THE EFFECT OF THAI BAHT VOLATILITY ON THE EMPLOYMENT RATE IN THAILAND

WICHAYA SITTIRUK

Graduate School Srinakharinwirot University

2022

ผลกระทบของความผันผวนของค่าเงินบาทต่ออัตราการจ้างงานในประเทศไทย

วิชญะ สิทธิรักษ์

สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตร
ศิลปศาสตรมหาบัณฑิต สาขาวิชาเศรษฐศาสตร์การจัดการ
คณะเศรษฐศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ
ปีการศึกษา 2565

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WICHAYA SITTIRUK

A Master's Project Submitted in Partial Fulfillment of the Requirements

for the Degree of MASTER OF ARTS

(Master of Arts Program in Managerial Economics)

Faculty of Economics, Srinakharinwirot University

2022

THE MASTER'S PROJECT TITLED

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BY

WICHAYA SITTIRUK

HAS BEEN APPROVED BY THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE MASTER OF ARTS
IN MASTER OF ARTS PROGRAM IN MANAGERIAL ECONOMICS AT
SRINAKHARINWIROT UNIVERSITY

(Assoc. Prof. Dr. Chatchai Ekpanyaskul, MD.)
Dean of Graduate School

ORAL DEFENSE COMMITTEE

..... Major-advisor
(Prof. Dr.Danai Tanamee)

..... Chair
(Prof. Dr.Kaveepot Satawatananon)

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Title	THE EFFECT OF THAI BAHT VOLATILITY ON THE EMPLOYMENT RATE IN THAILAND
Author	WICHAYA SITTIRUK
Degree	MASTER OF ARTS
Academic Year	2022
Thesis Advisor	Professor Dr. Danai Tanamee

The purposes of this study are to identify the effects of the volatility of Thai baht on the employment rate in Thailand by using the Autoregressive Conditional Heteroskedasticity model to identify the volatility of the exchange rate as an independent variable and to make a comparison between each independent variable, such as the exchange rate between the Thai Baht and the US dollar, Real Effective Exchange Rate moving average of the exchange rate, Gross Domestic Product, the Thai population, and the gold price may affect the employment rate, the number of employees and total size of the Thai labor forces. The research instrument used in collecting the data is secondary data, the sample size is 110 months in a time series collected from January 2011 until February 2020. Based on the investigation, it was concluded that the exchange rate volatility using the autoregressive conditional heteroskedasticity model has little effect on the Thai employment rate, but a movement in Thai Gross Domestic Product (GDP) affected the employment rate in the same direction with a high statistical significance and the number of Thai populations aged 15 to 60 years or older also affected the employment rate with high statistical significance, but in the opposite direction.

Keyword : employment rate, currency

ACKNOWLEDGEMENTS

From the investigation and research, this research was accomplished, thanks to the kindness of Professor Dr. Danai Tanamee, Independent Study advisor for giving advice and comments that make this research more complete and in line with the objectives of the study. The authors sincerely hope that this research will be of value and benefit to those who are interested.

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CHAPTER 1
INTRODUCTION

Background of the Study

Money refers to what people in society assume to use as a medium of exchange. It is the standard for measuring values. It is a form of asset that is liquidity, for most people, they are commonly kept as treasures. It can be used to exchange goods and services or be used as a measure of value. In society, money can be used as a standard for paying debts. Therefore, money stimulates production and supports the movement of goods from the source of production to the consumer. (The Economic Times, n.d.) Money facilitates the exchange of goods and services within society and causes an expansion in trading which affects both domestic and international economic growth. (Kansawad, 2012) Many countries use the same local currency when exchanging goods and services between different currencies according to each trading partner. Therefore, the standard for exchanging money value for currency was born, leading to the setting of the exchange rate. (Bank of Thailand, 2023b)

The turning point in the world's major currencies occurred when representatives of 44 partner nations entered into the Bretton Woods Agreement at a meeting in Bretton Woods, New Hampshire, USA in 1944. Together they established a foreign exchange management system that abolishes the currencies depending on gold and tie it to the US dollar instead because at that time the US dollar was supported by gold. At that meeting, it was scheduled to establish the International Monetary Fund (IMF) and the World Bank as well to maintain a stable exchange rate between the currencies of allied countries in the bloc and for the United States, US dollars can be exchanged for gold as needed. With this turning point, many countries switched from accumulating gold as reserves to accumulating US dollars instead. When the demand for more US dollars to occupy, many countries began to buy US government bonds as they assume it as a safe haven until the US dollar eventually became the world's main currency by international acceptance. Many countries began to move back from holding the US dollar to gold reservation and in 1971 during the US President Richard Nixon's decision

to disconnect the US dollar from gold, leading to the floating exchange rate to this day. (Moneybuffalo, 2022)

The foreign exchange rate is the price of one currency against another. The main characteristic of the exchange rate is two parts which are the local currency and the foreign currency. When Thailand has switched to a managed floating exchange rate system since July 1997, the exchange rate moves according to the world market mechanism. Estimating the exchange rate of Thailand using a macroeconomic model might not be used to predict the exchange rate of Thailand as well as theory because Thailand's exchange rate is under a floating system under management. Under the direction of the baht, Bank of Thailand (BOT) does not set a specific exchange rate or tie the baht to any foreign currency. The central bank intervenes from time to time in order to not affect the stability of the economy. Most of the movement of the baht is in line with the direction of major world currencies such as the US dollar, euro, pound sterling, and yen, etc., which reflects that Important factors affecting the baht are mainly caused by foreign factors such as the tendency to increase interest rates of foreign central banks, the differences between economic trends including investor views, sentiments, and reliability. (Waiquamdee, Disyatatand, & Pongsaparn, 2005) However, domestic factors such as the number of employment, recovery of the tourism sector, current account surplus, the strength of Thailand's external stability, those are an additional factor that support the confidence in the Thai baht. (Bank of Thailand, 2023d)

Studying the exchange rate in Thailand still be really difficult as well as increased exchange rate volatility. Moreover, the value of international transactions is large. Exchange rate movements are caused by a combination of many factors such as inflation, interest rates (affecting capital flows), private sector investment news, and trading demand. (Cumsawat, 2021) The last factor that affected the exchange rate is trade war, especially the trade war between super powerful countries which is difficult to happen. Trade war might affect Thai economy, especially in import business. Raising tax walls affects foreign companies such as the impact of importing parts and equipment in industries, resulting in being forced to relocate production plant bases,

and capital movement. (Vaisamruat & Sukhampha, 2020) The above reasons clearly lead to the change in employment rates. Many factors have an effect on the exchange rate more or less can be analyzed and solved the solutions from the monetary policy of Bank of Thailand. Nowadays, the Thai economic structure is more complex and linked to the global economy. As a result, the Thai baht tends to be more volatile. In the case of baht's volatility increase may affect the adjustment of the real economy, the BOT might consider overseeing the volatility of the baht depending on the necessity of the situation without forcing the fundamentals economics. In addition to the baht-to-dollar exchange rate of Foundation for Industrial Development Management System Certification Institute Thailand (MASCI), it also considers other factors such as the nominal effective exchange rate (NEER), which reflects the change in the baht's value relative to the currencies of trading partners and major competitors. (Bank of Thailand, 2023d)

Unemployment is the number of people who can work but are currently unemployed. Most countries measured the percentage of the active population. Foreign exchange rates have an indirect effect on unemployment as they affect the competitiveness of local companies and the cost of imported goods and raw materials. Changes in currency exchange rates can cause unemployment or increase employee demand indirectly. (Study.com, n.d.)

The rapid appreciation of the baht will affect exporters from reduced profits or affect the country's tourism revenue as well. If this happens for a long time, it may cause a loss of the business, unemployment problem, and will affect the growth rate The country's economy (GDP) due to the Thai economy still relies on income from exports and income from tourism as the main factor. (Panchai, 2015)

Due to the data which we have interested in, along with the time series information researcher decide to study the effect of Thai Baht volatility on the employment rate in Thailand. Several studies were studied on the relationship of the exchange rate volatility by using Autoregressive Conditional Heteroscedasticity (ARCH) model in time series data, therefore researcher will use Bivariate ARCH Model as basis model in this research.

Objectives of the Study

The research questions to achieve the purpose of the study are as follows:

1. The exchange rate volatility between The Thai currency (Baht) and the US Dollar over a period of time has resulted in volume of the employment rate.

2. Other factors as variables in equation have resulted in relationship with employment rate over a period of time in the same direction or opposite direction.

Significance of the Study

The result of this study aims to achieve information as an indicator and economic manual for managing a state's economic development plan which affects the labor market and employment. The result will provide not only necessary information that is useful to the business of state scale but also can be useful information which guideline private sector's strategy and action plan.

Scope of the Study

Identifying population and sample

A population is the complete set group of individuals, whether that group comprises a nation or a group of people with a common characteristic. Researcher choose Thai population starting from age 15-year-old to 60-year-old since January 2011 until February 2020.as scope of study

Variables used in this research

Independent variable

The exchange rate between Thai baht against US dollar, Nominal Effective Exchange Rate, Real Effective Exchange Rate, Gross Domestic Product, Gold price, and Thai Population,

Dependent variable

Thai employment rate in interested sectors since January 2011 until February 2020.as scope of study

Definition of Terms

Definitions of terms used in this research field defined as follows:

Thai Currency (Baht) The symbol is ฿ , the national currency of Thailand. The word "Baht" was originally one of the words used to refer to a unit of weight in Thailand. Currently, it is still used in some original meanings.

US Currency (Dollar) The symbol is $, which is the United State of America currency used as a reserve currency in many countries around the world. The United States uses the dollar as the national currency. In addition, the US dollar is the main currency in many countries, although the US dollar is not the main currency, it is still accepted for general commodity, and services spending. (Wikipedia, 2023b)

Foreign Exchange Market is the marketplace for exchanging different currencies, where the price of one foreign currency is compared to another is also known as the Foreign Exchange Rate. For example, The exchange rate of the baht against the US dollar or the exchange rate between the baht and the yuan, etc. The exchange rate will change according to the demand and supply of foreign currency in each period. The main factors that determine exchange rates are trade value and international investment flows, including forecasts of various players in the world market as well. (Bank of Thailand, 2023c)

Employment Rate is a measure of the boundary of available labor resources (people who are available to work) are being used. Be calculated as the ratio of the employed to the working-age population. In short term, employment rates are sensitive to the economic cycle, but in the longer term, they are significantly affected by income support policies, governments' higher education, and policies that encourage the employment of women and disadvantaged groups. Those people who are aged 15 to 60 years old or over are recorded in government data as employers. (The Organization for Economic Co-operation and Development (OECD)). In this research import data from BOT which collected from Official statistics registration systems, Department of Provincial Administration, Ministry of Interior. (OECD, 2023)

Balance of Trade is the comparison between the difference in the value of a country’s imports and the value of the country's exports. In general, the periods used for comparison are monthly, quarterly, and yearly, which if imports are more than exports indicates a trade deficit. But if exports are more than imports, it indicates a trade surplus. When exports and imports are equal, it is called trade balance (Kenton, 2023)

The Floating Exchange Rate is the system allowing the currency exchange rate to follow the market mechanism by depending on the supply and demand of that currency, which is usually controlled by the central bank. If there is an abnormal situation with the currency such as speculation. The central bank will intervene. (Bank of Thailand, 2023a)

Exchange rate volatility refers to the uncertainty in the directional movement of the exchange rate whether it goes up or down in a given time frame.

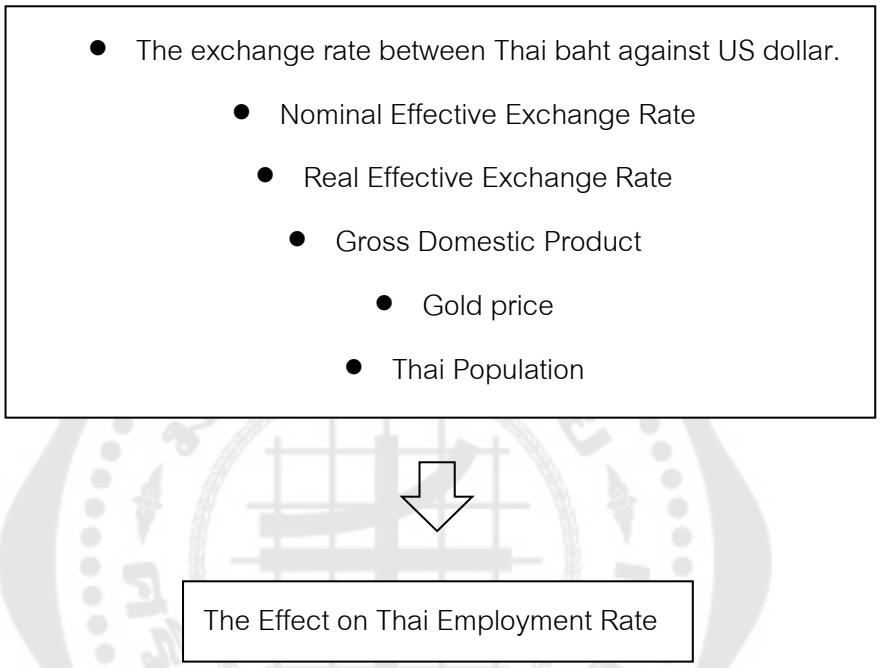
Gross Domestic Product (GDP), The term of the Royal Thai Council is Primary domestic product refers to the market value of the final goods and services produced in a country over a period of time, regardless of national resources. It was invented by the Russian economist, Simon Kuznets. The gross domestic product can be used as an indicator of the standard of living of the population in that country. (Fernando, 2023)

Nominal Effective Exchange Rate (NEER) and Real Effective Exchange Rate (REER), The baht index is an average comparison of the baht against the currencies of Thailand's trading partners and competitors by weighting each currency according to its trade significance to Thailand. The currency index plays an important role in assessing a country's price competitiveness and its impact on the economy. (Kenton, 2022)

Gold spot refers to the trading of gold in the global market using gold as the medium of exchange where the trade takes place in the form of a contract instead. The price of gold will be compared from the dollar (USD) per 1 ounce weight, which the gold’s price will increase or decrease 24 hours a day, but there will be purchase pressure from global market demand from Monday to Friday.

Conceptual Framework

Conceptual framework for research on the exchange rate volatility which impact on Thai employment and Thai employment rate.



CHAPTER 2
LITERATURE REVIEW

This chapter is to provide details of related research and related thesis in field of foreign exchange market and employment section especially in Thai's currency (Baht) and US dollar, to discuss details of foreign exchange and employment rate, the definition, and characteristics in term of economy theories will be represent.

Theories and relative research and thesis

Macroeconomic Theory

Mathematical Models

Related Studies

Macroeconomic Theory

The foreign exchange rate is the price of one unit of the currency against another currency. The foreign exchange rate can be divided into two major systems as follows:

Floating exchange rate system is an exchange rate system in which the price of a country's currency is determined by the foreign exchange market. It depends on the relevant supply and demand of other currencies. Floating exchange rates are not constrained by trade restrictions or government controls. This is different from fixed exchange rates because it is revived on the market mechanism. (Corporate Finance Institute, 2023)

Fixed exchange rate system means under an exchange rate system in which the central bank determines the value of that country's currency against one of the major world currencies at a fixed rate or sets the currency of that country compared with many foreign currencies, it is called the money basket system. (Majaski, 2020)

The appreciation of the currency affects the business as follows.

In the export business If the baht appreciates, the export profit will decrease.

In import business If the baht appreciates, it will make imports more profitable.

In export business If the baht depreciates, it will make exports more profitable.

In import business If the baht depreciates, imports will have lower profits. (Siam Commercial Bank PCL., n.d.)

Currency appreciation and depreciation foreign exchange or currency is an intermediary in the trading power of various countries where the currency is very volatile. Money will appreciate or depreciate depending on how much the flow rate of other currencies is exchanged into that currency. For example, in the case of a large amount of money flowing into Thailand. There is a chance that Thai baht will appreciate significantly. The reasons for the appreciation of the baht are caused by three factors:

Inflation Factors The higher the inflation rate in the country will make the currency depreciate. The exchange rate of the local currency against a foreign currency which the local currency has a lower inflation rate will have to pay more in exchange for a unit of foreign currency incurred at that moment.

Interest rate factors naturally, higher returns are more motivating for investors. Thai government bond interest rate is stable at 1.5% per annum, which is higher than other countries in the same region, thus, it attracts investment from foreign investors. For this reason, there is a large amount of foreign currency coming into Thailand. (PeerPower, 2019)

Factors of international trade, Import-export and tourism are the main factors that cause money to flow in or out of each country. Because it means the exchange of money between each other was generated. When Thai baht appreciates, it affects this part as well and will affect the economy such as import-export and employment in the country. As for the situation of the baht appreciation that is happening in Thailand (observed in the year 2019), caused by all three factors mentioned above. In this section representative of the Bank of Thailand has issued the following information

External factors

Global Market Volatility Changes in the economies of majority of many powerful countries around the world such as the United State-China trade war, stagnant of global economic and including the policies of the central bank of many countries that affect interest rates, which can cause more changes in investment to invest in Thailand because investors have positive expectations of the baht, causing the appreciate in Baht. The Federal Reserve's interest rate cut affects the relocation of the investment base Because when returns decline, investors look for new markets with better returns. Speculated that investing in the Thai stock market and bonds is a safe investment because of a good interest rate including upgrading many stocks to recommended stocks from foreign financial institutions advisory. (PeerPower, 2019)

Internal Factors

The current account balance (CAB) is part of a country's financial inflow and outflow. The current account balance is a measure of money coming in and out of the country as a country's key activity, such as capital markets and services. (Heakal, 2022) The current account balance (CAB) consists of two main parts which are Trade Balance and Service Account.

Trade balance, the comparison between the difference between the value of merchandise imports and the value of merchandise exports of the country. In general, the period used for comparison is monthly, quarterly, and yearly, which if imports exceed exports indicates a trade deficit. But if exports exceed imports, then there is a trade surplus. And if exports and imports are equal, it is called the trade balance. (Bank of Ayudhya, 2023)

Service Account or Services Balance is the current account balance that demonstrate items related to international services related to that country, showing how much income and expenditures that country has from the international services sector, either surplus or deficit. The Bank of Thailand has explained about the Service Account is defined as the net result between the income and expenditure of international services. It consists of transportation costs, travel expenses, service fees and other government expenses including telecommunication expenses. construction cost

Royalties, trademarks, insurance, etc. such as international transportation expenses, income from Chinese tourists, expenses of Thai people traveling to Japan, and income from labor of Thai people abroad, etc. In other words, when comparing a Trade Account, a Service Account is similar in function to a Trade Account, except that the Service Balance records revenues and expenses related to international services instead of revenues and expenses from trading goods between countries. (Piroj, 2019)

Government debt or public debt

Government debt or public debt refers to government borrowing when the government has insufficient income to cover its expenditures and therefore needs to borrow money to pay for expenses, especially governments of developing countries. Governments may need to spend money to develop the country by investing in roads, electricity, water, and energy to encourage people to expand investments in various businesses, making people have jobs, higher incomes, when national income increases, the government will be able to collect more income tax from the people to repay the debt. The governments of many countries, both developed and developing, have significant amounts of public debt. This public debt we can look at both sides: when the government borrows money, it is classified as government revenue in one way, and when the debt is due, the government must set up an expenditure budget to pay off the public debt of the government. The government therefore affects the overall economy of the country. (Public Debt Management Office, n.d.)

The impact of the baht's appreciation on exports and imports. Import business whether it is a business that directly imports goods or imports raw materials. The lower costs compared with previous will make more profit per investment of the same amount. If a country imports more quantity, the inflation rate will also be high as a result, when compared to countries with lower inflation rates or lower interest rates, the currency will depreciate more. Export business businesses that directly export goods or raw materials have higher initial costs, especially in dollar-denominated with trade partners or foreign companies located in Thailand must be paying more than the same cause reduction of production capacity. Travel business If tourism is more expensive

than other similar countries in the same region and other conditions are similar, tourists will choose to go where the money is cheaper. The stronger appreciation of Thai Baht, the more likely tourism will stagnate.

Real Sector

The real sector is the sector of the real economy or the real manufacturing sector in which the output of tangible goods or services is actually produced, where the output from these real sectors can be used, tangible or perceived, and can actually sell These include manufacturing, agriculture, mining, and energy businesses. and various service businesses, etc. Businesses in the real sector will produce goods and services with the price mechanism driving what to produce, how much, how to produce, and who is the customer group. In an economy, In the real economy, the real sector is the opposite of the financial sector, which does not actually produce goods or services but focuses on financing activities and various financial products. The real sector is a very important factor in the economy because it be able to grow sustainably in the long term, it is necessary to create productivity. (Piroj, 2023)

Equilibrium Theory

Balance of trade equilibrium (BTE) is defined as a situation when trading among different countries is such that the trading partners would generally balance debt free from one another over a reasonable number of years. In other words, the value of a country's exports would be equal to the value of its imports. (Bhandari, 2008)

Trade account or Trade balance can be separated into 2 types, Deficit and Surplus which can descript in relative equation as follow:

$$Trade\ Balance = Export\ Value - Import\ Value$$

If there is a positive value, it means the trade balance is in surplus and if it is negative, it means that the trade balance is in deficit.

Comparative Advantage

Comparative Advantage (David Ricardo) to adhere to the principle of division of labor a country will either produce a commodity that has a comparative advantage higher in comparison to another country or produce the goods at the lowest opportunity cost and export such goods to that country. On the other hand, will import manufactured goods at a lower comparative disadvantage or imports higher opportunity cost products from other countries. (Kansawad, 2012)

Employment Rate

Employment rates are defined as a measure of labor resources or a number of people available to work are being used in data which are calculated as the ratio of the employed to the labour force not volume of working-age population. Employment rate (EMR) are sensitive to the economic cycle in short term and are significantly affected by the government's higher education and income support policies and by policies that facilitate the employment of women and disadvantaged groups in the longer term. Employed people are those aged 15 or over who worked in gainful employment for at least one hour in the previous week or who had a job but were absent from work during the reference week. So that the working-age population refers to people aged 15 to 60 years old in their area of interest (P15). The labour force (LBF) refers to people that are able to work, including the summation number of employed and unemployed, this indicator is seasonally adjusted to be denominator as labour force. Employment rate (EMR) measured in terms of percentage ratio between a thousand unit of the numbers of employed persons aged 15 to 60 years old in target sectors divided by labour force.

$$Employment\ Rate\ (\%) = \frac{Employment}{Labour\ Force}$$

Researcher assumes employment (EPM) as the summation numbers of employed population in 12 categories of working fields which are 1. Mining and quarrying, 2. Production, 3. Electricity, gas, steam, and air conditioning system, 4. Water

supply, management and treatment of wastewater, waste, and sewage, 5. Construction, 6. Wholesale and Retail Repair of motor vehicles and motorcycles, 7. Transportation and storage, 8. Hotel activities and food service, 9. Information and Communication, 10. Financial and insurance activities, 11. Real Estate Activities, and 12. Professional, scientific, and technical

Summation volume of selected work categories from Thai labor force under condition, working age 15 to 60 years old, assumed as total volume of Employment (EMP) in equation and researcher also determine employment rate (EMR or EET1) as dependent variable. Monthly report of the number of population and employment which unit per thousand as following.

Table 1 MONTHLY REPORT OF THE NUMBER OF POPULATION AND EMPLOYMENT

DATE	EMPLOYMENT (EMP)	LABOUR FORCE (LBF)	EMPLOYMENT RATE (%) (EMR)	%CHANGE EMP
January 2011	19,082.65	38,059.95	50.14%	
February 2011	19,190.48	38,076.26	50.40%	0.57%
March 2011	19,691.84	38,432.88	51.24%	2.61%
April 2011	19,420.54	37,929.78	51.20%	-1.38%
May 2011	19,130.09	38,361.98	49.87%	-1.50%
June 2011	18,001.54	39,125.98	46.01%	-5.90%
July 2011	17,710.19	39,769.33	44.53%	-1.62%
August 2011	18,245.68	39,761.34	45.89%	3.02%
September 2011	18,908.55	39,233.23	48.20%	3.63%
October 2011	18,708.88	38,816.91	48.20%	-1.06%
November 2011	17,934.36	39,452.65	45.46%	-4.14%
December 2011	17,656.63	39,784.94	44.38%	-1.55%
January 2012	19,179.79	38,619.17	49.66%	8.63%
February 2012	19,301.75	38,798.15	49.75%	0.64%
March 2012	19,508.20	38,955.14	50.08%	1.07%
April 2012	19,444.08	38,909.27	49.97%	-0.33%
May 2012	18,612.58	39,006.98	47.72%	-4.28%
June 2012	17,928.94	39,883.25	44.95%	-3.67%
July 2012	17,970.99	40,097.64	44.82%	0.23%
August 2012	18,195.14	39,800.75	45.72%	1.25%
September 2012	18,364.44	39,438.77	46.56%	0.93%
October 2012	19,224.20	39,489.68	48.68%	4.68%
November 2012	18,247.67	40,170.93	45.43%	-5.08%

Table 1 (Continued)

DATE	EMPLOYMENT (EMP)	LABOUR FORCE (LBF)	EMPLOYMENT RATE (%) (EMR)	%CHANGE EMP
December 2012	18,157.72	39,820.99	45.60%	-0.49%
January 2013	19,858.98	38,747.97	51.25%	9.37%
February 2013	19,768.29	39,338.99	50.25%	-0.46%
March 2013	20,058.44	39,352.80	50.97%	1.47%
April 2013	20,121.18	38,787.11	51.88%	0.31%
May 2013	19,064.94	39,493.95	48.27%	-5.25%
June 2013	18,355.77	40,191.93	45.67%	-3.72%
July 2013	18,334.45	39,752.30	46.12%	-0.12%
August 2013	17,693.04	39,312.88	45.01%	-3.50%
September 2013	18,371.63	39,323.78	46.72%	3.84%
October 2013	19,030.15	39,033.43	48.75%	3.58%
November 2013	17,952.25	39,632.91	45.30%	-5.66%
December 2013	18,095.99	39,807.64	45.46%	0.80%
January 2014	20,788.04	38,433.61	54.09%	14.88%
February 2014	20,623.62	38,312.69	53.83%	-0.79%
March 2014	20,668.02	38,616.64	53.52%	0.22%
April 2014	21,038.77	38,023.66	55.33%	1.79%
May 2014	20,238.41	38,371.88	52.74%	-3.80%
June 2014	19,445.25	38,928.63	49.95%	-3.92%
July 2014	20,082.13	38,900.04	51.62%	3.28%
August 2014	19,735.73	38,724.69	50.96%	-1.72%
September 2014	19,677.44	38,850.45	50.65%	-0.30%
October 2014	20,527.54	38,306.52	53.59%	4.32%

Table 1 (Continued)

DATE	EMPLOYMENT (EMP)	LABOUR FORCE (LBF)	EMPLOYMENT RATE (%) (EMR)	%CHANGE EMP
November 2014	19,901.57	38,471.84	51.73%	-3.05%
December 2014	19,951.96	38,963.30	51.21%	0.25%
January 2015	20,773.75	38,010.41	54.65%	4.12%
February 2015	21,044.84	38,522.55	54.63%	1.30%
March 2015	20,708.02	38,370.29	53.97%	-1.60%
April 2015	21,529.22	38,283.85	56.24%	3.97%
May 2015	20,642.53	38,275.72	53.93%	-4.12%
June 2015	20,154.69	38,707.62	52.07%	-2.36%
July 2015	20,630.94	38,621.15	53.42%	2.36%
August 2015	19,705.22	38,940.60	50.60%	-4.49%
September 2015	19,871.41	38,652.56	51.41%	0.84%
October 2015	20,641.37	38,468.20	53.66%	3.87%
November 2015	19,930.81	38,556.89	51.69%	-3.44%
December 2015	19,781.88	39,164.85	50.51%	-0.75%
January 2016	21,150.99	38,125.89	55.48%	6.92%
February 2016	21,204.45	38,416.89	55.20%	0.25%
March 2016	20,925.74	38,352.31	54.56%	-1.31%
April 2016	21,870.77	38,023.66	57.52%	4.52%
May 2016	21,014.28	37,769.93	55.64%	-3.92%
June 2016	20,149.34	38,701.10	52.06%	-4.12%
July 2016	20,495.08	38,839.56	52.77%	1.72%
August 2016	20,262.00	38,860.14	52.14%	-1.14%
September 2016	19,991.56	38,278.33	52.23%	-1.33%
October 2016	20,493.46	37,720.34	54.33%	2.51%

Table 1 (Continued)

DATE	EMPLOYMENT (EMP)	LABOUR FORCE (LBF)	EMPLOYMENT RATE (%) (EMR)	%CHANGE EMP
November 2016	19,931.11	38,110.99	52.30%	-2.74%
December 2016	19,420.33	37,791.78	51.39%	-2.56%
January 2017	21,023.30	37,935.84	55.42%	8.25%
February 2017	21,344.03	38,380.81	55.61%	1.53%
March 2017	20,708.49	38,320.46	54.04%	-2.98%
April 2017	20,839.34	37,888.56	55.00%	0.63%
May 2017	20,583.00	37,978.50	54.20%	-1.23%
June 2017	19,821.86	38,820.95	51.06%	-3.70%
July 2017	19,942.06	38,502.27	51.79%	0.61%
August 2017	19,803.42	38,077.00	52.01%	-0.70%
September 2017	19,528.85	37,786.44	51.68%	-1.39%
October 2017	20,194.87	37,216.93	54.26%	3.41%
November 2017	20,263.64	38,281.47	52.93%	0.34%
December 2017	19,540.71	37,716.49	51.81%	-3.57%
January 2018	20,138.77	37,790.90	53.29%	3.06%
February 2018	20,842.16	38,421.60	54.25%	3.49%
March 2018	20,220.10	38,111.32	53.06%	-2.98%
April 2018	20,726.44	37,991.39	54.56%	2.50%
May 2018	21,129.42	38,547.31	54.81%	1.94%
June 2018	19,755.59	38,853.97	50.85%	-6.50%
July 2018	20,276.91	39,053.68	51.92%	2.64%
August 2018	20,598.52	38,727.99	53.19%	1.59%
September 2018	19,838.07	38,391.08	51.67%	-3.69%
October 2018	20,580.28	38,077.60	54.05%	3.74%

Table 1 (Continued)

DATE	EMPLOYMENT (EMP)	LABOUR FORCE (LBF)	EMPLOYMENT RATE (%) (EMR)	%CHANGE EMP
November 2018	20,560.40	38,742.77	53.07%	-0.10%
December 2018	20,232.66	38,353.32	52.75%	-1.59%
January 2019	20,739.02	38,197.37	54.29%	2.50%
February 2019	21,485.68	38,322.02	56.07%	3.60%
March 2019	20,586.72	38,498.26	53.47%	-4.18%
April 2019	21,132.70	38,032.67	55.56%	2.65%
May 2019	21,178.16	38,419.23	55.12%	0.22%
June 2019	19,815.09	38,823.79	51.04%	-6.44%
July 2019	20,128.40	38,094.55	52.84%	1.58%
August 2019	19,865.99	38,075.18	52.18%	-1.30%
September 2019	19,047.85	37,722.03	50.50%	-4.12%
October 2019	20,533.56	37,438.61	54.85%	7.80%
November 2019	20,306.53	38,221.81	53.13%	-1.11%
December 2019	19,796.54	38,207.12	51.81%	-2.51%
January 2020	21,028.66	37,873.56	55.52%	6.22%
February 2020	21,291.35	38,403.54	55.44%	1.25%

Data base from Bank of Thailand and National Statistical Office (2022)

Mathematical Models

Moving Average

A moving average, also known as a rolling average or running average, is a statistical calculation that involves analyzing data points by computing a series of averages for different subsets within the complete data set. It is a type of finite impulse response filter and is alternatively referred to as a moving mean (MM) or rolling mean.

To compute a moving average, a fixed subset size is applied to a series of numbers. The first value of the moving average is obtained by averaging the initial fixed subset of numbers. Subsequently, the subset is adjusted by "shifting forward," which involves excluding the first number in the series and including the next value in the subset.

Typically, a moving average is utilized in the context of time series data to smooth out short-term fluctuations and emphasize longer-term trends or patterns. The distinction between short-term and long-term is subjective and dependent on the specific application, with the parameters of the moving average tailored accordingly. It is also employed in economics to analyze macroeconomic time series such as gross domestic product (GDP) or employment. Mathematically, a moving average can be viewed as a type of convolution, resembling a low-pass filter used in signal processing. Although the primary usage is in relation to time series data, a moving average can also filter out higher frequency components in non-time series data, although some form of ordering is typically assumed. In simpler terms, it can be considered as a technique for smoothing data. (Wikipedia, 2023a)

Simple moving average

A simple moving average (SMA) is commonly used in financial applications to calculate the unweighted average of the k preceding data points. However, in scientific and engineering contexts, the concept is typically interpreted as the average of an equal amount of data on both sides of a central value. This approach ensures that changes in the average align with the corresponding changes in the data, rather than being displaced in time. For instance, a simple equally weighted running mean can be calculated by averaging the last k entries in a dataset containing n entries.

(Hayes, 2022) Let those data-points be $p_1, p_2, \ldots, p_n$ This could be closing prices of a stock. The mean over the last k data-points (days in this example) is denoted as SMA_k and calculated as

$$SMA_k = \frac{p_{n-k+1} + p_{n-k+2} + \cdots + p_n}{k} = \frac{1}{k} \sum_{i=n-k+1}^{n} p_i$$

Cumulative average

The concept of cumulative average (CA) involves processing data in a sequential manner, where the data is received in a specific order. The objective is to determine the average value of all the data points up to the current point in the sequence. This method is commonly used in various scenarios, such as calculating the average price of stock transactions for a specific stock until the present moment. As new transactions occur, the cumulative average can be recalculated to include all the transactions up to that point, providing an updated average price for the entire transaction history, typically an equally weighted average of the sequence of n values $x_1, x_2, \ldots, x_n$ up to the current time:

$$CA_n = \frac{x_1 + \cdots + x_n}{n}$$

Percentage Change

The percentage change calculation determines the change from one number to another and expresses the change as an increase or decrease as following equation:

$$Percentage\ Change\ (\%) = \frac{\Delta V}{V_t} x100$$

When V_t : the value of sample at t

ΔV : $V_{t+1} - V_t$

It is particularly useful in many aspects of finance, physics, chemistry, dynamics and exponential growth and decay, as well as in other areas of mathematics.

Thai Baht Index

The Thai Baht Index (NEER), calculated by Bank of Thailand, is a comparison of the Baht against the currencies of Thailand's trading partners and competitors and is weighted average by their trade ratio. The countries that Thailand trades with or competes in great quantity will gain a lot of weight and descend according to the importance of that country's trade to Thailand. for example, Japan is an important trading partner of Thailand. Yen will gain more weight in the calculation of the baht index, etc. The currency index is an important indicator that measures a country's price competitiveness. (Chummi, 2010) The calculation of the baht index is calculated by using the weighted geometric mean method with the following formula:

$$NEER_t = NEER_0 \prod_{i=1}^{n} \left(\frac{E_{it}}{E_{i0}}\right)^{w_{i,t}}$$

When

$$\prod_{i=1}^{n} \left(\frac{E_{it}}{E_{i0}}\right)^{w_{i,t}} = \left(\frac{E_{1t}}{E_{10}}\right)^{w_{1,t}} \left(\frac{E_{2t}}{E_{20}}\right)^{w_{2,t}} \dots \left(\frac{E_{nt}}{E_{n0}}\right)^{w_{n,t}}$$

$NEER_t$ = Currency index at base year

E_{it} = Exchange rate between currency i per 1 unit of baht at time t

E_{i0} = Exchange rate between currencies i per 1 unit of Thai baht at the base year

$w_{i,t}$ = Trade weight given to currency i

n = Amount of foreign currency used in all calculations

Autoregressive Conditional Heteroscedasticity (ARCH)

How explicitly model the Auto-Regressive Condition Heteroscedasticity process in the volatility of time series, the ARCH model has been first proposed to Rebert Engel in 1982 in application to inflation volatility in UK. Since then, ARCH has become one of the most popular models in financial and macroeconomic time series econometrics and the two reasons for it.

Autoregressive Conditional Heteroscedasticity (ARCH) is a statistical technique that examines volatility in time series data to predict future volatility. In the field of finance, ARCH modeling is crucial for assessing risk by providing a volatility model that closely resembles real market behavior. It reveals that periods of high volatility are often followed by more periods of high volatility, while periods of low volatility are typically followed by more periods of low volatility. (Kenton, 2021)

$$\varepsilon_t = \sigma_t V_t$$

The conditional volatility which is denoted Vt square (V_t^2) that consists of two terms that are the being added up together. Which are the unconditional volatility omega (**ω**) and Autoregressive Component alpha (**α**) which is ARCH coefficient, times lagged realized volatility or lagged squared residual epsilon t minus one squared (ε_{t-1}^2). When Alpha (**α**) is ARCH coefficient, the higher alpha as the more persistent in the volatility of our time series.

$$V_t^2 = \omega + \alpha\varepsilon_{t-1}^2$$

When V_t^2 : Conditional variance

ω : Unconditional variance

α : ARCH Alpha

Researcher will investigate the relationships between exchange rate volatility of Thai Baht effect on Thai employment rate by set up ARCH of exchange rate of Thai Bath against 1 US dollar as independent variable.

Ordinary Least Squares regression (OLS)

Ordinary least squares regression (OLS) is a general technique for estimating the coefficients of linear regression equations describing the relationship between one or more independent quantitative variables and the dependent variables. (Simple linear regression or multiple) least squares Minimum square mean (SSE) maximum likelihood and the general method of interval estimation is an alternative method for OLS. (Lumivero, n.d.) The ordinary least squares formula as following

$$Y = \beta_0 + \Sigma_{j=1\ldots P}\beta_j X_j + \varepsilon$$

Where Y : The dependent variable,

β_0 : The intercept of the model

X_j : corresponds to the j explanatory variable of the model

ε : The random error with expectation 0 and variance σ^2.

Related Studies

Several studies have been conducted to identify the need for exchange rate volatility in Thai employment. The related studies are summarized in this section.

Kim (2005) investigated patterns of employment responses to exchange rate volatility. Researcher focused on the relationship between two variables by using 28 industries data. The paper presented some common patterns in the signs of the employment responses to the exchange rate shocks for Korea. Most of patterns match

the theory. the industries with high openness tend and the industries with high openness and low imported input ratio show a positive sign in the employment response to the exchange rates shocks different from industries with middle or low openness which resent a negative sign in the employment rate shocks. Exchange rates much affectation to employment in Korea. Korean employment responds positively to exchange rate shocks using the panel data analysis. The results are statistically significant, Korean employment more responds to exchange rate shock than US employment because Korea has a higher number of openness tend industries than the US.

Demir (2010) Studied the impacts of exchange rate volatility on employment growth during the period of 1983–2005 in developing countries evident from Turkey. The paper reported that the exchange rate volatility has been economically significant on manufacturing firms by reducing employment growth. From estimation when using point estimate, the results show that for an average company a one standard deviation increase in real exchange rate volatility will reduce employment growth in the range of 1.4–2.1 percent.

Hamilton (2018) “Understanding Exchange Rates and Why They Are Important” published in Bulletin explored that one factor which affects financial flows and trade between Australia and other countries is an exchange rate that why exchange rates are important to Australia. The indirect effects of the exchange rate by depreciation of the Australian dollar will decrease the comparable price of goods and services produced in Australia on the international market. As Australian goods and services become cheaper compared to foreign, demand for Australian goods and services for oversea market should increase. Cause the volume in terms of quantity of Australian exports is about to increase, escalate demand and employment rate in Australia. Simultaneously, the exchange rate affects the imports of goods and services for Australian people. the depreciation of the Australian dollar influences Australian residents by reducing their consumption of expensive imported goods and services and towards to consumption of domestic products that can cause decrease in the volume of imports, leading to support aggregate demand and employment rate. Exchange rate movement also has a

committed relationship with the demand for non-tradable goods and services in case of cost depreciation, rising up of export volume will increase national income. In order to respond to the new demand of consumption rate, companies and firms might hire more workers to expand industries' production cause escalating total demand of employment rate tend to increase national income.

Hodge and Unisa (2005) evident from international research, the relationship between exchange rate volatility on international trade, and unemployment or employment in target countries. The evidence suggested that the movement from exchange rate volatility can have little effect on international trade. Previous small changes in international trade might involve the trade balance changed and becomes the reason for strong effect on employment.

Huang, Pang, and Tang (2014) The paper focuses on the employment effect of the exchange rate in Canada and the result is appreciations of the Canadian dollar (CAD) has a significant influence on employment in an area of manufacturing industries associated with most export weight exchange rate does not import weight exchange rate. The research also studied the loss of manufacturing employment associated with the rising up of the community market. During the appreciated Canadian dollar, the commodity price has grown by 15.77% from one standard deviation between the years 1994-2010, cause decreasing in employment by 0.8% in the manufacturing field which is only 0.08% of overall employment in Canada.

Bakhshi and Ebrahimi (2016) Researchers estimate the result by using an autoregressive econometric model with distributed lag searching for relationships between the real exchange rate and employment rate in Iran which consist of 5 variances such as exchange rate, export data, import data, gross domestic product, and namely unemployment rate. The solution from calculation supported that the relationship between exchange rate and employment rate is negative.

Izumi, Kazuhito, and Daiji (2021) Reported investigation of the effect of exchange rate fluctuations on the employment in a segmented labor market which is an adjustment of regular workers and non-regular workers by using heterogeneous

dependence on international trade. The analysis of Japanese firm-level panel data presents that the appreciation of Japanese currency (Yen) causes decreasing in employment rate of exporting firms. The analysis result suggests a significantly different in adjustment costs between regular and non-regular employment in the partitioned Japanese labor market. For elasticity in this situation, regular employment responded to the permanent exchange rate more than non-regular employment.

Mehtiyev, Magda, and Vasa (2021) The economic crisis mentioned in the summary had a significant impact on employment rates. The crisis led to a low employment situation in many countries. Economic downturns often result in reduced business activities, lower consumer demand, and financial constraints, leading to companies laying off employees or reducing their workforce. As a result, unemployment rates tend to rise during such periods.

HUA (2011) The real exchange rate appreciation has negative effects on employment. The study conducted in China using panel data for 29 provinces found that an increase in the real exchange rate had detrimental effects on employment.

Ahmad et al. (2020) Impact of Employment Rate, Exchange Rate and Foreign Direct Investment on Worker's Remittances and Economic Growth, the employment rate does share a long-run co-integration with exchange rates and foreign direct investment. This implies that changes in exchange rates can have an impact on the employment rate in Pakistan over an extended period.

Chipeta, Daniel Francois Meyer, and Muzindutsi (2017) The Effect of Exchange Rate Movements and Economic Growth on Job Creation, this study examines the relationship between job creation, real exchange rate, and economic growth in South Africa. The authors emphasize the importance of job creation for economic development and social cohesion. They argue that a job-friendly economic environment is crucial for promoting both macro and microeconomic stability. Using quarterly data from 1995 to 2015, the study employs the Vector Autoregressive (VAR) model and multivariate co-integration techniques to analyze the impact of the real exchange rate and economic growth on employment in South Africa. The country is chosen as a case study due to its

persistently high and increasing unemployment rate. The findings reveal that employment in South Africa responds positively to economic growth in the long run, while it displays a positive relationship in the short run. However, the effect of economic growth on job creation is not significant enough to stimulate employment sufficiently, as indicated by the variance decomposition results. In contrast, the study shows that changes in the real exchange rate have a significant negative effect on employment dynamics in both the short and long run. Specifically, a depreciation of the South African rand against the U.S. dollar is associated with a decrease in overall employment. The stability of the exchange rate is therefore identified as crucial for economic growth and job creation in South Africa. Based on the findings, the study provides recommendations for promoting job creation in South Africa and other developing countries. These recommendations are not specified in the summary.

He (2013) This paper examines the relationship between the unemployment rate and the real effective exchange rate in various countries from 1994 to 2009. The findings indicate that most countries experience a negative relationship between these factors, suggesting that a higher exchange rate can positively impact employment. However, re-exporting countries, such as the Netherlands, Singapore, and Hong Kong, exhibit a less negative relationship than other countries. The author suggests that this difference may be attributed to differences in the elasticity of demand for imports.

Atif Ali Jaffri, Amreen, Asjed, and Sana (2017) Impact of Real Effective Exchange Rate on Unemployment in Pakistan: An Empirical Investigation, the study found that the exchange rate, specifically the real effective exchange rate (REER), does have an impact on the unemployment rate in Pakistan. Contrary to expectations, an increase in the REER (appreciation) actually reduces unemployment in the long run. This suggests that a stronger domestic currency can stimulate economic activity and lead to more employment opportunities.

Ngandu (2008) The paper discusses the transmission channels through which exchange rates affect employment and emphasizes that this relationship is particularly significant in South Africa due to the higher volatility of the rand compared to other

emerging economies. The paper also highlights that the sector-specific impact of exchange rates is conditioned by industry characteristics, creating winners and losers in the face of currency shocks. Therefore, to fully understand the effects of exchange rates on employment, an economy-wide framework is necessary. The findings from a computable general equilibrium (CGE) model demonstrate that even in a country with unreliable employment data like South Africa, it is still possible to analyze the relationship between exchange rates and employment.

Zhao (2020) The Influence and Impact of the Exchange Rate on the Economy, this paper examines the influence and impact of the exchange rate from various perspectives. It starts by introducing the primary factors affected by the exchange rate, such as exports, prices, and costs. The paper also explores the relationship between the exchange rate and productivity, noting that a stronger local currency can lead to increased productivity. Additionally, it discusses the effect of the exchange rate on the number of tourists. After analyzing the impact of the exchange rate, the paper proposes some suggestions for exchange rate policies. It emphasizes the significance of the exchange rate as an essential element, emphasizing the need for logical operation and appropriate policy utilization.

Geerolf (2020) The Phillips Curve: A Relation between Real Exchange Rate Growth and Unemployment, the paper suggests that there is a negative correlation between unemployment and real exchange rate appreciation in both fixed and flexible exchange rate regimes. This means that when the exchange rate strengthens (appreciates), it tends to be associated with lower levels of unemployment.

Akkay (2021) The Real Effective Exchange Rate and Industrial Employment: The Turkish Case, there is a relationship between the exchange rate and employment rate in the Turkish economy. Specifically, the study suggests that an appreciation of the producer price index-based real effective exchange rate is associated with an increase in industrial employment. This means that when the exchange rate rises, it has a positive impact on employment, leading to higher levels of industrial employment.

Table 2 LITERATURE REVIEWED

ANTHERS, TITLE	OBJECTIVE	THEORY	VARIANCE	ANALYSIS	CONCLUSION
EXCHANGE RATE VOLATILITY AND EMPLOYMENT GROWTH IN DEVELOPING COUNTRIES: EVIDENCE FROM TURKEY (Demir, 2010)	EXPLORES THE IMPACTS OF EXCHANGE RATE VOLATILITY ON EMPLOYMENT GROWTH OF 691 PRIVATE FIRMS THAT ACCORDED FOR 26% OF TOTAL VALUE ADDED IN MANUFACTURING IN TURKEY DURING THE PERIOD OF 1983–2005	- TIME SERIES ANALYSIS - COBB-DOUGLAS PRODUCTION	-THE FOREIGN EXCHANGE - THE LOG DIFFERENCE OF MONTHLY MULTILATERAL RER - ASSETS IS THE NATURAL LOG OF FIRMS - VALUE ADDED IS THE FIRM LEVEL VALUE-ADDED GROWTH RATE - INDUSTRY IS THE LOGARITHM GROWTH RATE - WAGE IS THE LOGARITHMIC GROWTH RATE OF REAL WAGES IN THE MANUFACTURING SECTOR AT TIME T-1 - GDP IS THE LOGARITHMIC GROWTH RATE OF REAL GDP	-THE ECONOMETRIC MODEL - ESTIMATION TECHNIQUES, - ROBUSTNESS TESTS - GARCH (1, 1) PROCESS	AN AVERAGE FIRM WITH ONE STANDARD DEVIATION INCREASES IN REAL EXCHANGE. RATE VOLATILITY REDUCES EMPLOYMENT GROWTH IN THE RANGE OF 1.4 - 2.1 PERCENTAGE POINTS.

Table 2 (Continued)

ANTHERS, TITLE	OBJECTIVE	THEORY	VARIANCE	ANALYSIS	CONCLUSION
ANALYSES OF THE RELATIONSHIP BETWEEN EXCHANGE RATES AND EMPLOYMENT IN KOREA (Kim, 2005)	STUDIES ABOUT RELATIONSHIP BETWEEN EXCHANGE RATES AND EMPLOYMENT FOCUS ON USING 28 INDUSTRY DATA IN A DEVELOPING COUNTRY	- TRADE STRUCTURE CAMPA AND GOLDBERG (2001), - COBB-DOUGLAS FUNCTION	- THE NUMBER OF EMPLOYEES IN EACH INDUSTRY. - LOCAL REAL GDP, - WORLD REAL DEMAND, - LOCAL INTEREST RATE, - REAL OIL PRICE - WORLD INTEREST RATE REAL EXCHANGE RATES -THE NUMBER OF EMPLOYEES LAGGED AND DUMMY VARIABLES	- NON-PANEL ANALYSIS - HOMOGENEITY TEST - TESTS FOR INDIVIDUAL EFFECTS - TESTS FOR EXOGENEITY OF SOME VARIABLES - SPURIOUS REGRESSION	THE RESULTS SHOW THAT KOREAN EMPLOYMENT RESPONDS POSITIVELY TO EXCHANGE RATE SHOCKS. ALL INDUSTRIES WITH LOW IMPORTED INPUT RATIO AND HIGH OPENNESS SHOW A POSITIVE SIGN IN EMPLOYMENT TO EXCHANGE RATE SHOCKS.

Table 2 (Continued)

ANTHERS, TITLE	OBJECTIVE	THEORY	VARIANCE	ANALYSIS	CONCLUSION
THE EFFECTS OF EXCHANGE RATES ON EMPLOYMENT IN CANADA (Huang et al., 2014)	RESEARCHER FOCUSES ON THE EMPLOYMENT EFFECT OF THE EXCHANGE RATE IN CANADA UNDER A FLEXIBLE EXCHANGE RATE REGIME	-MACROECONOMICS	- COMMODITY PRICE - GDP OF CANADA - FOREIGN GDP - INTEREST RATE - GOVERNMENT EXPENDITURE SHARE - REAL NONRESIDENTIAL ELECTRIC POWER PRICE - NAICS -EMPLOYMENT RATE	- CERI - REAL CERI	THE REAL APPRECIATIONS OF THE CANADIAN DOLLAR HAVE NEGATIVE EFFECTS ON EMPLOYMENT IN THE MANUFACTURING INDUSTRIES, BUT NOT IN OTHER INDUSTRIES BECAUSE THE MANUFACTURING SECTOR. ACCOUNTS FOR ONLY ABOUT 10% OF EMPLOYMENT IN CANADA. 1%. APPRECIATION IN THE TRADEWEIGHTED EXCHANGE RATE IS ASSOCIATED WITH A 0.66% DECREASE IN EMPLOYMENT ON EVER RATE

Table 2 (Continued)

ANTHERS, TITLE	OBJECTIVE	THEORY	VARIANCE	ANALYSIS	CONCLUSION
THE EFFECT OF REAL EXCHANGE RATE ON UNEMPLOYMENT (Bakhshi & Ebrahimi, 2016)	-INVESTIGATE THE RELATIONSHIP BETWEEN EXCHANGE RATE AND UNEMPLOYMENT IN IRAN USING THE ANNUAL DATA OF 30 YEARS (FROM 1981 TO 2012) - CONSIDERING EXCHANGE RATE VOLATILITY IN RECENT YEARS	- MACROECONOMICS	- NAMELY UNEMPLOYMENT RATE, - EXCHANGE RATE, - EXPORT, IMPORT, AND - GROSS DOMESTIC PRODUCT	- AUTOREGRESSIVE ECONOMETRIC MODEL - AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) - ESTIMATION OF LONG-RUN RELATIONSHIP - ASSUMPTIONS OF CLASSICAL REGRESSION	THE RESULTS OF THE STUDY DEMONSTRATED THAT ECONOMIC GROWTH HAD A SIGNIFICANT AND POSITIVE EFFECT ON UNEMPLOYMENT. IN ADDITION, IT WAS SHOWN THAT THERE WAS A NEGATIVE RELATIONSHIP BETWEEN UNEMPLOYMENT AND EXCHANGE RATE.

Table 2 (Continued)

ANTHERS, TITLE	OBJECTIVE	THEORY	VARIANCE	ANALYSIS	CONCLUSION
EMPLOYMENT ADJUSTMENTS OF REGULAR AND NON-REGULAR WORKERS TO EXOGENOUS SHOCKS: EVIDENCE FROM EXCHANGE-RATE FLUCTUATION (Izumi et al., 2021)	- THE ADJUSTMENTS IN EMPLOYMENT OF REGULAR AND NON-REGULAR WORKERS, EXPLOITING THE EXCHANGE-RATE FLUCTUATION AND HETEROGENEOUS DEPENDENCE ON INTERNATIONAL TRADE ACROSS FIRMS AS A SOURCE OF EXOGENOUS VARIATION.	- MACROECONOMICS	- ADJUSTMENTS IN EMPLOYMENT OF REGULAR AND NON-REGULAR WORKERS - THE OUTCOME VARIABLES, WHICH ARE TOTAL SALES AND THE NUMBER OF REGULAR OR NON-REGULAR EMPLOYEES OF FIRM I IN INDUSTRY J IN YEAR T. - YEN POWER - GDP	- HETEROSKEDASTICITY-ROBUST STANDARD ERRORS	THE APPRECIATION OF THE JAPANESE YEN SPONTANEOUSLY DECREASED THE SALES OF EXPORTERS AND THE EMPLOYMENT OF NON-REGULAR WORKERS, BUT IT DID NOT REDUCE THE EMPLOYMENT OF REGULAR WORKERS. - THE EXPORTERS USE THE EMPLOYMENT OF NON-REGULAR WORKERS AND WAGES OF REGULAR WORKERS AS ADJUSTMENT MARGINS FOR THE EXCHANGERATE FLUCTUATION TO HOARD REGULAR WORKERS, WHO PRESUMABLY HOLD HIGHER LEVELS OF FIRM-SPECIFIC HUMAN CAPITAL

CHAPTER 3
RESEARCH METHODOLOGY

This study aims to investigate the relationship and estimation of exchange rate volatility between the Thai currency (Baht) and the United States currency (Dollar) which influences on Thai employment rate. This chapter describes the research methodology, research instruments, and procedures.

In this chapter, the researcher proceeded with the following steps:

Data collection and Sources of information

Identify variables

Methodology

Data and Sources of information

This research uses independent variables as secondary time series data, collected historical data of the Thai baht-dollar exchange rate for a total of 110 months since January 2011 to February 2020, which are data from both government and private agencies as follows:

Table 3 ABBREVIATION MEANING

ABBREVIATION	MEANING
EMPLOYMENT (EMP, EET1)	NUMBERS OF EMPLOYED PERSONS FROM SELECTED WORKING CATAGORIES UNDER AGED CONDITION,15 TO 60 YEARS OLD
EMPLOYMENT RATE (EMR)	PERCENTAGE OF EMPLOYMENT (EMP) TO LABOUR FORCE
EXCHANGE RATE USD/THB (USD)	THE EXCHANGE RATE BETWEEN THE VALUE OF THE THAI BAHT AGAINST ONE US DOLLAR.
LBF	LABOUR FORCE

Table 3 (Continued)

ABBREVIATION	MEANING
LOG	LN FUNCTION, RETURNS THE NATURAL LOGARITHM OF A NUMBER. NATURAL LOGARITHMS ARE BASED ON THE CONSTANT E (2.71828182845904)
RAD	EQUAL TO (USD) AT TIME $(t-1)$
MV (3)	MOVING AVERAGE TYPE CUMULATIVE AVERAGE (CA); $n=3$
RETURN	PERCENTAGE CHANGE IN VALUE OF THAI BAHT PER US DOLLAR UNIT OVER TIME SERIES.
ARCH (REALISED)	AUTOREGRESSIVE CONDITIONAL HETEROSKEDASTICITY - REALISED
P15	THE CURRENT POPULATION OF THAILAND MOVING ALONG TIME SERIES
NEER	NOMINAL EFFECTIVE EXCHANGE RATE
REER	REAL EFFECTIVE EXCHANGE RATE
GDP	GROSS DOMESTIC PRODUCT
XAU	GOLD PRICE
DXAU	THE PERCENTTAGE CHANGE OF GOLD PRICE

Table 4 DATA REARCHING TOOLS

ABBREVIATION	SOURCES OF INFORMATION
USD	BANK OF THAILAND
P15	
NEER	
REER	
GDP	
XAU, DXAU	INVESTING.COM - STOCK MARKET QUOTES & FINANCIAL NEWS

Identify variables

Log (LOG) is LN function, returns the natural logarithm of a number. Natural logarithms are based on the constant e (2.71828182845904)

Rad is LN function at t-1, Returns the natural logarithm of a number. Natural logarithms are based on the constant e (2.71828182845904). The variable's symbol is (Rad)

Exchange rate (USD) is the information of trade currency between Thai currency (Baht) and United States of America currency (U.S. dollar) which was collected from Bank of Thailand (BOT) as monthly time series data.

Autoregressive Conditional Heteroscedasticity (ARCH) model

Select appropriate Model

Analytic tools, the researcher selected to analyst the volatility of exchange rate as follow:

Autoregressive (AR) Models

Autoregressive (AR) models are fundamental to time series analysis. They are estimated via regressing a variable on one or more of its lagged values. That is, AR models take the form.

$$Y_t = c + \sum_{i=1}^{p} \beta_i Y_{t-1} + \epsilon_t$$

Where we say p is the order of our auto regression.

Creating analytical processing tools 1: Autoregressive Conditional Heteroscedasticity (ARCH) model

The autoregressive conditional heteroscedasticity (ARCH) model is a statistical model for time series data that models the variance of the current error as a function of the actual sizes of the previous time periods' errors. The ARCH model is

appropriate when the error variance in a time series follows an autoregressive (AR) model. An ARCH(q) process can be written as

$$Y_t = \alpha_0 + \sum_{i=1}^{q} Y_{t-q} + \varepsilon_t$$

where ε_t denote the error terms. These ε_t are separated into a stochastic piece z_t and a time-dependent standard deviation σ_t characterizing the typical size of the terms so that $\epsilon_t = \sigma_t z_t$. The random variable z_t is a strong white noise process. The series σ_t^2 is modeled as

$$\sigma_t^2 = \alpha_0 + \alpha_1 \epsilon_{t-1}^2 + \cdots + \alpha_q \epsilon_{t-1}^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \epsilon_{t-1}^2$$

Where $\alpha_0 > 0$ and $\alpha_i > 0, i > 0$, Estimate the best fitting autoregressive model AR(q)

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \cdots + \alpha_q Y_{t-q} + \epsilon_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i Y_{t-1} + \epsilon_t$$

Achieve the squares of the error ϵ^2 and regress them on a constant and q lagged values

$$\hat{\epsilon}^2 = \hat{\alpha}_0 + \sum_{i=1}^{q} \hat{\alpha}_\iota \hat{\epsilon}_{t-i}^2$$

where q is the length of ARCH lags. Null Hypothesis: $\alpha_i = 0$ for all $i = 1, \dots, q$. Alternative hypothesis: At least one of the estimated α_i coefficients must be significant. Under the null hypothesis of no ARCH errors, the test statistic $T'R^2$ follows X^2 distribution with q degrees of freedom, where $T'$is the number of equations in the model which fits the residuals vs the lags (i.e., $T' = T - q$). If $T'R^2$ is greater than the Chi-square table value, we reject the null hypothesis and conclude there is an ARCH effect, otherwise we do not reject the null hypothesis.

Population or P15

This is research related to the exchange rate volatility of the Thai baht against the US dollar. This may affect the movement and the relationship to employment and to the employment rate. The data is secondary data base from Bank of Thailand (https://www.bot.or.th), Thai population starting age from 15 years old to 60 years old served in employment in Civil Registration.

Cumulative average use as moving average (MV)

In a cumulative average (CA), the data arrive in an ordered datum stream, and the user would like to get the average of all of the data up until the current data. Cumulative average is one of technical moving average (MV) which the data arrive in an ordered datum stream, and the user would like to get the average of all of the data up until the current data, typically, an equally weighted average of the sequence of n values $x_1, x_2, \dots, x_n$ up to the current time. The researcher used n = 3 as an independent variable.

$$CA_n = \frac{x_1 + \cdots + x_n}{n}$$

When CA_n is the average of exchange rate $x_1 + \cdots + x_n$ times by n. In this calculation we use $n = 3$, The equation can be written as follows:

$$CA_3 = \frac{x_t + x_{t-1} + x_{t-2}}{3}$$

When x_t is exchange rate between US dollar and Thai Baht at base month

Thai Baht Index (NEER), (REER)

The Thai Baht Index (NEER and REER) is a comparison of the Baht against the currencies of Thailand's trading partners and competitors and is weighted average by their trade ratio. the weighted geometric mean method with the following formula:

$$NEER_t = NEER_0 \prod_{i=1}^{n} \left(\frac{E_{it}}{E_{i0}}\right)^{w_{i,t}}$$

Secondary data which used in this thesis is calculated from Bank of Thailand

Gold price (XAU)

Gold price (XAU) and the differentiation of gold price along time series (DXAU) both refers to the trading of gold in the global market by using gold as the medium of exchange where the trade takes place in the form of a contract instead. The price of gold will be compared from the dollar (USD) per 1 ounce weight.

Methodology

Step 1: Prepare the variables

Researcher will prepare each independent variable and dependent variable in time series, by calculation and harvesting of secondary data.

To use the Autoregressive conditional heteroskedasticity (ARCH) model in Microsoft office, excel, to examine the volatility of exchange rate, researcher must start by calculating the sub variables in ARCH model equations. First of all, it is an immensely powerful tool that generates scenarios that are very close to reality or at least

satisfactory close to reality and second, it is really conceptually simple it approaches volatility processes in a very intuitive way. The conditional volatility which is denoted Vt square (V_t^2) that consists of two terms that are the being added up together. Which are the unconditional volatility omega (**ω**) and Autoregressive Component alpha (**α**) which is ARCH coefficient, times lagged realized volatility or lagged squared residual epsilon t minus one squared (ε_{t-1}^2). When Alpha (**α**) is ARCH coefficient, the higher alpha as the more persistent in the volatility of our time series

$$V_t^2 = \omega + \alpha\varepsilon_{t-1}^2$$

When V_t^2 : Conditional variance

ω : Unconditional variance

α : ARCH Alpha

And

$$\varepsilon_t^2 = V_t^2 + \mu_t$$

When μ_t : Constant (Disturbance term)

ε_t^2 : Squared residual (The actual realized volatility)

ε_{t-1}^2 : Lagged squared residual

The actual realized volatility (ε_t^2) consists of the conditional volatility (V_t^2) and the disturbance term (μ_t) can be interpreted either as volatility or error in volatility.

To calculate the baseline parameter of our time series that is that would have been thought of the time series if we assumed that it is homoscedastic that there are no ARCH processes in our data. First calculate average the exchange rate between Thai Baht and Dolla US 110 month as sample size. Second calculate the sample

standard deviation (SD) and then to calculate the sample variance by squared the standard deviation as usual (SD^2). The base line case just assume that equation has no ARCH processes in our data that cause constant equal to the sample average, The unconditional variance (ω) is equal to the normal sample variance (SD^2) and our ARCH alpha, the magnitude of ARCH processes is equal to zero. Then the long run volatility would be expressed by a formula that is unconditional variance (ω) divided by 1 minus alpha (α), Constant (μ), unconditional variance (ω), and alpha (α) are starter of the model parameters.

$$Long - run\ volatility = \frac{\omega}{(1-\alpha)}$$

To calculate the residuals, we subtract the intercept (constant term) of our ARCH model from the observed values of our dependent variable, y. We then square these residuals to obtain squared residuals. To incorporate lagged realized volatility in our ARCH modeling, we lag the squared residuals by one. Using a specific formula, we can calculate the conditional variance observation by observation, using this formula over here so first of all what value of conditional variance.

At the first observation, the value of the conditional variance is typically determined by plugging in the long-run volatility estimator from the ARCH model coefficients. In subsequent observations, we iterate this value. The conditional variance formula consists of the unconditional variance (omega), the magnitude of the ARCH process (alpha), and the lagged squared residual (lagged realized volatility).

$$V_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta v_{t-1}^2$$

Assuming constant volatility and no ARCH processes in the data, the conditional variance will always be the same and equal to the unconditional variance. Adjust the parameters of the model, namely the intercept (constant term) and the ARCH

coefficient. Regular linear regression techniques cannot be applied here since we lack matrices and independent variables.

The preferred method for parameter estimation, in this case, is maximum likelihood estimation. By maximizing a likelihood function based on the model parameters, we can determine the optimal values. While optimizing a product is challenging numerically, we can simplify the process by using the log-likelihood function. By maximizing the sum of logarithms, we can effectively maximize the likelihood function. Calculating the logarithm of the likelihood function for each observation and summing them gives us the log-likelihood.

$$V_t^2 = \omega + \alpha \varepsilon_{t-1}^2$$

To input the likelihood function, start with the natural logarithm. In the denominator, we include the square root of two times pi times the conditional variance. then multiply this by the exponent of the squared residuals divided by two times the conditional variance. Using these calculations, we arrive at the log-likelihood function. Summing the log-likelihoods for all observations provides the overall log-likelihood.

That particular solver lacks support for strict inequality restrictions, as it only manages non-strict inequalities. However, it is possible to make some adjustments to effectively enforce strict inequality. This can be achieved by stating that the unconditional variance, omega, should be greater than or equal to a very small number. In other words, the goal is to ensure that the unconditional variance is always positive.

Moving on, restrictions need to be imposed on the ARCH coefficient, alpha, for both theoretical and mathematical reasons. Theoretically, alpha should be bounded between zero and one. A value less than zero would be difficult to interpret and lacks meaningful significance. It would imply that higher realized volatility in the previous observation results in lower conditional volatility in the current observation, which is quite counterintuitive. From a mathematical standpoint, as explained earlier, the long-run volatility is calculated as a sum of an infinite series, equal to the unconditional

variance divided by one minus alpha. If alpha is equal to or greater than one, the infinite series does not converge, resulting in an unstable value for the long-run volatility. Consequently, the conditional variance would become explosive, which is undesirable. Therefore, it is necessary to specify that the ARCH coefficient, alpha, should be greater than or equal to zero and less than or equal to one.

$$L(\mu, \omega, \alpha) = \frac{1}{V_t\sqrt{2\pi}^{e-\frac{\varepsilon_{t-1}^2}{2V_t^2}}}$$

These specified restrictions allow the solver to optimize the log-likelihood. For this task, a nonlinear solving algorithm, such as gradient descent, can be used, as it is sufficient for solving this relatively straightforward problem. Once the processed, it is necessary to wait for the solver to find the optimal solution for the maximum likelihood.

After optimization, there is a slight increase in the log-likelihood function. This indicates that the ARCH model provides a better mathematical approximation of reality compared to the assumption of constant volatility. Examining the coefficients reveals that the constant term, constant (mu),

The initial investigation of the conditional variance expression revealed that the ARCH model provides a fairly accurate representation of reality. It successfully predicts volatility spikes and effectively explains the behavior of the volatility process in financial and macroeconomic data from the real world. However, there is room for improvement. It appears that even better results can be achieved.

Model Evaluation: Evaluate the quality of the model and determine the statistical significance of the estimated coefficients. Examine indicators such as the R-squared value, significance levels of the coefficients, and perform diagnostic tests, such as the Lagrange Multiplier (LM) test, to assess the presence of ARCH effects.

Analysis and Interpretation: Analyze the outcomes of the ARCH model within the framework of the relationship between exchange rates and employment rates.

Interpret the estimated coefficients, volatility dynamics, and identify any significant relationships between the variables.

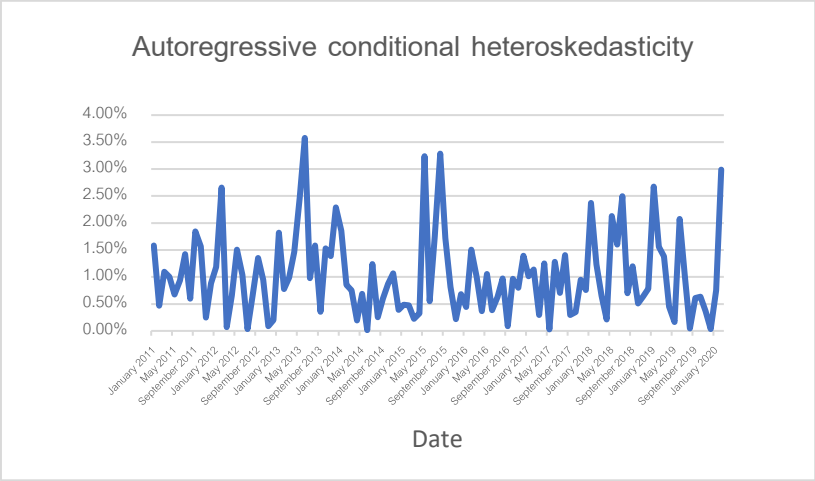


Figure 1 EXCHANGE RATE VOLATILITY BY ARCH MODEL

Step 2: Import Data

Import the exchange rate (USD) including LOG, Rad, moving average (MV3), and exchange rate volatility (ARCH), employment rate (EMR), population (P15), Nominal Effective Exchange Rate (NEER), Real Effective Exchange Rate (REER), gold price (XAU), and return of gold price (DXAU) data into Gretl. Ensure that the data is in a suitable format, such as a Comma Separated Value file (CSV), and that each variable is organized in a column.

Step 3: Data analytic

estimate the model using the Ordinary least squares (OLS) command. This command is a type of linear least squares method for choosing the unknown parameters in a linear regression model with fixed level-one effects of a linear function of a set of explanatory variables. In this case, the dependent variable would be the employment rate, and the others are independent variables.

Step 4: Gretl provides output tables that show the estimated coefficients, standard errors, p-values, and other relevant statistics. Resulted the ARCH-related parameters, such as the autoregressive coefficients and the estimated conditional variance equation coefficients.

CHAPTER 4
RESULT

This study aims to investigate the relationship and estimation of exchange rate volatility between the Thai currency (Baht) and the United States currency (Dollar) which influences on Thai employment rate. Analytical variables, data calculation and results processed as following step

Data stability test by using Unit Root Test

Multiple linear regression

Heteroscedasticity Test

Autocorrelation test

Ordinary Least Squares (OLS)

Unit Root Test

The Unit Root Test, specifically the Augmented Dickey-Fuller (ADF) test, is used to determine whether certain stochastic processes in time series models exhibit stationary or nonstationary behavior. In this study, the researcher conducted the ADF test on various variables, including employment rate, exchange rate, logarithmic returns, moving averages, population size, effective exchange rates, GDP, gold prices, and ARCH condition. Initially, some of the data were found to be stationary, but for the nonstationary variables, first and second differences were applied, Unit Root Test is a feature of some stochastic processes that can produce problems in statistical inference involving time series models. Unit root test is a stationary data static property test used in the study. The static data will be analyzed in the next step. The researcher will test the dependent and independent variables in the model one by one which are numbers of employed persons aged 15 to 60 as a percentage of the working-age population employed (EMR), the exchange rate between the value of the Thai baht against one US dollar (USD), returns the natural logarithm of a number (LOG), Rad (Equal to USD at time t-1), Moving average n=3 (MV3),), Moving average n=20 (MV20), The current population of Thailand (P15), Nominal Effective Exchange Rate (NEER), Real Effective

Exchange Rate (REER), Gross Domestic Product (GDP), Gold price (XAU) and, ARCH condition (Realised and, Conditional)

To evaluate by Unit Root of data using the Augmented Dickey-Fuller test, was performed to determine stationary: [I (0); integrated of order 0] or nonstationary [I (d); integrated of order. d]. Initially, it was found that the data were still stationary in some factors, so the data were modified by the 1st Difference and 2nd Difference of selected variables and were evaluated for the Unit Root again.

The Unit Root Test using the Augmented Dickey-Fuller (ADF) method after correction for nonstationary data by 2nd Differences showed that all variables considered as statistical significance level of 99%. Economic factors and exchange rate are non-stationary but stationary at 2nd Differences.

Multiple Linear Regression

Estimation of beta coefficient from the Multiple linear regression analysis by using Ordinary Least Square (OLS) to find the beta coefficient (β) which shows the relationship between the employment rate and the independent variable such as the exchange rate between baht against US dollar, gold prices, Thai GDP, and population.

Information from that preliminary estimate there are three commonly found types which are Multicollinearity, Heteroscedasticity, and Autocorrelation. These 3 types of problems are different in terms of impact on the data, problem testing and solving the problems, for this reason researcher will investigate and fix problems with statistical methods.

Table 5 MULTICOLLINEARITY TESTING RESULT

Multicollinearity: Variance Inflation Factors						
Variables	USD	LOG	Rad	MV3	NEER	REER
VIF	365.826	368.520	2.114	2.357	18.825	18.871

Table 6 MULTICOLLINEARITY TESTING RESULT 2

Multicollinearity: Variance Inflation Factors						
Variables	GDP	XAU	DXAU	Realised	Conditional	P15
VIF	1.286	1.226	1.110	1.965	2.059	1.105

Variance Inflation Factors (VIF), The Minimum possible value = 1.0 and the Values > 10.0 may indicate a collinearity problem, Researcher decided to remove some of VIF(j), where R(j) is the multiple correlation coefficient between variable j and the other independent variables. Return, LOG, and NEER are selected variables which researcher decided to remove from model.

Table 7 MULTICOLLINEARITY SOLVED RESULT

Multicollinearity: Variance Inflation Factors									
Variables	USD	Rad	MV3	REER	GDP	XAU	DXAU	Realised	P15
VIF	2.033	1.911	2.209	1.761	1.234	1.222	1.067	1.065	1.058

From the table above, Multicollinearity testing result by using the Variance Inflation Factors method shown that the independent variables from table have VIF values < 10, meaning that the correlation between the independent variables was at an acceptable level theoretically. It can be concluded that all of the above economic factors and the exchange rate are independent of each other and at an acceptable level. Multicollinearity is not found.

Heteroscedasticity Test

White's test result

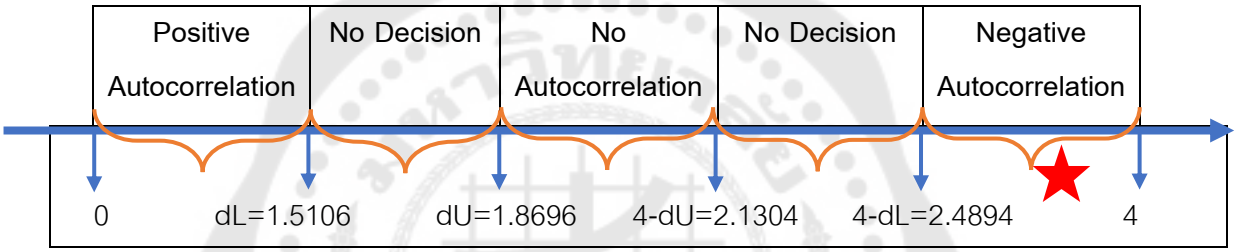
from the Heteroscedasticity test by White' test method found that the TR2 value of model was 42.613613, with p-value = P (Chi-square (54) > 42.613613) = 0.868299 which was comparatively lower than the critical value of 72.1532,

(54< 72.1532). Therefore, it can be concluded from the result that this data does not find any variable error or heteroscedasticity problem.

Autocorrelation Test

The Autocorrelation test with the Durbin-Watson d test found that the DW value of model was equal to 2.724712. By examining the problems will compare with the values of dL and dU as follows

Table 8 AUTOCORRELATION TEST RESULT



This model encountered an autocorrelation issue because the DW value of model was equal to 2.724712 which located between (4-dL and 4) designated as Negative Autocorrelation.

Ordinary Least Squares (OLS)

The step involved estimating the beta coefficient (β) using Multiple Linear Regression analysis with Ordinary Least Squares (OLS). This estimation aimed to identify the relationship between the employment rate and independent variables such as exchange rates, gold prices, Thai GDP, Real Effective Exchange Rate, moving average and population. After obtaining preliminary estimates, three common types of problems were identified: Multicollinearity, Heteroscedasticity, and Autocorrelation.

Table 9 MULTIPLE LINEAR REGRESSION (OLS) RESULT 1

Variables	Employment Rate
Const	0.000110842
	(0.00137835)
USD	−0.0214364 **
	(0.00899389)
Rad	0.119684
	(0.251833)
MV3	−0.00854567
	(0.0177259)
P15	−0.000141570 ***
	(1.08239e-05)
REER	−0.00166310
	(0.00207218)
GDP	3.83157e-07 ***
	(9.89270e-08)
XAU	−1.34104e-05
	(2.75389e-05)
DXAU	−0.0505288
	(0.0574218)
ARCH	−0.0336531
	(0.201378)

Table 10 MULTIPLE LINEAR REGRESSION (OLS) RESULT 2

R-Squared	0.317605
Adjusted R-Squared	0.254936
Durbin-Watson	2.724712
P-value(F)	2.35e-34

Result

The result shown that it the exchange rate has between the Thai baht agent US dollar changes by 1 unit, the employment rate changes 0.0214364 unit in the opposite direction with a statistical significance of 95% . If the change in the number of Thai populations aged 15 years or older for 1 unit, it will result the change in the employment rate of 0.000141570 unit in the opposite direction, with 99% statistical significance. And if a change in Thai Gross Domestic Product (GDP) by one unit results the change in the employment rate of 3.83157e-07 in the same direction with 99% statistical significance.

Discussions

This analysis examines the relationships between various economic factors and the employment rate in Thailand. Specifically, the study found 3 variables have an impact on the employment rate.

Exchange Rate and Employment Rate: The analysis indicates that there is a statistically significant relationship between the exchange rate of the Thai baht against the US dollar and the employment rate. Specifically, when the exchange rate changes by 1 unit, the employment rate changes in the opposite direction by approximately 0.0214364 units. The statistical significance of 95% suggests a high level of confidence in this relationship. Therefore, it can be concluded that there is an inverse association between the exchange rate and the employment rate in Thailand. The relationship between the Thai baht exchange rate and the employment rate reveals the impact of currency fluctuations on employment trends in Thailand. A change in the exchange rate reflects the relative value of the Thai baht compared to the US dollar. When the Thai baht strengthens against the US dollar (i.e., its value increases), it becomes more expensive for foreign investors to conduct business in Thailand. As a result, businesses may experience a decrease in profitability, leading to potential job cuts and a higher unemployment rate. Conversely, when the Thai baht weakens (i.e., its value decreases), it becomes more affordable for foreign investors, potentially stimulating business activities, job creation, and reducing unemployment.

Population Change and Employment Rate: The analysis also shows a statistically significant relationship between the change in the number of Thai populations aged 15 years and older and the employment rate. When the population changes by 1 unit, the employment rate changes in the opposite direction by approximately 0.000141570 units. The statistical significance of 99% indicates a strong level of confidence in this relationship. Hence, we can conclude that there is an inverse relationship between population changes and the employment rate in Thailand. The number of Thai populations aged 15 years or older serves as a proxy for the labor force, representing the potential workforce available for employment. Changes in this demographic group can have implications for the overall employment rate in the country. An increase in the number of individuals aged 15 and above can result from factors such as population growth, immigration, or changes in the working-age population's participation rate. When the number of working-age individuals increases, it introduces additional labor supply into the economy. If the labor demand does not keep pace with this increase, it can lead to higher competition for jobs, potentially increasing unemployment rates. Conversely, a decrease in the working-age population may alleviate competition for jobs, leading to a lower unemployment rate.

GDP and Employment Rate: The analysis reveals a statistically significant relationship between changes in Thai Gross Domestic Product (GDP) and the employment rate. When the GDP changes by one unit, the employment rate changes in the same direction by approximately 3.83157e-07 units. The statistical significance of 99% provides a high level of confidence in this relationship. Thus, we can conclude that there is a positive association between GDP changes and the employment rate in Thailand. The relationship between Thai GDP and the employment rate reflects the interplay between economic growth and job creation. Gross Domestic Product represents the total value of goods and services produced within a country's borders. An increase in Thai GDP indicates economic expansion, often driven by factors such as increased consumer spending, business investment, and exports. This economic growth can lead to higher demand for goods and services, resulting in increased

production and the need for additional workers, thus lowering the unemployment rate. Conversely, a decrease in Thai GDP suggests an economic contraction, which can lead to reduced demand, lower production, and potentially job losses.

CHAPTER 5
SUMMARY DISCUSSION AND SUGGESTION

Conclusion

The research results obtained in this thesis have significant implications and potential applications in various domains. For Economic Policy, the research on exchange rates and their impact on employment rates can provide valuable insights for policymakers in formulating effective economic policies. The findings can help guide decisions related to monetary policy, foreign exchange interventions, and trade regulations to promote economic stability and employment growth. For Business and Trade, this research can assist businesses, particularly those engaged in international trade, in understanding the implications of exchange rate volatility on their competitiveness and employment levels. It can aid in strategic decision-making regarding currency hedging, export-import planning, and resource allocation.

This thesis examines the relationship between the volatility of the baht and the employment rate in Thailand. The Thai baht is the national currency. Plays an important role in the country's economy. Exchange rate volatility can be significant for various economic indicators. including employment, the purpose of this study was to analyze the impact of the volatility of the Thai baht on the employment rate in Thailand. and identify factors contributing to this relationship. The research method involves a comprehensive analysis of relevant economic data. Statistical Modeling and review of existing literature. The findings can provide valuable insights for policymakers and stakeholders in understanding the dynamics between exchange rate volatility and employment outcomes in Thailand.

To avoid and manage affectation. For exchange rate management, Regarding the selection of tools to mitigate the volatility of the baht, the Bank of Thailand will assess the suitability according to the situation by engaging in foreign exchange transactions to slow down the volatility of the baht in the short term, Central banks can actively manage exchange rates through interventions in the foreign exchange market. This action will affect the change in international reserves. If the BOT controls the baht to reduce its

appreciation volatility, it will buy foreign currencies and sell baht. which will make the reserve increase While taking care of the baht to slow down the weaker volatility will be buying the baht. and the sale of foreign currency This will reduce the reserve. This intervention can help stabilize exchange rates and reduce volatility, providing more predictability for businesses and minimizing disruptive effects on employment. However, in the event that there are signs of baht speculation, the BOT may use additional tools to monitor the baht as well, such as measures to prevent baht speculation. which may adjust the intensity level to suit the situation in each period.

For fiscal policy, governments can use fiscal policy measures to support industries affected by exchange rate fluctuations. This can include targeted subsidies, tax incentives, or grants to help businesses withstand competitive pressures from imports or take advantage of export opportunities. These measures can help protect jobs in affected sectors.

Monetary policy: Central banks can adjust monetary policy to address the impacts of exchange rates on employment. For instance, if a strong domestic currency is negatively affecting employment in export-oriented industries, the central bank can adopt a more accommodative monetary policy to stimulate economic activity and boost competitiveness. This may involve lowering interest rates or implementing measures to increase liquidity in the economy.

Trade policies: Governments can implement trade policies to support domestic industries and protect employment. This can include imposing tariffs or quotas on certain imports to reduce competition for domestic producers. By creating a more level playing field, these measures can help maintain employment in sectors vulnerable to import competition.

Skill development and training: Governments can invest in education, training, and skill development programs to enhance the competitiveness of the workforce. By equipping workers with the skills required for emerging industries or high-value-added sectors, they can adapt to changing economic conditions and reduce the impact of exchange rate fluctuations on employment.

Diversification and economic resilience: Governments can encourage economic diversification to reduce dependence on a few sectors that may be more vulnerable to exchange rate fluctuations. Promoting a diverse range of industries can help distribute employment opportunities across different sectors and make the economy more resilient to external shocks.

General suggestions for future research

Longitudinal Study: Conduct a longitudinal study to observe changes in the employment rate and the relationships with independent variables over an extended period. This can provide insights into the long-term trends and dynamics of the labor market and offer a more comprehensive understanding of the factors influencing employment.

Sector-Specific Analysis: Explore the employment rate and its determinants in specific sectors or industries. Analyzing sector-specific employment patterns can help identify sector-specific challenges and opportunities, allowing for targeted policy interventions to promote employment growth and development in specific sectors.

Impact of Technological Advancements: Investigate the impact of technological advancements, such as automation, artificial intelligence, and digitalization, on the employment rate. Examine how these advancements affect job creation, job displacement, and the skill requirements of the workforce.

Labor Market Flexibility: Examine the relationship between labor market flexibility and the employment rate. Analyze the effects of labor market regulations, such as employment protection legislation or flexible work arrangements, on employment dynamics and explore potential policy measures to enhance labor market flexibility.

Regional Disparities: Investigate regional disparities in employment rates within the country. Examine the factors contributing to regional variations in employment and explore policies or interventions to address regional inequalities in job opportunities and economic development.

Labor Market Integration: Study the impact of labor market integration, such as the free movement of labor within regional economic blocs, on the employment rate.

Analyze the effects of labor mobility on employment patterns, wage dynamics, and economic growth.

Socioeconomic Factors: Consider incorporating socioeconomic factors, such as education levels, income inequality, gender disparities, or social welfare policies, into the analysis. Explore how these factors interact with employment dynamics and examine policy measures to promote inclusive and equitable employment growth.

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APPENDIX

OLS Model, using observations 2011:03-2020:02 (T = 108)

Dependent variable: d_d_ETT1

HAC standard errors, bandwidth 3 (Bartlett kernel)

	coefficient	std. error	t-ratio	p-value	
const	0.000110842	0.00137835	0.08042	0.9361	
d_d_USD	-0.0214364	0.00899389	-2.383	0.0191	**
d_d_Rad	0.119684	0.251833	0.4752	0.6357	
d_d_MV3	-0.00854567	0.0177259	-0.4821	0.6308	
d_d_P15	-0.000141570	1.08239e-05	-13.08	3.22e-023	***
d_d_REER	-0.00166310	0.00207218	-0.8026	0.4242	
d_d_GDP	3.83157e-07	9.89270e-08	3.873	0.0002	***
d_d_XUA	-1.34104e-05	2.75389e-05	-0.4870	0.6274	
d_d_DXAU	-0.0505288	0.0574218	-0.8800	0.3810	
d_d_Realised	-0.0336531	0.201378	-0.1671	0.8676	

Mean dependent var	-0.000032	S.D. dependent var	0.034041
Sum squared resid	0.084611	S.E. of regression	0.029383
R-squared	0.317605	Adjusted R-squared	0.254936
F(9, 98)	54.90018	P-value(F)	2.35e-34
Log-likelihood	232.9532	Akaike criterion	-445.9063
Schwarz criterion	-419.0850	Hannan-Quinn	-435.0312
rho	-0.381213	Durbin-Watson	2.724712

Excluding the constant, p-value was highest for variable 64 (d_d_Realised)

Figure 2 CALCULATION RESULT BY USING OLS

Source: Author's calculations

VITA

NAME	WICHAYA SITTIRUK
DATE OF BIRTH	23 August 1994
PLACE OF BIRTH	LAMPANG, THAILAND
INSTITUTIONS ATTENDED	2018 Bachelor of Engineering (Chemical Engineering International Program), Sirindhorn International of Technology (SIIT), Thammasat University