 2025. The data is collected from the CSMAR database. To avoid the frequent transactions and large basis risk dwindle the effectiveness of the research, the price of the CSI 300 index future is the transaction price of a contract with maturity in 3 months. As mentioned before, this research uses the return rate of the stock index and the relative future and logarithm of the return. The variables in the dataset are listed in Table 1.

As to the trade friction between China and the US, it began in 2018 and continuously affect international trade until today. The research lists the significant date and the acts of governments in Table 2.

There have been a series of tariff adjustments in the past decade, during the interval, there have been continuous announcements of trade policy adjustments. New policies are just

published in a second, but it takes time to transform the impacts on the other parties in the global economies and react to the policy changes. To estimate the period under the influence of the tariff policies adjustment, the paper set the buffer window for 30 days to show the shock in the stock market and the future market as the policies put off. To estimate the effect policies changed on the CSI 300 index and CSI 300 index future, the paper creates two events to seek the influence of tariff changes. The details of the events are recorded in Table 3.

**Table 1.** Variables name

Variable Name	Variable Meaning	Time Period
IF_Clsprc	Price of CSI 300 index future	2018.01.03- 2025.03.14
300Indexpic	CSI 300 index	
Ln(IF_Clsprc)	Logarithm of CSI 300 index future price	
Ln(300Indexpic)	Logarithm of CSI 300 index	
Ln(IF_Clsprc_Return)	Logarithm the return rate of the CSI 300 index future depends on its closing price	
Ln(300Indexpic_Return)	Logarithm the return rate of the CSI 300 index depends on its index	

**Table 2.** The time of significant trade policies announced

Time Spot	Acts of the Governments
2018.03.09	Trump issued the tariff decree that charged the imported goods from China 25% extra
2018.06.15	China announced to increase in the tariffs on import commodities from the US
2018.07.06	Chinese export commodities to the US in the list were charged an extra 25% tariff
2018.12.01	China and the US reached an agreement that stopped raising the tariff in 2019
2019.05.10	The US announced to extend the range of products imported from China on the list which are charged higher tariffs
2020.02.06	China announced an adjustment to the tariff on goods imported from the US, lowering the rate.
2025.02.01	The US announced to charge all import commodities produced in China 10% tariff extra
2025.02.10	China announced to rise tariffs of some goods imported from the US

**Table 3.** Events in the research

Event ID	Time Periods	Dataset
Event 1	2018.01.02- 2025.03.15	Take 2018.03.09, 2018.07.06, 2019.05.10, and 2025.02.01 as the time to estimate trade policies change imposed and take 30 days as the buffer window to trace the information transaction.
Event 2	2018.03.09- 2018.12.01	Consider the interval as the period under the influence of the trade policy changes

## 2.2 ADF

Before modeling the VECM model, the time series are supposed to be stationary. Then performing ADF validation on the datasets to check the stationarity. The optimal lag, found by the VAR model, was selected following the Akaike information criterion(AIC). After performing the first difference, the result of the ADF test conveys that the sequence that logarithm return of CSI 300 and CSI 300 index future are stationary sequences with 99% confidence. For the reason that the ADF statistic is much less than -3.96, which represents the 99% confidence that there is no unit root in the logarithm return rate series. The CSI 300 index and CSI 300 index future price and the series taking logarithm are nonstationary. It can be said that the logarithm of the CSI 300 index and the CSI 300 index future are I(1) variables.

In the following sectors, the research takes  $Ln(IF\_Clsprc)$  and  $Ln(300Indexpic)$  as variables to set up the model.

### 2.3 Johansen cointegration test

Based on the result of the ADF test, the time series is nonstationary, taking the Johansen cointegration relationship test to check whether the CSI 300 stock index is cointegrated with the CSI 300 stock index future within the periods, the result of the Johansen test shows the hypothesis that at most there is 1 rank is accepted. The test concludes that both in Event 1 and Event 2, there is 1 cointegration relationship between  $Ln(IF\_Clsprc)$  and  $Ln(300Indexpic)$ .

### 2.4 Granger causality test

The Granger causality test is for examining the ability of a variable to predict another variable, making the model better for predicting future trends in similar scenarios. As the datasets are categorized by the events, in the Granger causality test, checking the causality of CSI 300 index and CSI 300 index future in different periods, and the result shows that there is 95% confidence to take  $Ln(IF\_Clsprc)$  and  $Ln(300Indexpic)$  as an indicator to predict in two events with the optimal lag relatively.

## 3 Result and discussion

### 3.1 VECM model

VECM model requires the dataset that the time series have to be nonstationary and there is at least 1 cointegration relationship between variables. The tests that have been done before conveying the stock index and price of the future are I(1) variables, corresponding with the assumption of the VECM model. Also, there is one cointegration rank between  $Ln(IF\_Clsprc)$  and  $Ln(300Indexpic)$  according to the result of the Johansen Cointegration test. Molding started with the function (1):

$$\Delta Y_t = \alpha \beta^T Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

The result of matrixes in the functions in Event 1 and Event 2 are in Table 4.

**Table 4.** VECM result

Event	Lag	Result	
Event 1	7	$\alpha = \begin{pmatrix} -0.11093076 \\ -0.07280556 \end{pmatrix}$	$\Gamma^T = \begin{pmatrix} 0.1993916 & 0.47313806 \\ -0.22378509 & -0.49497641 \\ 0.1761243 & 0.33304278 \\ -0.16333216 & -0.32494274 \\ 0.2502249 & 0.36731145 \\ -0.22432664 & -0.35593857 \\ 0.01127758 & 0.06398994 \\ -0.04287864 & -0.09064303 \\ 0.28027905 & 0.31686033 \\ -0.32240188 & -0.35562505 \\ 0.22176096 & 0.23042195 \\ -0.28583157 & -0.29678275 \\ 0.01100935 & 0.01840035 \\ 0.00375701 & -0.00210645 \end{pmatrix}$
		$\beta = \begin{pmatrix} 1 \\ -0.95904794 \end{pmatrix}$	
Event 2	4	$\alpha = \begin{pmatrix} -0.19193764 \\ -0.09544942 \end{pmatrix}$	

	$\beta = \begin{vmatrix} 1 \\ -0.88927025 \end{vmatrix}$	$\Gamma^T = \begin{pmatrix} -0.32877011 & 0.11364303 \\ 0.2567966 & -0.19184054 \\ -0.0430603 & 0.12264254 \\ 0.04368741 & -0.11175301 \\ 0.92112471 & 0.90311248 \\ -0.91112505 & -0.9092987 \\ 0.4332328 & 0.44508456 \\ -0.54468608 & -0.55452773 \end{pmatrix}$
--	--	---

### 3.2 Result interpretation

The VECM model is for describing the long-term equilibrium of variables. In this case, the general idea the models convey is that the CSI 300 index and CSI 300 index future are in long-term equilibrium, although there are distractions in the periods with the impact of significant events. The functions describing the long-term equilibrium are listed in Function 2.

$$\begin{cases} \ln((IF\_Clspc))_{t-1} = 0.9590 \times \ln(300Indexpic)_{t-1} + 0.9590 & (\text{Event 1}) \\ \ln((IF\_Clspc))_{t-1} = 0.8893 \times \ln(300Indexpic)_{t-1} + 0.8893 & (\text{Event 2}) \end{cases} \quad (2)$$

These functions provide strong evidence that the future still has a price discovery function even if under an uncertain economic environment. As the  $\beta$  is positive, it can be said that from 2018 to 2025, both the stock and futures markets have spontaneous growth within short periods. In Event 1, the dataset imported the events and took 30 days as a buffer window to estimate the influence of significant events as an exogenous variable, estimating the relationship of the spot and the future in the whole window. The absolute number of the basis is larger when trade policy changes happened for the  $\beta$  in Event 2 is smaller than in Event 1. This can be explained by the periods that in Event 2 both the spot market and the futures market are under the influence of the tariff policies change, both the stock index and future have a higher level of uncertainties and larger risk exposure. As a result, the stock index cannot be fully predicted by the CSI 300 index future, presenting in the formula that the  $\beta$  is smaller when the tariff policies change frequently.

Also,  $\alpha$  in the function is the adjusted velocity, correcting the volatile of spot and future when they distract equilibrium in the next period, the result of  $\alpha$  is on Function 3.

$$\begin{cases} \alpha_{event 1} = \begin{vmatrix} \alpha_1 \\ \alpha_2 \end{vmatrix} = \begin{vmatrix} -0.1109 \\ -0.0728 \end{vmatrix} \\ \alpha_{event 2} = \begin{vmatrix} \alpha_1 \\ \alpha_2 \end{vmatrix} = \begin{vmatrix} -0.1919 \\ -0.0954 \end{vmatrix} \end{cases} \quad (3)$$

As the price of the CSI 300 index future and its changes can apply to the CSI 300 index fluctuation interpretation, so does the CSI 300 index, there is spillover volatile crossing the spot and the future market in the short run. Both in Event 1 and Event 2, if the CSI 300 index and CSI 300 index future are higher than equilibrium for a unit at time  $t$ , in the next period,  $\Delta \ln((IF\_Clspc))_{t-1}$  or  $\Delta \ln(300Indexpic)_{t-1}$  will decrease  $\alpha$  unit to back to equilibrium. The velocity of correcting price and index to the long-term equilibrium is faster when trade policies are announced frequently. This may be because trade policy changes will distract the index and price of the future making them more scattered, which requires a higher velocity to correct. Also, in two events, the velocity of correcting the CSI 300 index future to the equilibrium is faster than the CSI 300 index. Under the impact of trade policy changes, the velocity of the CSI 300 index future correcting is faster than the stock index approximately two times.

In Table 5, it shows the testing result in statistics of the model in Event 2. After lag for 3 periods, there is 95% confidence either use  $\ln(IF\_Clspc)$  to explain  $\ln(300Indexpic)$  or use  $\ln(IF\_Clspc)$  to explain the trend of  $\ln(300Indexpic)$ . But it is supposed to be noticed that

it is more convincing to take  $Ln(IF\_Clsprc)$  after 3 lag to explain the changes of spot and future is less than take  $Ln(300Indexpic)$ .

**Table 5.** Testing result of VECM model in Event 2

Loading coefficients (alpha) for equation Ln(IF Clsprc)						
variable	coef	Std err	z	P> z	[0.025	0.975]
ec1	-0.1919	0.132	-1.459	0.145	-0.450	0.066
Loading coefficients (alpha) for equation Ln(300Indexpic)						
variable	coef	Std err	z	P> z	[0.025	0.975]
ec1	-0.0954	0.116	-0.825	0.409	-0.322	0.131
Cointegration relations for loading-coefficients-column 1						
variable	coef	Std err	z	P> z	[0.025	0.975]
beta.1	1.0000	0	0	0.000	1.000	1.000
beta.2	-0.8893	0.029	-30.161	0.000	-0.947	-0.831
const	-0.8955	0.241	-3.718	0.000	-1.368	-0.423

### 3.3 Model Estimation

P-values of  $\alpha$  in two events are less than the critical value of 95%, explaining that the stock index and future can explain the fluctuation of the other, corresponding with the result of the Granger Causality test. Both significance levels of the  $\beta$  and  $\alpha$  are higher than 99% in Event 1, except the P-value of  $\alpha$  in  $Ln(300Indexpic)$  is 0.019, higher than the 99% critical value.  $\beta$  in Event 2 with a 99% significance level that the cointegration equation can explain the price of future and index and  $\alpha$  in Event 2 is accepted with a 95% significance level.

### 3.4 Discussion

The paper molding the VECM model for detecting the relationship between the price of future and spot under tariff adjustments by creating two events. Event 1 estimates the relationship of the spot and the future in the long term taking trade policy adjustments as an exogenous variable. Event 2 presumes to be the period affected by the tariff changes in China and America. Informed by the Granger Causality test, with optimal lag, spot, and future are the Granger Causality of another variable. It can be rephrased that the price discovery of the future is still affected by the influence of the trade policies adjusting. The VECM model in Event 1 and Event 2 suggests that the CSI 300 index and the price of the CSI 300 index future are in long-term equilibrium, the spillover volatile effect between the CSI 300 index and CSI 300 index future has been found under the impact of trade policies change. Also, there is a lagged impact of spot and future on each other. While the influence of the tariff increase persists, enlarging the fluctuation of the CSI 300 index and the price of the future. Consequently, the short-run correcting volatility is higher than the volatility in a longer time.

Even if the statistic results in Event 1 show that shocks the research takes to presume the changes of the tariff are not significant, Event 1 still gives an overview of the relationship between CSI 300 index and future in a longer time period. The Event 2, which under the most significant periods affected by the tariff increasing, clearly present how stock index and future affect other relatively.

## 4 Conclusion

The paper analyzes the relationship between the CSI 300 index and the CSI 300 index future under trade policy changes. The spillover volatile effect on the spot and future market has

been proved under the trade policies changes. Also, during the uncertainty exists in the international trade, the price discovery of future still effect.

This research associates the changes in international trade with the equity market and future market, consisting of the uncertainty of the international policies as a risk premium of the future market. As the global value chain specializes, collaborating with sectors in different countries is the future trend. Indicating the fluctuation in another economy will spread to other countries and shock their domestic market. A financial market is essential to drive the development of the economy. Stock index, as an overview of the equity market, summarizes the profitable ability of the listed company and the general economic circumstance of a country. Identifying the relationship between the stock index and the stock index's future under unexpected shocks helps the economy react to the changes instantly, Stabilize the equity market, and manage risk. The research this paper conducted does not eliminate the impact of COVID-19, dividend payment and component stock changes, which might affect the capability to apply the model in practice.

As current international interactions are full of uncertainty, probably tariff adjustments and other changes in trade policy between countries will happen in the future. It is better to keep tracing the impact of international policy issued by countries and adjusting the model. What's more, there are many models capable of exploring the relationship between the spot and the future. Taking the influence of the events into other models to mine the information data embodies. To precisely measure the influence of unexpectable issues in the financial market, setting up indicators about the global uncertainty and the intensity of events, quantifying the systematic risk accurately.

## References

1. E.C., Chang, J. W., Cheng, & J. Michael., Pinegar, Does futures trading increase stock market volatility? The case of the Nikkei stock index futures markets. *Journal of Banking & Finance*. **23(5)**, 727–753 (1999)
2. A., Frino, & A., West, The impact of transaction costs on price discovery. *Pacific-Basin Finance Journal*. **11**, 139–151 (2003)
3. J., Jia, & S. B., Kang, Do the basis and other predictors of futures return also predict spot return with the same signs and magnitudes? Evidence from the LME. *Journal of Commodity Markets*, **25**, 100187 (2021)
4. F. X., Diebold, & K., Yilmaz, Better to give than to receive: Predictive directional measurement of volatility spillovers. *International Journal of Forecasting*, **28**, 57–66 (2012)
5. B., Arshanapalli, & J., Doukas, The linkages of S & P 500 stock index and S & P 500 stock index futures prices during October 1987. *Journal of Economics and Business*, **49**, 253–266 (1997)
6. M. A., Ayadi, Walid Ben Omrane, & R., Khan, Intraday impact of macroeconomic and COVID-19 news on Latin American stock indexes. *Global Finance Journal*, **65**,101103–101103 (2025)
7. Y.-H., Go, & W.-Y., Lau, The impact of global financial crisis on informational efficiency: Evidence from price-volume relation in crude palm oil futures market. *Journal of Commodity Markets*, **17**, (2018)
8. F., Shi, Y., Deng, & Y., Guo, Comparison of the interdependence relationship between crude oil futures and spot in China and international crude oil markets – evidence from time-frequency and quantile perspectives. *The North American Journal of Economics and Finance*, **77**, 102390 (2025)

9. W.-X., Zhou, Y.-S., Dai, K. T., Duong, & P.-F., Dai, The impact of the Russia-Ukraine conflict on the extreme risk spillovers between agricultural futures and spots. *Journal of Economic Behavior & Organization*, **217**, 91–111 (2024)
10. X., Chen, & J., Tongurai, Informational linkage and price discovery between China's futures and spot markets: Evidence from the US–China trade dispute. *Global Finance Journal*, **55**, 100750 (2023)