

# Hedging Against U.S. Chinese Currency Fluctuation

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*Hedging currency helps protect financial assets and stock price by reducing the potential volatility of foreign exchange rates. A multiple regression analysis is used to assist in explaining some of the relative valuation of U.S. Chinese currency. This analysis uses the U.S. interest rate, U.S. 10-year Treasury Bond, Chinese CPI, U.S. CPI, Chinese Government 10-year Bond, and the Chinese Import Price as independent variables to predict the U.S. Chinese exchange rate. After conducting the analysis, the model was determined to be statistically significant. Two predictor variables: the U.S. CPI and Import Price Index were also statistically significant.*

## INTRODUCTION

America's economy is flourishing. Unemployment is low, and GDP is high. The U.S. dollar is appreciating against all foreign currencies. While the United States is currently experiencing a period of growth, organizations are still tasked with hedging their financial assets and protecting their financial interests. Due to the fluctuation in value of U.S. and foreign currencies over time, organizations are constantly searching for best practices to predict future exchange rates and protect their corporations and finances. By anticipating potential losses caused by the exchange rate, organizations can hedge accordingly (Brown, 2002).

The U.S. dollar is the world's main currency. Any changes in the value of the dollar affects the rest of the world. This growth is affecting investments throughout the world and attracting overseas money to the United States. Many investors believed the U.S. dollar's growth would be short-lived, but as it continues to grow to the highest level since July 2017, investors are beginning to bet on the U.S. dollar against foreign currencies. The growth of the Chinese Yuan is slowing down, but the growth of the U.S. dollar is steadily increasing. While a strong dollar is beneficial to importers, it is concerning to U.S. exporters, because a strong U.S. dollar results in a price increase in international prices for U.S. goods. The U.S. dollar is projected to continue increasing in value as the U.S. economy grows. However, this fluctuation of U.S. currency still poses a risk of loss to organizations. Some organizations can choose to utilize the fluctuation of currency to their advantage. However, it is unwise to be speculative and bank on the fluctuation of exchange rates to increase cash flow. Trade tensions with China have also been cited as a U.S. dollar booster because if a "trade war" erupts, the U.S. is projected to have the upper-hand against China (Iosebashvili, 2018). With the continued growth of the U.S. dollar, this projection means the U.S. dollar will be able to purchase more of a foreign currency than it did in the past. If the dollar continues to grow, distributors can purchase more goods from China at a lower price. However, there is no guarantee that the dollar will continue to grow and for this reason, organizations must hedge themselves against foreign currency. If the U.S. dollar weakens, it would result in an increase in the net cost of goods purchased from foreign countries

and a decrease in the net cost of U.S. made goods purchased by other countries. A weaker U.S. dollar would create a fall in the U.S. Treasury Bond yield, which in turn affects mortgage rates. Lastly, a weakened U.S. dollar means the U.S. dollar is not in high demand, which in turn could increase the demand for the Chinese Yuan (Amadeo, 2018).

With new policies set in place by President Trump, some argue that a “trade war” is imminent between the U.S. and China. Trump has levied tariffs on \$50 billion of goods imported from China (Swanson, 2018). With tariffs being placed on Chinese goods, China is retaliating with tariffs for imported American goods. The fear is that consumer prices will skyrocket in response to the newly imposed tariffs. President Trump’s goal is to levy taxes on over 1,000 Chinese products and bring jobs back to the United States by increasing the cost of imported goods. With tensions escalating, distribution companies must determine an effective process to hedge their finances when purchasing goods from China. The Trump Administration suggests a 25% tariff on \$50 billion of Chinese tech imports (Bremmer, 2018). For technology distributors in the U.S., this raises questions as to how China will react to these actions. China is threatening to levy heavy additional tariffs on U.S. imports in response. China’s Central Bank has been known to manipulate the exchange rate. Recently, the Central Bank Chief vowed to maintain the stability of the Yuan and protect their economy. With the value of the Yuan rising and falling in a matter of days, investors are constantly searching for the best means to hedge themselves and their companies from the volatility of the Yuan (Vaishampayan, 2018).

When looking at the volatility of the Yuan, organizations are constantly searching for ways to protect their financial interests. One way to protect financial interests is through hedging currency. To effectively hedge currency, an organization must determine which variables impact an exchange rate forecast with the highest accuracy. Determining which factors are the strongest predictors of the exchange rate is difficult. There are many qualitative and quantitative variables to consider. This study attempts to determine which factors are the strongest exchange rate predictors between the United States and China. It looks at exchange rate risk from a distributor’s perspective, since distributors constantly purchase products internationally. This paper will determine if the variables chosen are able to consistently be used to forecast the exchange rate between the United States and China.

If a distributor can accurately predict the exchange rate between the United States and China, they can purchase products when the exchange rate is higher, and the U.S. dollar is stronger than the Chinese Yuan. They can also enter into financial agreements to protect themselves from negative fluctuations in the exchange rate. This would create an opportunity where the distributor’s U.S. dollar buys more Chinese product. Determining the exchange rate between countries helps a distributor decide the most cost-effective way to purchase product. If they can accurately predict the fall of the exchange rate it might be in the best interest of organizations to purchase next month’s product inventory from a different country with a greater value of the U.S. dollar versus the foreign currency. Purchasing product from a country with the lowest exchange rate will save the organization money, thus hedging it from exchange rate fluctuations and the volatility of foreign currency. An example of hedging would be entering into a financial agreement to protect against the fluctuation in the exchange rate. This would be done through the financial futures market. Hedging is in the best interest of distributors because it protects their financial assets and stock price. Predicting the exchange rate could help distributors turn a profit from the fluctuation of exchange rates. The key is to reduce the volatility of foreign exchange rates by analyzing various predictors of the exchange rate, then making decisions based on the forecast.

## **REVIEW OF RELATED LITERATURE**

Gardner, Ritschel, White and Wallen discuss how the United States Department of Defense uses forecasting to determine future foreign currency exchange rates (2017). This article analyzes and compares the accuracy of various forecasting methods such as center-weighted average, ARIMA (auto regressive, integrated, moving average), random walk method, forward rates, futures, and uses a private company’s forecasting. The best forecasting method was determined by finding the sum of squared errors or the forecast errors.

Frazier (2014) defines risk management and best practices to effectively minimize risk in a business environment. Through his research he discusses the utilization of hedges to protect companies from an increase in price, forecasting inventory needs to ensure that a company does not have too many or too few materials in inventory, and the effectiveness of hedging. Companies must create and maintain a competitive edge by anticipating future risks and taking preventative measures by hedging in the financial futures market. Frazier uses regression to analyze the effectiveness of an automobile manufacturer's hedging strategy regarding the Canadian dollar exchange rate. It was determined that the U.S Consumer Price Index (USCPI), the Canadian 10 Year Bond (CATYTB), and the U.S. 10 Year Treasury Bond (USTYTB) were the largest influencers of the Canadian U.S. exchange rate (EXRATE).

Schwartz and Ganatti (2014) describe the situations where companies will begin to hedge their funds against foreign currencies. With central banks across the world changing their policies, it is believed that the value of the U.S. dollar and exchange rate will also change. If the U.S. has higher exchange rates than other foreign countries, then companies are more likely to hedge their funds. Schwarz and Ganatti used the Consumer Price Index (CPI) as another good indicator in determining the power of a country's currency. Through an analysis of data over four decades, they discovered a trend in the value of the U.S. dollar, stating that its value would cycle between weak and strong every six to ten years. They also determined that foreign currency provided a diversification in investments that the U.S. dollar could not offer. If organizations are not confident in their knowledge of foreign currency and forecasting the fluctuation of foreign currency, it is recommended that they hedge their financial assets.

Dow and Kunz (2015) looked at St. Louis Chemical (SLC), a chemical distributor, and their decision to purchase RMO International, a company similar to St. Louis Chemical but headquartered in Germany. Don Williams had to decide whether to acquire RMO International or continue with the current joint venture with him owning fifty-one percent of RMO International. If acquired, all future euro cash flows from RMO International would be converted from euros to U.S dollars at unknown exchange rates. The fluctuation of the euro's strength would determine if SLC's return on investment would increase or decrease. A strong euro would mean more USD per euro and a higher return on investment, but a weak euro would mean less USD per euro and a lower return on investment. They decided to swap currencies to reduce borrowing costs and exchange rate risk to make the deal profitable and less risky for SLC. Williams ran a report to analyze exchange rate risk based off a neutral exchange rate of euros to USD to determine if it would result in a positive or negative net present value. A moderately neutral exchange rate would result in a positive net present value with 85% confidence level. A moderately weak neutral exchange rate would result in a positive net present value with only 65% confidence level, and if there was a weak exchange rate, it would result in a positive net present value 35% of the time. To hedge his company Williams decided to swap currencies by borrowing \$135 million, exchanging it for €100 million and repaying €5.8 million each year. This would hedge his company from the fluctuating value of the euro.

Chang and Lee (2017) utilized an econometric model to determine the factors that influenced governments' exchange rate regime. Events that affect the entire world, the volume of international trade, the economy of each country, and globalization influence a government's decision on exchange rate. They determined the likelihood that a government would choose a flexible or fixed exchange rate regime by MNL and MNP models. They discovered that democratic and left-wing countries with a central bank are more likely to implement a flexible regime, which allows the exchange rate to be determined by supply and demand. China is considered one of these left-wing countries because they have a high output and their central bank created a flexible exchange rate regime. A flexible exchange rate also allows the Chinese government to manipulate their exchange rate to increase or decrease the value of their currency. China's central bank intentionally devalues their currency to make it a more cost-effective choice for other countries. Politics and a country's economy play a large role in determining what is a preferable exchange rate.

Reed (2016) discusses how the strengthening of the U.S. dollar impacts other international currencies like the euro, Japanese Yen, Chinese Yuan, and Canadian dollar. As the U.S. dollar strengthens against other dollars, it can purchase more goods from other countries, making imports cost less. When analyzing

the results of the study regarding China, Reed discovered China's economy was struggling in 2015. It experienced low growth, a volatile stock market, and a weak export sector. The People's Bank of China can manipulate the exchange rate by creating policies to devalue the Yuan by basing the price of Yuan on the midpoint of the previous day's closing price. This policy devalued the Yuan by 1.9%. The devaluation of the Yuan helps China compete with other countries by making their exports cheaper than competitors thus creating an appeal to American companies. The combination of a strong U.S. dollar and a weaker Yuan means U.S. companies can import goods at lower prices than before.

Wen-Chih and Chen-Yuan (2013) collected quantitative data on international political power in relation to China to determine whether international political pressure had an impact on China's international exchange rates while using China and the United States' relationship as the foundation for the study. Politicians manipulate the exchange rate policy to promote economic growth. This paper used qualitative data on Chinese explanations of their exchange rate policy, variations of the policy, international political interaction, and comments of foreign governments to create the study. In 2003, the U.S. had a trade deficit with China which gave China a competitive edge. The Secretary of State urged China to implement a more flexible regime, arguing that the Chinese government had undervalued the Chinese Yuan. After constant pressure from the U.S. government, in 2005 the Chinese government increased the exchange rate of the Yuan. Their analysis showed that international political pressure impacted China's decision to increase the Yuan exchange rate from the years 2002-2008. Analyzing the fluctuation of exchange rate, Wen-Chih and Chen-Yuan determined that international political pressure, inflation, and economic factors significantly influenced the Chinese exchange rate. This shows that the Chinese government will change their exchange rate in response to pressure from other governments. Exchange rate is influenced by quantifiable factors like CPI, but also qualitative factors like international political pressure.

Wei (2015) investigates utilizing the VAR model to describe China's economy. They pulled monthly data from 1994 through 2010 and analyzed the effect of the price of oil, U.S. and Chinese industrial production, U.S. and Chinese consumer price index, and the U.S.-Chinese bilateral exchange rate. It was determined that China's aggregate supply shock and exchange rate shock had the greatest impact on U.S.-Chinese exchange rates, and that the U.S. supply and demand, oil prices, and production did not affect the exchange rate. Instead, the Chinese supply and demand had the highest impact of exchange rate. In the conclusion of their findings, Wei stated that manipulating the exchange rate is not an effective way to correct trade imbalances.

## **BUSINESS ENVIRONMENT**

Distribution companies are becoming more widespread in the United States. However, distributors do not manufacture the products they sell. Instead, they buy products from a manufacturer and sell for a mark-up. This means distributors operate on minimal profit margins, which creates the need for efficiency in every area of the business. Successful distributors will possess a solid customer base, supplier contracts, and contracts that ensure that the needs of customers are being met while offering competitive prices (Dow & Kunz, 2015). Since margins are low, a small fluctuation in the exchange rate could affect the margin in a large way. To encourage purchasing product from the distributors rather than the manufacturer, distribution companies add value. Some distributors offer marketing services, reseller financial services, the ability to store goods in their own warehouse, education and sales training, or access to IT support. Distribution companies must anticipate future losses and hedge themselves accordingly. Many organizations will conduct a financial analysis of their suppliers and end users to determine the likelihood of receiving payment.

Whether products are exported to China or imported from China, there is a foreign exchange risk every time U.S. dollars are converted to Chinese Yuan or vice-versa. Distributors are tasked with hedging their financial assets and protecting their margins. Publicly-traded distribution companies are required to keep shareholders informed on the financial standing of the company. For this reason, distributors must hedge against translation exposure. Translation exposure is the risk that the value of assets and liabilities

will change when converted from one currency to another. This would affect the annual 10k report stockholders receive summarizing the company's performance over the past year. Exchange rates could affect the report thus creating an image that the company's financial performance was weaker or stronger than in reality.

The 10k publication on the United States Security and Exchange Commission of various distributors stated actual results could differ from those suggested due to changes in exchange rate. One example, Distributor X, utilizes foreign currency derivatives to reduce foreign currency exposure to zero. When hedging the goals are to manage foreign risk without speculation, reduce the volatility of cash flows, and protect earnings. They used foreign exchange future contracts to hedge against foreign exchange risk. Currently, Distributor X does not analyze predictors of exchange rate. Instead, they focus on hedging against balance sheet exposure so there is no net change from the fluctuation of exchange rates. Distributor X could increase their hedging potential by analyzing predictors of exchange rate and adding yet another hedge to their organization.

## **METHODOLOGY**

Multiple regression analysis is used to analyze the data for this study. A regression analysis is useful in determining the relationship between exchange rate and the U.S. interest rate, U.S. Treasury Bond, Chinese Government Bond, U.S. CPI, Chinese CPI, and the Chinese Import Price Index. Table 1 outlines the dependent and predictor variables. It also provides additional details for each variable. The exchange rate formula used is as follows:

$$\text{EXCHANGE} = \alpha + \beta_1 \text{USINTRATE} + \beta_2 \text{USTBOND} + \beta_3 \text{CHINACPI} + \beta_4 \text{USCPI} + \beta_5 \text{CHINAGBOND} + \beta_6 \text{PRICEINDEX} + \mu. \quad (1)$$

where  $\alpha$  is a constant and  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$  and  $\beta_6$  are coefficients of the USINTRATE, USTBOND, CHINACPI, USCPI, CHINAGBOND, and PRICEINDEX. Each of these factors potentially affect the relative demand for one country's currency versus another. Table 2 details the variables that were entered into the regression analysis. Table 3 details the  $r^2$  and adjusted  $r^2$  value for the analysis. Table 4 is the ANOVA table that details the statistical significance of the model. Table 5 shows the statistical significance of the variables used in the model. It also shows the statistical significance for each variable.

**TABLE 1**  
**DEPENDENT AND PREDICTOR VARIABLES**

<b>Abbreviation</b>	<b>Variable</b>	<b>Definition</b>	<b>Location of Data</b>
EXCHANGE	China U.S. Exchange Rate	Price of China's currency in terms of U.S. dollar	U.S. Federal Reserve
USINTRATE	U.S. Interest Rate	Rate which U.S. banks and credit unions lend to other institutions	Fed Prime Rate
USTBOND	U.S. Treasury Bond	10-year risk-free bond issued by the U.S. Treasury to finance government spending, yield includes full range of investments offered by the U.S. government	U.S. Treasury
CHINACPI	China CPI	Percent change in prices year-to-year, or inflation, of goods purchased by consumers	Inflation.eu
USCPI	U.S. CPI	Percent change of prices year-to-year for all urban consumer prices	Bureau of Labor and Statistics
CHINAGBOND	China Government Bond	10-year bond issued by the Chinese government to finance government spending	Investing.com
PRICEINDEX	Chinese Import Price Index	Measures average change in prices of goods imported into the U.S. from China	Bureau of Labor and Statistics

### **Hypothesis Formulation**

It is hypothesized that the Chinese U.S. exchange rate is a function of the U.S. interest rate, U.S. 10-year Treasury Bond, Chinese CPI, U.S. CPI, Chinese Government Bond, and Chinese Import Price Index. The regression analysis would determine if the variables chosen were strong predictors of the China U.S. exchange rate. This hypothesis is based on quantifiable factors that could potentially affect the exchange rate with a focus on variables that influence distributors. The purpose was to determine if the variables chosen could predict Chinese U.S. exchange rates and be used by distribution companies to effectively hedge against fluctuations in the exchange rate. The null hypothesis is that there is no correlation between U.S. interest rate, U.S. 10-year Treasury Bond yield, Chinese CPI, U.S. CPI, Chinese 10-year Government Bond, and the Chinese Import Price Index and the exchange rate. If the p-value is less than .05, the null hypothesis will be rejected.

### **Dependent Variable**

EXCHANGE: The foreign exchange rate between China and the U.S. was available through the U.S. Federal Reserve. It lists the units of Yuan per U.S. dollar.

### **Independent Variable**

USINTRATE: The U.S. Interest Rate was found by gathering data from the Fed Prime Rate. The data used was the monthly prime rate.

USTBOND: The U.S. 10-year Treasury Bond yield was available through the U.S. Treasury. The daily treasury curve yield rate was used with data from the first day of each month over a five-year period.

CHINACPI: The Chinese Consumer Price Index was available through Inflation.eu – Worldwide Inflation Data. The Chinese CPI can be used to determine if inflation correlates with exchange rate and can be used as a predictor of future exchange rates.

USCPI: The U.S. Consumer Price Index was available on the Bureau of Labor and Statistics. The data included all items for all urban consumers (CPI-U) for all items. This was based on the percent change in CPI from 12 months prior. The base period of the data was 1967 = 100. The U.S. CPI can be used to determine if inflation correlates with exchange rate and can be used as a predictor of future exchange rates.

CHINAGBOND: The monthly yield rate of a 10-year Chinese Government Bond was found on Investing.com. The monthly yield was based on the first day of each month.

PRICEINDEX: The Chinese Import Price Index was available through the Bureau of Labor and Statistics. The data used included the index value listing for all industries across China. The base period of the data was December 2003 = 100. The Import Price Index shows the average price movement for goods imported from China each month.

The data used in this study are statistics from January 2013 through December 2017.

**TABLE 2  
VARIABLES ENTERED / REMOVED**

Model	Variables Entered	Variables Removed	Method
1	USINTRATE, USTBOND, CHINACPI, USCPI, CHINAGBOND, PRICEINDEX <sup>b</sup>		Enter

a. Dependent Variable: EXCHANGE

b. All requested variables entered.

**TABLE 3  
MODEL SUMMARY**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957 <sup>a</sup>	.916	.906	.0830716

a. Predictors: (Constant), USINTRATE, USTBOND, CHINACPI, USCPI, CHINAGBOND, PRICEINDEX

**TABLE 4  
ANOVA TABLE**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.986	6	.664	96.273	.000 <sup>b</sup>
	Residual	.366	53	.007		
	Total	4.352	59			

a. Dependent Variable: EXCHANGE

b. Predictors: (Constant), USINTRATE, USTBOND, CHINACPI, USCPI, CHINAGBOND, PRICEINDEX



**TABLE 5**  
**LIST OF COEFFICIENTS**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	21.012	2.394		8.776	.000
	USCPI	.093	.020	.256	4.681	.000
	CHINACPI	-.035	.022	-.072	-1.552	.127
	USTBOND	-.015	.057	-.020	-.263	.794
	CHINAGBOND	-.082	.055	-.152	-1.489	.143
	PRICEINDEX	-.138	.022	-.811	-6.395	.000
	USINTRATE	-.052	.088	-.066	-.597	.553

a. Dependent Variable: EXCHANGE

## LIMITATIONS

This study had several limitations. This study did not analyze the role qualitative factors had in influencing the exchange rate. There are other variables that could potentially affect the exchange rate between countries such as oil prices, Gross Domestic Product, international political pressure, and a government's political agenda. There are an innumerable multitude of variables that defy prediction, including "black swan events" like war, political turmoil, natural disasters, a worldwide pandemic, or an unexpected upheaval in the stability of governments (Taleb, 2007). This data is incredibly difficult to quantify and analyze. These unforeseen events cannot be forecasted, thus increasing the difficulty of accurately predicting exchange rate fluctuations over long periods of time.

## RECOMMENDATIONS FOR FUTURE RESEARCH

Given the limitations of this research, there is an opportunity to conduct future research to analyze monthly data over a ten-year and then twenty-year period to determine if the exchange rate predictors listed above are the best factors to predict the exchange rate between China and the U.S. over an extended period, which could enhance the credibility of those variables being strong predictors of the exchange rate. Another opportunity would be to consider lagging the exchange rate by a month. This means one would use last month's independent variables to predict the upcoming month's exchange rate. Another suggestion is to analyze different time constraints by utilizing comparative methodology in the timing. This method would take the predictor variable and dependent variable in different months, then, it would analyze how the exchange rate prediction compares to the current month to determine the accuracy of the prediction. Additionally, it would be interesting to study the effects of qualitative events such as war, natural disasters, and political instability and how each impacted the exchange rates. A further recommendation would be to apply the exchange rate predictor formula to other currencies like the euro to determine if the variables chosen were the most effective predictors, or if there are better predictor variables that apply universally to all currency. Finally, one could analyze other factors like Gross Domestic Product, the price of gold, and oil prices as predictors of exchange rates to determine which factors are the strongest predictors of the exchange rate.

## CONCLUSION

After running the regression analysis, the  $r^2$  value was 0.916 suggesting that the variables can predict 91.6% of the variability in the Chinese U.S. exchange rate. The model was statistically significant at the

$\alpha = .05$  level. For this reason, the null hypothesis would be rejected. After analyzing the results from the regression analysis, it can be determined that the predictor variables' Import Price Index and the US CPI were statistically significant at the .05 level. A 1 percentage point increase in the US CPI would lead to a .093 increase in the Yuan to USD ratio. Additionally, as the Chinese Import Price Index increases, one would expect movement in the Chinese Yuan to USD exchange rate. A 1 percentage point increase in the average price of imported Chinese goods would lead to a .138 decline in the Yuan to USD rate.

This formula may benefit distributors as they continue to purchase products from China. By using this formula to predict the exchange rate, distributors may benefit by hedging their currency according to the forecasted exchange rate. In daily use, predicting exchange rate fluctuations can be utilized as a risk management strategy. This will allow them to be better prepared to prevent and mitigate the risk of exchange rate fluctuation. The knowledge of future exchange rates can better prepare management to determine if they will source their product externally or domestically. Depending on the exchange rate volatility, it may be wise to practice near-sourcing and purchase products from a country closer to their organization. Management could also invest in multi-sourcing and have a backup supplier if the forecasted foreign exchange rate is unfavorable. Predicting the foreign exchange rate will help CEO's and their executive team to make more informed decisions regarding their organization. The ability to accurately predict the foreign exchange rate will decrease the risk associated with exchange rate fluctuation and help to hedge an organization against uncertainty. By doing this, organizations may be able to present a more accurate financial summary to company stockholders.

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