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To Link this Article: <http://dx.doi.org/10.6007/IJARAFMS/v3-i4/405>

DOI:10.6007/IJARAFMS /v3-i4/405

Received: 13 October 2013, **Revised:** 18 November 2013, **Accepted:** 04 December 2013

Published Online: 19 December 2013

In-Text Citation: (Dinh & Gong, 2013)

To Cite this Article: Dinh, D. V., & Gong, G. (2013). Applied Financial Mathematical Model for Derivative Instruments and Hedging Exchange Rate. *International Journal of Academic Research in Accounting Finance and Management Sciences*. 3(4), 327 – 351.

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Vol. 3, No. 4, 2013, Pg. 327 - 351

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Applied Financial Mathematical Model for Derivative Instruments and Hedging Exchange Rate

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Abstract

Currently, the international economic transactions are regularly occurring. The statistics of imports and exports were published by the General Administration of Customs that the total turnover of the country's imports in year of 2012 was 228.37 billion U.S. dollars, increased by 12.1 % in comparison with the results of 2011. Thus, this is the 2nd year in a row total export and import turnover of Vietnam exceeded \$ 200 billion. This result shows that the foreign currency transactions of Vietnam economy are growing and exchange rates are regularly fluctuated in the foreign exchange market. The objective of the article is application of derivative instruments to hedge exchange rate fluctuation. From the data of actual economic events, the article uses the financial mathematical formulas to evaluate spot rate, forward rate, put and call options rate and finds out the results of the impact factors of exchange rate risk and the effectiveness of the application of derivative instruments for financial hedging. The research results show that the application of derivative instruments is necessary to minimize financial risk and how to bring high economic benefits?

Keywords: Derivatives Instruments, Hedging, Exchange Rate, Forward Contracts, Option Contracts, Swap Contracts

Introduction

Background

The exchange rate is always a concern in financial markets that may cause the exchange market to be declined unexpectedly, increased or remain stable. Revenue of some export and import companies are increased or decreased by the exchange rate volatility. This is also the concern of investors because the exchange rate can have negative impact on economic development and the export and import companies. The application of derivative instruments for hedging the exchange rate will help export and import companies have many advantages, while revenue in dollars from sectors such as: fisheries, rubber, minerals, agricultural products, oil and gas etc. Particularly, in 2013, export revenue of Phuoc Hoa Rubber Joint Stock Company (PHURUCO) is approximately 50% of the total annual turnover of the company; the expected export revenue of PHURUCO can reach about \$36 million (reduced

by a drop in rubber price). So, if the rates rise 1%, the interest rate difference of PHURUCO will be \$7.5 billion. But PHURUCO has also had debt in dollars that is about VND 250 billion (nearly \$12 million). This case, the company will suffer rate losses of about 2.6 billion, if the rates rise 1%. Therefore, if the rates rise 1%, the net gains from foreign exchange differences of PHURUCO are estimated to be close to VND 5 billion.

Normally, the exchange rate fluctuation will make the companies get difficulty in debts in dollars, make the price of imported goods rise and make the Consumer Price Index (CPI) increase. These will have negative impact on the economy. In addition, the exchange rate volatility also makes net sales volatility of foreign currency. If some industry groups depend on imported raw materials or foreign currency debt, they should apply derivative instruments for hedging exchange rate risk such as: the export and import companies, commercial banks, foreign currency business institutions etc. The majority of enterprises in this sector use foreign currency. The exchange rate increase has an impact on some sectors of imported materials or imported commodities such as: steel or on the companies who have a great debt ratio of dollars. On the contrary, this exchange rate increase brings benefit to the export companies.

For the above reasons, the revenue and payment of foreign currency of the import and export companies depend on the agreed conditions of transactions. Because of exchange rate fluctuation, the value of Vietnam's export and import revenue is also fluctuated. So the companies need to engage in some hedging forms to minimize financial risk due to exchange rate fluctuation.

Literature Review

Al-Qaisi (2012) researched "The Dynamics of Foreign Exchange Rate Risk Management in Different Enterprises". This study was related to the foreign exchange management in companies with foreign transactions. The research studied the management measures in the Jordan Company and foreign exchange risk for its businesses. The research had made some questionnaire in order to collect data from a random sample. The volume of samples in this study was random samples of 120 firms and the samples were applied sampling techniques to select different sizes of businesses. At the same time, the research based on the samples to handle the issues of exchange rate risk. From the collected data, this study applied descriptive statistical model to assess the level of the exchange rate risk of some types of companies. The study of the diversity of legal forms is used by the companies. The study was aimed at providing information on the behavior of firms in the management of foreign exchange risk

Al Wo ASAOLU Olufem had research in (2010) "Exchange Rate Risk Exposure of Nigerian Listed Firms". The author also used the sampling method of the company; the volume of samples was 117 PC from 1998 to 2007 and used descriptive statistical methods to find the slope of the regression equation. This result, the research assessed profit share on the exchange rate volatility and profit share had been used by the company. The study used three alternative currency rates of exchange. It was the U.S. dollar, British Pounds and the real exchange rate of Euro currency to find out the disadvantages of the use of three different currency types. This study also continued to study the differences in exposure to the financial companies and non-financial companies. However, the results of this research did not show any difference in risk prevention model between financial companies and non-financial companies to argue that financial firms should be hedging exchange risk. The study concluded

that exchange rate stability was a significant obstacle for business operations in Nigeria listed companies.

Andrei Tudor Stancu also studied the title (2010) "Impact of Foreign Exchange Risk on International Portfolios ". The purpose of this study was to illustrate the impact of foreign exchange risk in the international investment portfolio as well as variety of properties. This study was the approach of value at risk (VaR) model to calculate the error - covariance. The author's analyses were performed based on the relationship with VaR. The results of the study showed that currency fluctuation had a significant impact on the international portfolio and also showed that the unpredictable nature of the exchange rate is non-existent and their correlation with profit of foreign capital. In addition, the research had also established a general rule relating to currency risk which will be of great use when dealing with the hedging.

M. Nihat Solakoglu and Nazmi Demir also had title "Exchange-Rate Exposure and the Financial Sector." The two authors showed in this study the sensitivity analysis of companies in the financial sector of Turkey with the exchange rate fluctuation by using a market model. This study also identified some specific elements of companies which only hedge the exchange rate according to statistical significance. This study used the logical binary model. The results of this study suggested hedging rate and the likelihood of hedging exchange increases. In addition, the authors also showed that the ROE was positive impact on banking and insurance sub-sectors.

Beside the above studies , the authors below also studied the exchange rate risk and inflation risk such as: the author Kashif Saleem, Ph.D had (2013) study of "Inflation Risk , Exchange Rate Risk, and Asset Returns: Evidence From Korea, Malaysia, and Taiwan", the author Patro (2002) had "Explaining exchange rate risk in world stock Markets: A Panel Approach", "interest rate and foreign exchange risk exposures of Australian banks: A Note" of Shamsuddin (2009), the author Philippe Aghion, Philippe Bacchetta, Romain and Kenneth Rogoff Rancière also had research on the subject (2009)" Exchange rate volatility and productivity growth: The role of financial development" etc. All these researches reviewed the purposes of exchange rate fluctuation and assessed the risk level. Simultaneously, the studies also used statistical methods and sampling methods. However, these studies didn't apply financial mathematical model for economic transactions to minimize foreign exchange risk. For this reason, this paper adopts the financial mathematical model and statistical methods to apply to economic transactions and indicate application methods for firms.

Methodology of Determining Exchange Rate

When the enterprises have demand for frequent use of foreign currency transactions in the context of exchange rate fluctuation, they need to effectively use derivative instruments to hedge risk for foreign currency capital. These instruments help the investors and enterprises minimize great losses. Many forms of exchange rate hedging are used in the world. In Vietnam, some forms have been applied, such as forward contracts, option contracts or futures contracts. However, the use of mathematical model has not been applied to measure forward rate and profit level through put and call option or short selling. Therefore, the research applies the mathematical model to find out their usefulness in the issues that is solved below:

(1), why derivative instruments have been popularly applied in the developed countries and the Vietnam legal framework has also been issued to apply, but the enterprises have not still applied, leading to their losses from difference exchange rate and cannot manage the risk?

- (2), How are the mathematical model applied to assess economic effectiveness?
- (3), How to get profits from hedging foreign exchange through this model?
- (4), How is significance of adopting this model for economic development?

From these issues above, the research mainly sets up financial mathematical formulas to measure the value of the exchange rate and the future value of the exchange rate, to be applied to economic transactions and these formulas have also estimated the value of the forward contracts, swap contracts and option contracts. These are derivative instruments applied to hedge the exchange rate in Vietnam companies.

Forward Contracts

The forward contracts are applied to a big volume of goods transactions (common goods, financial assets, exchange rates etc.), and are determined at a time in the future at a fixed price and are agreed under regulations at the time of contract signing. From date of contract signing to the date of contract maturity that is called contracts period and the contract's payment date is called date of maturity.

The forward contracts for trading foreign currency or imported and exported goods are evaluated by forward rate formula as follows:

- (1), F is the forward rates
- (2), r_d : the interest rate of the evaluated currency, i.e. Viet Nam Dong (VND) rates
- (3), r_y : the interest rate of the basic currency, i.e. United States Dollar (USD) rates
- (4), S is the current rates, such as S = USD/VND.

$$F = s \times \frac{(1 + r_d)}{(1 + r_y)} \quad \text{Formula (1)}$$

The formula (1) assesses as follows:

First case: if the interest rate of the evaluated currency is greater than the interest rate of the quoted currency:

$r_d > r_y \Rightarrow 1 + r_d > 1 + r_y \Rightarrow \frac{(1 + r_d)}{(1 + r_y)} > 1 \Rightarrow F > s$. It is called an increase in the forward rate point.

Second case: if such interest rate of the evaluated currency is less than the interest rate of the quoted currency:

$r_d < r_y \Rightarrow 1 + r_d < 1 + r_y \Rightarrow \frac{(1 + r_d)}{(1 + r_y)} < 1 \Rightarrow F < s$. It is called deduction of forward rates point.

Combining two cases above we see that the forward rate can be summarized as follows: $F = S + \text{forward point}$, in which the forward point can be positive (+) or negative (-) and is determined based on the current price ratio and interest rate differences between the evaluated currency and quoted price. Assuming that the fiscal year is 360 days and the interest rate is percentage per year. From these cases, there are two formulas such as: formula (2) is the forward rate of purchase, formula (3) is the forward rate of sale.

$$F_p = s_p + \frac{s_p \times (Lgt(VND) - Lcv(NT)) \times N}{100 \times 360} \quad \text{Formula (2)}$$

$$F_s = s_s + \frac{s_s \times (L_{cv}(VND) - L_{gt}(NT)) \times N}{100 \times 360} \quad \text{Formula (3)}$$

In which:

- (1), F_p : forward rate of purchase and s_p is the current rate of purchase,
- (2), F_s : forward rate of sale and s_s is the current rate of sale,
- (3), $L_{gt}(VND)$: the deposit interest rate and $L_{cv}(VND)$ is the loan interest rate in Viet Nam Dong (VND),
- (4), $L_{gt}(NT)$: the deposit interest rate and, $L_{cv}(NT)$ is the loan interest rate in foreign currency,
- (5), N is the number of days of the forward contracts.

Swap Exchange Rate

Swaps are foreign exchange transactions that simultaneously include both transactions: purchase and sale of the same amount of currency among different countries, in which the maturity of two different transactions and rates of two transactions are determined at the time of the contract signing. Characteristics of foreign exchange (FOREX) Swaps.

(1), In the swap contracts, if the first partner carries out the first purchase and last sale, the second partner will carry out the first sale and last purchase (or vice versa).

(2), Purchase and sale are signed on the same day of the contract signing date (trading days) in the same contract and with the same partner (or vice versa).

(3), The amount of purchase and sale of currency is equal for both sides (purchase and sale) of swap contracts.

Purchase value and sale value is on the same date. The Swap exchange rate is evaluated by formula 2 and 3.

Option Contracts

Call option contracts: an agreement allows a buyer having a call option to buy a seller's property at a fixed price on maturity of the contract.

Put option contracts: an agreement allows a seller having put option to sell his property to a buyer at fixed price on the maturity of the contract. This contract characteristic is not binding on call and put option, but a buyer of a call option or a seller of a put option has to pay transaction fees before or on the contract maturity. The formula of option contracts as follows:

The option value of the European model is determined according to the following formula 6:

$$C_e(S, T, E) \geq \max \{0, S(1+b)^{-T} - E(1+a)^{-T}\} \quad \text{formula (6)}$$

$$\text{and } P_e(S, T, E) \geq \max \{0, E(1+a)^{-T} - S(1+b)^{-T}\}$$

In which: C_e : Call option, P_e : Put option, S: current exchange rate, E inter-bank rate, a: interest rate of currency A, b: interest rate of currency B and T: the contract period. The determined option value of Black-Scholes model¹:

¹ Black-Scholes model was awarded the Nobel Prize in economics in 1997

$$C_e = Se^{-bT}N(d_1) - Ee^{-aT}N(d_2) \quad \text{and} \quad P_e = Ee^{-aT}N(d_2) - Se^{-bT}N(d_1) \quad \text{formula (7)}$$

In which:

- (1), C_e : Price of call option of European model
- (2), S : Spot rate between currency A and currency B
- (3), E : Realized exchange rate
- (4), T : The duration of contract, $T = 360$ days.
- (5), a : Uninterrupted compound interest of currency A (Compound interest is defined as a term interest rate is calculated great interest rate to infinity)
- (6), b : Uninterrupted compound interest of currency B
- (7), σ : is the standard deviation of annual percentage changes compared with the spot rate.
- (8), $N(d_1)$ and $N(d_2)$: the value of the standard cumulative distribution function is defined as follows:

$$d_1 = \frac{\ln(S/E) + \left[(a-b) + \frac{\sigma^2}{2} \right]}{\sigma\sqrt{T}} \quad \text{and} \quad d_2 = d_1 - \sigma\sqrt{T} \quad \text{formula (8)}$$

(9), $e = ?$ Now e is calculated from compound interest as follows:

If year is divided into m period to calculate interest rate and unchanged interest rate per each year is r , the interest rate per period (r/m) and the proceeds after N years is: $C = A(1+r/m)^{N.m}$, we see that when m increases, C also increases.

In which:

- (1), A is the initial amount
- (2), r is the interest rate per period
- (3), N is the number of deposit's term
- (4), C is proceeds after N terms

Put; $S_m = A \left(1 + \frac{r}{m} \right)^{Nm}$. Then that

$$\lim_{m \rightarrow +\infty} S_m = \lim_{m \rightarrow +\infty} A \left(1 + \frac{r}{m} \right)^{Nm} = \lim_{m \rightarrow +\infty} \left[\left(1 + \frac{1}{\frac{m}{r}} \right)^{\frac{m}{r}} \right]^{Nr}$$

See that $\lim_{m \rightarrow +\infty} \left(1 + \frac{1}{\frac{m}{r}} \right)^{\frac{m}{r}} = \lim_{t \rightarrow +\infty} \left(1 + \frac{1}{t} \right)^t = e; e \approx 2.7183 \Rightarrow \lim_{m \rightarrow +\infty} S_m = Ae^{Nr}$

Therefore, C cannot increase to infinity.

Now $e \approx 2.7183$, formula of uninterrupted compound interest is $S = Ae^{N.r}$

The Black - Scholes model is that the price of the call option European model depends on risk-free interest rate between two countries, the duration of the contract, the standard deviation of exchange rate change between two different currencies and the implemented exchange rate in comparison with the spot rate. This model is based on assumptions as follows:

(1), Interest rates remain unchanged and deposit interest rate and loan interest rate is the same.

(2), There are no taxes or transaction costs.

(3), The difference in rates follows rules of the standard distribution.

(4), The standard deviation remains constant throughout the term of the contract.

Data of Economic Events

The data on economic events is applied by the financial mathematical formula for determining spot rate and forward rate. The exchange transactions can be done on the basis of spot rate or forward rate. Forward rate may be greater than or less than the spot rate. In addition, exchange rate is also applied put and call option" or is the applicable method of swap rate. In case, the exchange rate is applied put and call options, this method is different with application of forward rate. Because, they apply the methods of put and call, they are not the obligation to pay this transaction in the future if they know foreign exchange transaction with their uncertainty benefit. They also apply swap rate in transactions for exported and imported goods with the commercial banks. We can apply these methods for foreign exchange transactions and these issues will be made below.

When applying the Black-Scholes model, we need have the data of exchange rate volatility in one year in order to calculate the standard deviation of annual percentage changes that is compared with the spot rate. This article, the author uses data of exchange rate volatility of the Joint stock Commercial Bank for Foreign Trade of Vietnam for a year. This data is the basis to calculate the standard deviation of annual percentage changes in the spot rate.

Table 1

Exchange rate volatility of Joint stock commercial Bank for Foreign Trade of Vietnam (Unit: VND/\$1)

Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase
From 29/2/2012	1/1/ to 21,030	From 30/4/2012	1/3/ to 20,860	From 30/6/2012	1/5/ to 20,930	From 31/8/2012	1/7/ to 20,920	From 31/10/2012	1/9/ to 20,900	From 31/9/2012	1/11/ to 20,865
21,036	21,030	20,860	20,800	20,930	20,850	20,920	20,860	20,900	20,860	20,865	20,825
21,036	21,030	20,850	20,790	20,900	20,840	20,910	20,850	20,910	20,870	20,865	20,825
21,036	21,030	20,850	20,790	20,870	20,820	20,930	20,870	20,910	20,870	20,865	20,825
21,036	21,030	20,850	20,790	20,870	20,820	20,920	20,860	20,910	20,870	20,865	20,825
21,036	21,030	20,850	20,790	20,870	20,820	20,920	20,860	20,910	20,870	20,865	20,825
21,036	21,030	20,860	20,800	20,870	20,820	20,910	20,860	20,910	20,870	20,865	20,825
21,036	21,030	20,860	20,800	20,885	20,835	20,910	20,860	20,910	20,870	20,880	20,830
21,036	21,030	20,860	20,800	20,890	20,830	20,900	20,860	20,900	20,860	20,865	20,825
21,036	21,030	20,870	20,810	20,880	20,830	20,900	20,860	20,875	20,835	20,865	20,825
21,036	21,030	20,870	20,810	20,870	20,820	20,900	20,860	20,880	20,840	20,865	20,825
21,036	21,030	20,870	20,810	20,870	20,820	20,890	20,855	20,875	20,835	20,865	20,825
21,036	21,030	20,870	20,810	20,870	20,820	20,885	20,850	20,875	20,835	20,865	20,825
21,036	21,030	20,870	20,810	20,870	20,820	20,875	20,845	20,875	20,835	20,865	20,825
21,036	21,030	20,870	20,810	20,870	20,820	20,875	20,845	20,875	20,835	20,865	20,825
21,036	21,030	20,850	20,790	20,870	20,820	20,875	20,845	20,870	20,830	20,870	20,830
21,034	21,028	20,850	20,790	20,870	20,820	20,875	20,845	20,870	20,830	20,885	20,835
21,020	20,960	20,850	20,790	20,870	20,820	20,870	20,840	20,870	20,830	20,885	20,835
20,930	20,840	20,850	20,790	20,870	20,820	20,865	20,835	20,870	20,830	20,885	20,835
20,910	20,820	20,870	20,810	20,870	20,820	20,860	20,820	20,870	20,830	20,875	20,835
21,036	20,736	20,870	20,810	20,870	20,820	20,865	20,835	20,870	20,830	20,875	20,835
21,036	20,736	20,890	20,830	20,870	20,820	20,865	20,835	20,870	20,830	20,875	20,835
21,036	20,736	20,950	20,850	20,870	20,820	20,865	20,835	20,870	20,830	20,880	20,840
21,036	20,736	20,920	20,860	20,870	20,820	20,865	20,835	20,870	20,830	20,880	20,840
21,036	20,736	20,920	20,860	20,880	20,830	20,910	20,860	20,870	20,830	20,880	20,840
21,036	20,736	20,920	20,860	20,880	20,830	20,910	20,860	20,870	20,830	20,880	20,840
21,036	20,736	20,920	20,860	20,880	20,830	20,900	20,865	20,865	20,825	20,880	20,840
21,036	20,736	20,900	20,840	20,880	20,830	20,885	20,850	20,865	20,825	20,875	20,835
21,036	20,736	20,860	20,800	20,880	20,830	20,885	20,850	20,865	20,825	20,870	20,830
21,036	20,736	20,860	20,800	20,880	20,830	20,885	20,850	20,870	20,830	20,870	20,830
21,036	20,936	20,860	20,800	20,890	20,840	20,885	20,850	20,870	20,830	20,870	20,830
21,036	20,986	20,860	20,800	20,890	20,840	20,885	20,850	20,900	20,860	20,870	20,830
20,860	20,800	20,860	20,800	20,890	20,840	20,880	20,845	20,910	20,870	20,870	20,830
20,850	20,790	20,860	20,800	20,890	20,840	20,880	20,845	20,910	20,870	20,865	20,825
20,850	20,790	20,860	20,800	20,890	20,840	20,875	20,845	20,910	20,870	20,865	20,825
20,850	20,790	20,860	20,800	20,950	20,880	20,880	20,840	20,910	20,870	20,865	20,825
20,850	20,790	20,875	20,815	20,990	20,920	20,880	20,840	20,910	20,870	20,880	20,830
20,860	20,800	20,870	20,810	21,036	20,966	20,880	20,840	20,910	20,870	20,880	20,830
20,860	20,800	20,870	20,810	21,036	20,966	20,880	20,840	20,900	20,860	20,880	20,830
20,870	20,810	20,870	20,810	21,036	20,966	20,880	20,840	20,875	20,835	20,880	20,830
20,870	20,810	20,860	20,810	21,036	20,966	20,870	20,840	20,880	20,840	20,865	20,825
20,870	20,810	20,870	20,810	21,036	20,966	20,870	20,840	20,875	20,835	20,860	20,820
20,870	20,810	20,870	20,810	21,010	20,940	20,870	20,840	20,875	20,835	20,860	20,820
20,870	20,810	20,870	20,810	20,960	20,890	20,870	20,840	20,875	20,835	20,865	20,825
20,870	20,810	20,870	20,810	21,000	20,930	20,870	20,840	20,875	20,835	20,865	20,825
20,870	20,810	20,870	20,810	20,990	20,920	20,870	20,840	20,870	20,830	20,865	20,825
20,850	20,790	20,870	20,810	20,990	20,930	20,865	20,835	20,870	20,830	20,865	20,825
20,850	20,790	20,870	20,810	20,990	20,930	20,860	20,830	20,870	20,830	20,865	20,825
20,850	20,790	20,870	20,810	20,980	20,930	20,860	20,830	20,870	20,830	20,870	20,830
20,870	20,810	20,870	20,810	20,970	20,920	20,860	20,830	20,870	20,830	20,870	20,830
20,870	20,810	20,870	20,810	20,970	20,920	20,860	20,830	20,870	20,830	20,870	20,830
20,890	20,830	20,870	20,810	20,940	20,890	20,855	20,820	20,870	20,830	20,870	20,830
20,950	20,850	20,870	20,810	20,940	20,880	20,855	20,820	20,870	20,830	20,870	20,830
20,920	20,860	20,870	20,810	20,940	20,880	20,925	20,870	20,870	20,830	20,865	20,825
20,920	20,860	20,880	20,830	20,940	20,880	20,880	20,830	20,870	20,830	20,865	20,825
20,920	20,860	20,880	20,830	20,940	20,880	20,880	20,830	20,865	20,825	20,865	20,825
20,920	20,860	20,880	20,830	20,910	20,850	20,880	20,830	20,865	20,825	20,855	20,815
20,900	20,840	20,930	20,850	20,920	20,860	20,880	20,830	20,865	20,825	20,860	20,810

Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase
From 29/2/2012	1/1/ to 30/4/2012	From 1/3/ to 30/6/2012	From 1/5/ to 31/8/2012	From 1/7/ to 31/10/2012	From 1/9/ to 31/9/2012						
20,850	20,790	20,930	20,850	20,920	20,860	20,880	20,830	20,870	20,830	20,860	20,810
20,870	20,810	20,930	20,850	20,920	20,860	20,875	20,835	20,870	20,830	20,860	20,810
		20,930	20,850	20,920	20,860	20,875	20,835	20,865	20,825	20,855	20,815
						20,880	20,840				

Source: <http://www.vietcombank.com.vn/ExchangeRates/>

Period of exported and imported goods are always longer than the period of goods in the domestic business activities because exported and imported goods have purchase phase and sale phases. For export business, the goods are purchased in the domestic market and sold in foreign markets, for import business, the goods are bought in foreign markets to sell in domestic market. Delivery time and payment term: The import time and export time of goods and the payment term are often not identical and take a long time.

Assuming that the economic events of the goods import company or goods Exports Company occurred in January, but the company paid in September. During this period, the exchange rate has great volatility. The exported and imported goods affect firm's benefit. It means that if the exchange rate increases, the benefit of exporters is increased but importers are unprofitable and vice versa. Data tables of exchange rate and other data tables below are used to evaluate the factors affecting the profitability of importers and exporters.

Table 2

Exchange rate fluctuation in 01/2013 and 09/2013, Unit: VND/USD

Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale
From 15/01/2013	1/01/2013	From 31/01/2013	16/01/2013 to	From 15/09/2013	1/09/2013 to	From 30/09/2013	16/09/2013 to
20,815.00	20,855.00	20,820.00	20,860.00	21,110.00	21,180.00	21,080.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,110.00	21,180.00	21,080.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,110.00	21,180.00	21,110.00	21,170.00
20,820.00	20,860.00	20,825.00	20,865.00	21,115.00	21,185.00	21,095.00	21,155.00
20,815.00	20,855.00	20,825.00	20,865.00	21,110.00	21,180.00	21,080.00	21,140.00
20,815.00	20,855.00	20,820.00	20,860.00	21,110.00	21,175.00	21,080.00	21,140.00
20,820.00	20,860.00	20,830.00	20,870.00	21,110.00	21,175.00	21,080.00	21,140.00
20,825.00	20,865.00	20,830.00	20,870.00	21,110.00	21,175.00	21,080.00	21,140.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,080.00	21,140.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,080.00	21,140.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,090.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,090.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,090.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,090.00	21,150.00
20,820.00	20,860.00	20,825.00	20,865.00	21,080.00	21,150.00	21,080.00	21,140.00
		20,825.00	20,865.00				

Source: <http://www.vietcombank.com.vn/ExchangeRates/>

Collecting data below is to compare USD LIBOR interest rate with VND interest rate, and it is basis to evaluate forward rate.

Tables 3

USD LIBOR interest rate – maturity: 12 months

First rate per month	Percentage	First rate per year	Percentage
October 01, 2013	0.62665 %	January 02, 2013	0.84250 %
September 02, 2013	0.66810 %	January 03, 2012	1.13005 %
August 01, 2013	0.67319 %	January 04, 2011	0.78094 %
July 01, 2013	0.69015 %	January 04, 2010	0.99375 %
June 03, 2013	0.69020 %	January 02, 2009	2.02375 %
May 01, 2013	0.70400 %	January 02, 2008	4.18750 %
April 02, 2013	0.72800 %	January 02, 2007	5.34000 %
March 01, 2013	0.74950 %	January 03, 2006	4.85000 %
February 01, 2013	0.77700 %	January 04, 2005	3.11000 %
January 02, 2013	0.84250 %	January 02, 2004	1.47750 %

Source: <http://www.global-rates.com/interest-rates/libor/american-dollar/usd-libor-interest-rate-12-months.aspx>

In addition, the article needs to collect the data related to the deposit interest rate of VND and dollar and loan interest rate of VND and dollar. The interest rates in the table are selected to evaluate related exchange rate volatility in interest rates.

Table 4

Deposit interest rate of VND and Dollar

Term	VND	USD
Term deposits		
1 month	5.00%	0.25%
2 months	6.50%	0.25%
3 months	6.80%	0.25%
6 months	7.00%	0.25%
9 months	7.00%	0.25%
12 months	7.50%	0.25%

Table 5

Loan interest rate of VND and Dollar

Term	VND (%/year)	USD (%/year)
State Bank		
Short term	9.75%	4.50%
Medium and long term	12.15%	6.50%
Commercial banks		
Short term	10.50%	5.50%
Medium and long term	12.50%	6.75%

Source: <http://www.vietcombank.com.vn/InterestRates/?Type=Corporates>

The data above is preliminary to estimate the rate and profitability of the business and the factors that influence the rate through the following results.

Results and Discussion

Data table No 3 is used to calculate the average rate of the January and September by formula

$$\bar{X} = \frac{\sum_{i=1}^n x_i}{N}$$

In which: $N = 1 \div n$, \bar{X}_{M1-P} is average exchange rate of purchase in January, \bar{X}_{M1-S} is average exchange rate of sale in January; \bar{X}_{M9-P} is average exchange rate of purchase in September, \bar{X}_{M9-S} is average exchange rate of sale in September and also is spot rate.

$$\overline{X_{M1-P}} = \text{VND}20,822 / \$1 ; \overline{X_{M1-S}} = \text{VND}20,862 / \$1 ; \overline{X_{M9-P}} = \text{VND}21,091 / \$1 ; \overline{X_{M9-S}} = \text{VND}21,156 / \$1 \cdot$$

Based on these results, change percentage of the exchange rate of purchase and sale is calculated by the formulas:

$$\% Y_{i-P2012} = \frac{\overline{X_{M1-P}} - y_i}{y_i} \times 100; i = 1 \div n ; \% Y_{i-S2012} = \frac{\overline{X_{M1-S}} - y_i}{y_i} \times 100; i = 1 \div n$$

In which: $\% Y_{i-P2012}$ is change percentage of exchange rate of purchase in 2012, $\% Y_{i-S2012}$ is change percentage of exchange rate of sale in 2012 that are compared with spot rate are $\overline{X_{M1-P}} = \text{VND}20,822 / \1 and $\overline{X_{M1-S}} = \text{VND}20,862 / \1 , the article has result table as follows:

Table 6
Change percentage of exchange rate of purchase and sale

Purchas		Purchas		Purchas		Purchas		Purchas		Purchas	
Sale	e	Sale	e	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	e
From 29/2/2012	1/1/ to	From 30/4/2012	1/3/ to	From 30/6/2012	1/5/ to	From 31/8/2012	1/7/ to	From 31/10/2012	1/9/ to	From 31/11/2012	1/11/ to
-		0.299								0.179	
0.798%	-0.988%	%	0.107%	0.059%	-0.133%	0.011%	-0.181%	0.011%	-0.181%	%	-0.013%
-		0.348						-		0.179	
0.798%	-0.988%	%	0.155%	0.107%	-0.085%	0.059%	-0.133%	0.037%	-0.229%	%	-0.013%
-		0.348				-		-		0.179	
0.798%	-0.988%	%	0.155%	0.203%	0.011%	0.037%	-0.229%	0.037%	-0.229%	%	-0.013%
-		0.348				-		-		0.179	
0.798%	-0.988%	%	0.155%	0.203%	0.011%	0.011%	-0.181%	0.037%	-0.229%	%	-0.013%
-		0.348				-		-		0.179	
0.798%	-0.988%	%	0.155%	0.203%	0.011%	0.011%	-0.181%	0.037%	-0.229%	%	-0.013%
-		0.299				-		-		0.179	
0.798%	-0.988%	%	0.107%	0.203%	0.011%	0.011%	-0.181%	0.037%	-0.229%	%	-0.013%
-		0.299				-		-		0.155	
0.798%	-0.988%	%	0.107%	0.131%	-0.061%	0.011%	-0.181%	0.037%	-0.229%	%	-0.037%
-		0.299				-		-		0.179	
0.798%	-0.988%	%	0.107%	0.155%	-0.037%	0.011%	-0.181%	0.011%	-0.181%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.155%	-0.037%	0.011%	-0.181%	0.131%	-0.061%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.203%	0.011%	0.011%	-0.181%	0.107%	-0.085%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.203%	0.011%	0.035%	-0.157%	0.131%	-0.061%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.203%	0.011%	0.059%	-0.133%	0.131%	-0.061%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.203%	0.011%	0.083%	-0.109%	0.131%	-0.061%	%	-0.013%
-		0.251				-		-		0.179	
0.798%	-0.988%	%	0.059%	0.203%	0.011%	0.083%	-0.109%	0.131%	-0.061%	%	-0.013%
-		0.348				-		-		0.155	
0.798%	-0.988%	%	0.155%	0.203%	0.011%	0.083%	-0.109%	0.155%	-0.037%	%	-0.037%
-		0.348				-		-		0.131	
0.788%	-0.978%	%	0.155%	0.203%	0.011%	0.083%	-0.109%	0.155%	-0.037%	%	-0.061%
-		0.348				-		-		0.131	
0.466%	-0.657%	%	0.155%	0.203%	0.011%	0.107%	-0.085%	0.155%	-0.037%	%	-0.061%
-		0.348				-		-		0.131	
0.107%	-0.085%	%	0.155%	0.203%	0.011%	0.131%	-0.061%	0.155%	-0.037%	%	-0.061%
-		0.251				-		-		0.131	
0.203%	0.011%	%	0.059%	0.203%	0.011%	0.203%	0.011%	0.155%	-0.037%	%	-0.061%
-		0.251				-		-		0.131	
0.609%	0.416%	%	0.059%	0.203%	0.011%	0.131%	-0.061%	0.155%	-0.037%	%	-0.061%
-		0.155				-		-		0.131	
0.609%	0.416%	%	-0.037%	0.203%	0.011%	0.131%	-0.061%	0.155%	-0.037%	%	-0.061%

INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ACCOUNTING, FINANCE AND MANAGEMENT SCIENCES

Vol. 3, No. 4, 2013, E-ISSN: 2225-8329 © 2013 HRMARS

Purchase		Purchase		Purchase		Purchase		Purchase		Purchase	
Sale	1/1/ to	Sale	1/3/ to	Sale	1/5/ to	Sale	1/7/ to	Sale	1/9/ to	Sale	1/11/ to
From 29/2/2012		From 30/4/2012		From 30/6/2012		From 31/8/2012		From 31/10/2012		From 31/9/2012	
0.609%	0.416%	0.059%	-0.133%	0.203%	0.011%	0.131%	-0.061%	0.155%	-0.037%	0.107%	-0.085%
0.609%	0.416%	0.011%	-0.181%	0.203%	0.011%	0.131%	-0.061%	0.155%	-0.037%	0.107%	-0.085%
0.609%	0.416%	0.011%	-0.181%	0.155%	-0.037%	0.011%	-0.181%	0.155%	-0.037%	0.107%	-0.085%
0.609%	0.416%	0.011%	-0.181%	0.155%	-0.037%	0.011%	-0.181%	0.155%	-0.037%	0.107%	-0.085%
0.609%	0.416%	0.107%	-0.181%	0.155%	-0.037%	0.013%	-0.205%	0.179%	-0.013%	0.131%	-0.085%
0.609%	0.416%	0.299%	-0.085%	0.155%	-0.037%	0.059%	-0.133%	0.179%	-0.013%	0.155%	-0.061%
0.609%	0.416%	0.299%	0.107%	0.155%	-0.037%	0.059%	-0.133%	0.179%	-0.013%	0.155%	-0.037%
0.609%	0.416%	0.299%	0.107%	0.155%	-0.037%	0.059%	-0.133%	0.155%	-0.037%	0.155%	-0.037%
0.352%	-0.543%	0.299%	0.107%	0.107%	-0.085%	0.059%	-0.133%	0.155%	-0.037%	0.155%	-0.037%
0.590%	-0.780%	0.299%	0.107%	0.107%	-0.085%	0.059%	-0.133%	0.011%	-0.181%	0.155%	-0.037%
0.299%	0.107%	0.299%	0.107%	0.107%	-0.085%	0.083%	-0.109%	0.037%	-0.229%	0.179%	-0.037%
0.348%	0.155%	0.299%	0.107%	0.107%	-0.085%	0.083%	-0.109%	0.037%	-0.229%	0.179%	-0.013%
0.348%	0.155%	0.299%	0.107%	0.107%	-0.085%	0.083%	-0.109%	0.037%	-0.229%	0.179%	-0.013%
0.348%	0.155%	0.227%	0.107%	0.085%	-0.277%	0.107%	-0.085%	0.037%	-0.229%	0.155%	-0.013%
0.348%	0.155%	0.251%	0.035%	0.276%	-0.467%	0.107%	-0.085%	0.037%	-0.229%	0.155%	-0.037%
0.299%	0.107%	0.251%	0.059%	0.495%	-0.686%	0.107%	-0.085%	0.037%	-0.229%	0.155%	-0.037%
0.299%	0.107%	0.251%	0.059%	0.495%	-0.686%	0.107%	-0.085%	0.011%	-0.181%	0.155%	-0.037%
0.251%	0.059%	0.251%	0.059%	0.495%	-0.686%	0.107%	-0.085%	0.131%	-0.061%	0.179%	-0.037%
0.251%	0.059%	0.251%	0.059%	0.495%	-0.686%	0.107%	-0.085%	0.107%	-0.085%	0.203%	-0.013%
0.251%	0.059%	0.251%	0.059%	0.495%	-0.686%	0.107%	-0.085%	0.131%	-0.061%	0.203%	0.011%
0.251%	0.059%	0.251%	0.059%	0.371%	-0.562%	0.107%	-0.085%	0.131%	-0.061%	0.179%	0.011%
0.251%	0.059%	0.251%	0.059%	0.133%	-0.324%	0.107%	-0.085%	0.131%	-0.061%	0.179%	-0.013%
0.251%	0.059%	0.251%	0.059%	0.324%	-0.515%	0.107%	-0.085%	0.131%	-0.061%	0.179%	-0.013%
0.251%	0.059%	0.251%	0.059%	0.276%	-0.467%	0.107%	-0.085%	0.155%	-0.037%	0.179%	-0.013%
0.348%	0.155%	0.251%	0.059%	0.324%	-0.515%	0.131%	-0.061%	0.155%	-0.037%	0.179%	-0.013%
0.348%	0.155%	0.251%	0.059%	0.324%	-0.515%	0.155%	-0.037%	0.155%	-0.037%	0.179%	-0.013%
0.348%	0.155%	0.251%	0.059%	0.324%	-0.515%	0.155%	-0.037%	0.155%	-0.037%	0.155%	-0.013%
0.348%	0.155%	0.251%	0.059%	0.324%	-0.515%	0.155%	-0.037%	0.155%	-0.037%	0.155%	-0.037%
0.251%	0.059%	0.251%	0.059%	0.276%	-0.467%	0.155%	-0.037%	0.155%	-0.037%	0.155%	-0.037%
0.251%	0.059%	0.251%	0.059%	0.276%	-0.467%	0.155%	-0.037%	0.155%	-0.037%	0.155%	-0.037%
0.155%	-0.037%	0.251%	0.059%	0.133%	-0.324%	0.203%	0.011%	0.155%	-0.037%	0.155%	-0.037%
0.059%	-0.133%	0.251%	0.059%	0.085%	-0.277%	0.203%	0.011%	0.155%	-0.037%	0.179%	-0.037%
0.011%	-0.181%	0.251%	0.059%	0.085%	-0.277%	0.037%	-0.229%	0.155%	-0.037%	0.179%	-0.013%

Purchas		Purchas								Purchas		
Sale	e	Sale	e	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	e	
From 29/2/2012	1/1/ to	From 30/4/2012	1/3/ to	From 30/6/2012	1/5/ to	From 31/8/2012	1/7/ to	From 31/10/2012	1/9/ to	From 31/9/2012	1/11/ to	
0.011%	-0.181%	0.155%	-0.037%	-	0.085%	-0.277%	0.155%	-0.037%	0.155%	-0.037%	0.179%	-0.013%
0.011%	-0.181%	0.155%	-0.037%	-	0.085%	-0.277%	0.155%	-0.037%	0.179%	-0.013%	0.179%	-0.013%
0.011%	-0.181%	0.155%	-0.037%	0.059%	-0.133%	0.155%	-0.037%	0.179%	-0.013%	0.227%	0.035%	
0.107%	-0.085%	0.059%	-0.133%	0.011%	-0.181%	0.155%	-0.037%	0.179%	-0.013%	0.251%	0.059%	
0.348%	0.155%	0.059%	-0.133%	0.011%	-0.181%	0.155%	-0.037%	0.155%	-0.037%	0.251%	0.059%	
0.251%	0.059%	0.059%	-0.133%	0.011%	-0.181%	0.131%	-0.061%	0.155%	-0.037%	0.251%	0.059%	
		0.059%	-0.133%	0.011%	-0.181%	0.131%	-0.061%	0.179%	-0.013%	0.227%	0.035%	
						0.107%	-0.085%					

The similar method above, the article also has the result of change percentage of exchange rate of purchase in 2012 and change percentage of exchange rate of sale in 2012 that are compared with spot rate are $\overline{X_{M9-P}} = \text{VND}21,091/\1 and $\overline{X_{M9-S}} = \text{VND}21,156/\1 as follows:

Table 7

Change percentage of exchange rate of purchase and change percentage of exchange rate of sale

Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase
From 29/2/2012	1/1/ to	From 30/4/2012	1/3/ to	From 30/6/2012	1/5/ to	From 31/8/2012	1/7/ to	From 31/10/2012	1/9/ to	From 31/9/2012	1/11/ to
0.5712%	0.2901%	1.4198%	1.3990%	1.0806%	1.1559%	1.1289%	1.1074%	1.2257%	1.1074%	1.3955%	1.2773%
0.5712%	0.2901%	1.4684%	1.4478%	1.2257%	1.2044%	1.1773%	1.1559%	1.1773%	1.0589%	1.3955%	1.2773%
0.5712%	0.2901%	1.4684%	1.4478%	1.3712%	1.3016%	1.0806%	1.0589%	1.1773%	1.0589%	1.3955%	1.2773%
0.5712%	0.2901%	1.4684%	1.4478%	1.3712%	1.3016%	1.1289%	1.1074%	1.1773%	1.0589%	1.3955%	1.2773%
0.5712%	0.2901%	1.4684%	1.4478%	1.3712%	1.3016%	1.1289%	1.1074%	1.1773%	1.0589%	1.3955%	1.2773%
0.5712%	0.2901%	1.4198%	1.3990%	1.3712%	1.3016%	1.1773%	1.1074%	1.1773%	1.0589%	1.3955%	1.2773%
0.5712%	0.2901%	1.4198%	1.3990%	1.2984%	1.2287%	1.1773%	1.1074%	1.1773%	1.0589%	1.3226%	1.2530%
0.5712%	0.2901%	1.4198%	1.3990%	1.2741%	1.2530%	1.2257%	1.1074%	1.2257%	1.1074%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3226%	1.2530%	1.2257%	1.1074%	1.3469%	1.2287%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3712%	1.3016%	1.2257%	1.1074%	1.3226%	1.2044%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3712%	1.3016%	1.2741%	1.1316%	1.3469%	1.2287%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3712%	1.3016%	1.2984%	1.1559%	1.3469%	1.2287%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3712%	1.3016%	1.3469%	1.1801%	1.3469%	1.2287%	1.3955%	1.2773%
0.5712%	0.2901%	1.3712%	1.3503%	1.3712%	1.3016%	1.3469%	1.1801%	1.3469%	1.2287%	1.3955%	1.2773%
0.5712%	0.2901%	1.4684%	1.4478%	1.3712%	1.3016%	1.3469%	1.1801%	1.3712%	1.2530%	1.3712%	1.2530%
0.5808%	0.2996%	1.4684%	1.4478%	1.3712%	1.3016%	1.3469%	1.1801%	1.3712%	1.2530%	1.2984%	1.2287%
0.6478%	0.6250%	1.4684%	1.4478%	1.3712%	1.3016%	1.3712%	1.2044%	1.3712%	1.2530%	1.2984%	1.2287%
1.0806%	1.2044%	1.4684%	1.4478%	1.3712%	1.3016%	1.3955%	1.2287%	1.3712%	1.2530%	1.2984%	1.2287%
1.1773%	1.3016%	1.3712%	1.3503%	1.3712%	1.3016%	1.4198%	1.3016%	1.3712%	1.2530%	1.3469%	1.2287%
0.5712%	1.7120%	1.3712%	1.3503%	1.3712%	1.3016%	1.3955%	1.2287%	1.3712%	1.2530%	1.3469%	1.2287%
0.5712%	1.7120%	1.2741%	1.2530%	1.3712%	1.3016%	1.3955%	1.2287%	1.3712%	1.2530%	1.3469%	1.2287%
0.5712%	1.7120%	0.9841%	1.1559%	1.3712%	1.3016%	1.3955%	1.2287%	1.3712%	1.2530%	1.3226%	1.2044%
0.5712%	1.7120%	1.1289%	1.1074%	1.3712%	1.3016%	1.3955%	1.2287%	1.3712%	1.2530%	1.3226%	1.2044%
0.5712%	1.7120%	1.1289%	1.1074%	1.3226%	1.2530%	1.1773%	1.1074%	1.3712%	1.2530%	1.3226%	1.2044%
0.5712%	1.7120%	1.1289%	1.1074%	1.3226%	1.2530%	1.1773%	1.1074%	1.3712%	1.2530%	1.3226%	1.2044%
0.5712%	1.7120%	1.1289%	1.1074%	1.3226%	1.2530%	1.2257%	1.0832%	1.3955%	1.2773%	1.3226%	1.2044%
0.5712%	1.7120%	1.2257%	1.2044%	1.3226%	1.2530%	1.2984%	1.1559%	1.3955%	1.2773%	1.3469%	1.2287%
0.5712%	1.7120%	1.4198%	1.3990%	1.3226%	1.2530%	1.2984%	1.1559%	1.3955%	1.2773%	1.3712%	1.2530%
0.5712%	1.7120%	1.4198%	1.3990%	1.3226%	1.2530%	1.2984%	1.1559%	1.3712%	1.2530%	1.3712%	1.2530%

<i>Sale</i>	<i>Purchase</i>	<i>Sale</i>	<i>Purchase</i>	<i>Sale</i>	<i>Purchase</i>	<i>Sale</i>	<i>Purchase</i>	<i>Sale</i>	<i>Purchase</i>	<i>Sale</i>	<i>Purchase</i>
<i>From</i>	<i>1/1/</i>	<i>to</i>	<i>From</i>	<i>1/3/</i>	<i>to</i>	<i>From</i>	<i>1/5/</i>	<i>to</i>	<i>From</i>	<i>1/7/</i>	<i>to</i>
<i>29/2/2012</i>		<i>30/4/2012</i>		<i>30/6/2012</i>		<i>31/8/2012</i>		<i>31/10/2012</i>		<i>31/9/2012</i>	
0.5712%	0.7404%	1.4198%	1.3990%	1.2741%	1.2044%	1.2984%	1.1559%	1.3712%	1.2530%	1.3712%	1.2530%
0.5712%	0.5003%	1.4198%	1.3990%	1.2741%	1.2044%	1.2984%	1.1559%	1.2257%	1.1074%	1.3712%	1.2530%
1.4198%	1.3990%	1.4198%	1.3990%	1.2741%	1.2044%	1.3226%	1.1801%	1.1773%	1.0589%	1.3712%	1.2530%
1.4684%	1.4478%	1.4198%	1.3990%	1.2741%	1.2044%	1.3226%	1.1801%	1.1773%	1.0589%	1.3955%	1.2773%
1.4684%	1.4478%	1.4198%	1.3990%	1.2741%	1.2044%	1.3469%	1.1801%	1.1773%	1.0589%	1.3955%	1.2773%
1.4684%	1.4478%	1.4198%	1.3990%	0.9841%	1.0105%	1.3226%	1.2044%	1.1773%	1.0589%	1.3955%	1.2773%
1.4684%	1.4478%	1.3469%	1.3260%	0.7916%	0.8174%	1.3226%	1.2044%	1.1773%	1.0589%	1.3226%	1.2530%
1.4198%	1.3990%	1.3712%	1.3503%	0.5712%	0.5962%	1.3226%	1.2044%	1.1773%	1.0589%	1.3226%	1.2530%
1.4198%	1.3990%	1.3712%	1.3503%	0.5712%	0.5962%	1.3226%	1.2044%	1.2257%	1.1074%	1.3226%	1.2530%
1.3712%	1.3503%	1.3712%	1.3503%	0.5712%	0.5962%	1.3226%	1.2044%	1.3469%	1.2287%	1.3226%	1.2530%
1.3712%	1.3503%	1.4198%	1.3503%	0.5712%	0.5962%	1.3712%	1.2044%	1.3226%	1.2044%	1.3955%	1.2773%
1.3712%	1.3503%	1.3712%	1.3503%	0.5712%	0.5962%	1.3712%	1.2044%	1.3469%	1.2287%	1.4198%	1.3016%
1.3712%	1.3503%	1.3712%	1.3503%	0.6957%	0.7211%	1.3712%	1.2044%	1.3469%	1.2287%	1.4198%	1.3016%
1.3712%	1.3503%	1.3712%	1.3503%	0.9359%	0.9622%	1.3712%	1.2044%	1.3469%	1.2287%	1.3955%	1.2773%
1.3712%	1.3503%	1.3712%	1.3503%	0.7437%	0.7692%	1.3712%	1.2044%	1.3469%	1.2287%	1.3955%	1.2773%
1.3712%	1.3503%	1.3712%	1.3503%	0.7916%	0.8174%	1.3712%	1.2044%	1.3712%	1.2530%	1.3955%	1.2773%
1.4684%	1.4478%	1.3712%	1.3503%	0.7916%	0.7692%	1.3955%	1.2287%	1.3712%	1.2530%	1.3955%	1.2773%
1.4684%	1.4478%	1.3712%	1.3503%	0.7916%	0.7692%	1.4198%	1.2530%	1.3712%	1.2530%	1.3955%	1.2773%
1.4684%	1.4478%	1.3712%	1.3503%	0.7916%	0.7692%	1.4198%	1.2530%	1.3712%	1.2530%	1.3955%	1.2773%
1.4684%	1.4478%	1.3712%	1.3503%	0.8397%	0.7692%	1.4198%	1.2530%	1.3712%	1.2530%	1.3712%	1.2530%
1.3712%	1.3503%	1.3712%	1.3503%	0.8878%	0.8174%	1.4198%	1.2530%	1.3712%	1.2530%	1.3712%	1.2530%
1.3712%	1.3503%	1.3712%	1.3503%	0.8878%	0.8174%	1.4198%	1.2530%	1.3712%	1.2530%	1.3712%	1.2530%
1.2741%	1.2530%	1.3712%	1.3503%	1.0323%	0.9622%	1.4441%	1.3016%	1.3712%	1.2530%	1.3712%	1.2530%
0.9841%	1.1559%	1.3712%	1.3503%	1.0323%	1.0105%	1.4441%	1.3016%	1.3712%	1.2530%	1.3712%	1.2530%
1.1289%	1.1074%	1.3712%	1.3503%	1.0323%	1.0105%	1.1047%	1.0589%	1.3712%	1.2530%	1.3955%	1.2773%
1.1289%	1.1074%	1.3226%	1.2530%	1.0323%	1.0105%	1.3226%	1.2530%	1.3712%	1.2530%	1.3955%	1.2773%
1.1289%	1.1074%	1.3226%	1.2530%	1.0323%	1.0105%	1.3226%	1.2530%	1.3955%	1.2773%	1.3955%	1.2773%
1.1289%	1.1074%	1.3226%	1.2530%	1.1773%	1.1559%	1.3226%	1.2530%	1.3955%	1.2773%	1.4441%	1.3260%
1.2257%	1.2044%	1.0806%	1.1559%	1.1289%	1.1074%	1.3226%	1.2530%	1.3955%	1.2773%	1.4198%	1.3503%
1.4684%	1.4478%	1.0806%	1.1559%	1.1289%	1.1074%	1.3226%	1.2530%	1.3712%	1.2530%	1.4198%	1.3503%
1.3712%	1.3503%	1.0806%	1.1559%	1.1289%	1.1074%	1.3469%	1.2287%	1.3712%	1.2530%	1.4198%	1.3503%
		1.0806%	1.1559%	1.1289%	1.1074%	1.3469%	1.2287%	1.3955%	1.2773%	1.4441%	1.3260%
						1.3226%	1.2044%				

From the data of table 6 and table 7, the standard deviations of annual change percentage compared with the spot rate are evaluated by statistical software of excel as follows:

Table 8
Standard Deviation of Annual Change Percentage

	<i>The change percentage of exchange rates compare with spot rates in January</i>	<i>The change percentage of exchange rates compare with spot rates in January</i>	<i>The change percentage of exchange rates compare with spot rates in September</i>	<i>The change percentage of exchange rates compare with spot rates in September</i>			
Standard Error	0.00013394	Standard Error	0.000133684	Standard Error	0.000131459	Standard Error	0.000135409
Standard Deviation	0.002562431	Standard Deviation	0.002557518	Standard Deviation	0.002514956	Standard Deviation	0.002590527
Sample Variance	6.56605E-06	Sample Variance	6.5409E-06	Sample Variance	6.32501E-06	Sample Variance	6.71083E-06
Minimum	-0.007976316	Minimum	-0.009878361	Minimum	0.005712429	Minimum	0.002900618
Maximum	0.006088834	Maximum	0.004159822	Maximum	0.014684253	Maximum	0.017119985
Count (N)	366	Count (N)	366	Count (N)	366	Count (N)	366
Confidence Level (95.0%)	0.000263392	Confidence Level (95.0%)	0.000262887	Confidence Level (95.0%)	0.000258512	Confidence Level (95.0%)	0.00026628

This table indicates Standard Deviation of the change percentage of exchange rates and the change percentage of exchange rates in January and September in order to evaluate the value of put and call option of foreign currency.

Evaluation of Forward Rates

Assuming that x amount of U.S. dollar is carried out with maturity date in September; period of forward contracts is 9 months. Forward contracts are signed in January. This case, forward rates are evaluated on basis of spot rates in January and something else that are $\overline{X_{M1-p}} = \text{VND}20,822/\1 , $\overline{X_{M1-s}} = \text{VND}20,862/\1 , from the table of deposit interest rates of VND and Dollar and the table of loan interest rates of VND and Dollar, we have $L_{gt}(VND) = 7.5\%/a$ year and $L_{cv}(NT) = 6.75\%/a$ year. The forward rates of purchase are evaluated by

$$F_p = 20,822 + \frac{20,822 \times (7.5\% - 6.75\%) \times 270}{100 \times 360} = \text{VND}20,823/\$1 \quad (\text{No: 1})$$

Also from the table of deposit interest rates of VND and Dollar and the table of loan interest rates of VND and Dollar, we have the forward rates of sale is evaluated based on $L_{cv}(VND) = 12.15\%/a$ year and $L_{gt}(NT) = 0.25\%/a$ year.

$$F_s = 20,862 + \frac{20,862 \times (12.15\% - 0.25\%) \times 270}{100 \times 360} = \text{VND}20,881/\$1 \quad (\text{No: 2})$$

These results can be applied to purchase and sell following forward rates. Or they can be applied to exchange rate of put and call option.

If the firm applies forward rates for foreign currency transactions in the import and export, the firm can apply swap rate method. It means that the firm purchases USD from the Commercial Bank with forward rates of VND20,823/\$1 to pay the exporter in the future. Assuming that, the firm must pay for the commodities from the foreign countries in September. However, in September the spot rate is $\overline{X_{M9-p}} = \text{VND}21,091/\1 leading to have different exchange rates. If call P is profit function, V is volume of USD purchase and R is a different level of forward rates and spot rates, $P_p = V_p \times R_p$. This case, the firm has the profit from volume of USD purchase, equaling to $V \times (\text{VND}21,091/\$1 - \text{VND}20,823/\$1) = V \times \text{VND}268/\1 . If he purchases \$200,000,000, he will get the profit of VND 5,360,000,000, equivalently to \$254,136.84 with the exchange rate is \$1/VND21,091. This formula indicates that P is appurtenant to V, if V increases, P will increase with the fixed R.

In the case of USD sale, the firm can sell USD for the commercial bank with forward rate of VND 20,881/\$1 in January, also leading to have a difference level of forward rate and spot rate of $\overline{X_{M1-s}} = \text{VND}20,862/\1 in January. If calling R is difference level, V is volume of USD sale and P is the profit from sale of foreign currency, $P_s = V_s \times R_s$. This case, the firm has the profit of $V_s \times \text{VND}19/\1 . It means that if he sells \$1, then he will get profit of VND19. Assuming that he sells \$500,000,000, he will get profit of VND 9,500,000,000, equivalently to \$455,373.41 with the exchange rate of \$1/VND20,862.

Besides, the results above are basis to evaluate the profit of put and call option activities. This case, the investors should apply the Black-Scholes model to give decisions of investment or non-investment. Because, if they have put or call option, they can purchase or not purchase, or they can sell or not sell. Therefore, they have to know their profit in future by the way of applying Option pricing of the Black - Scholes model for short selling activities. In the case of USD purchase in January, the d_1 and d_2 are calculated by the formula 8 as follows:

The d_1 and d_2 are calculated with data as follows: $E = \text{VND}20,881/\$1$ (from No2), $T = 270/360 = 0,75$, $a = 7.50\%/year = 0.625\%/month$ (VND), $b = 0.66810\%/month$ (USD) (Table:

USD LIBOR interest rate - maturity 12 months), $e \approx 2.71828$, $\sigma = 0.002562431$ (Table: Standard Deviation of Annual Percentage Changes) and $S = \overline{X_{M1-S}} = \text{VND}20,862/\1 .

$$\text{See that: } d_1 = \frac{\ln(20,862 / 20,881) + \left[(0.625\% - 0.6681\%) + \frac{0.0002562431^2}{2} \right]}{0.0002562431 \sqrt{0.75}} = -\text{VND}0.6/\$1$$

$$\text{and } d_2 = -0.6 - 0.000221913 = -\text{VND}0.609/\$1$$

From the results above, we have put option: (Sale)

$$p_e = 20,881 \times 2.17828^{-0.625\% \times 0.75} \times -0.609 - 20,862 \times 2.17828^{-0.6681\% \times 0.75} \times -0.69 = \text{VND } 227.57/\$1$$

This result shows that if the firm purchases \$1, he will get profit of VND227.57. Assuming that he purchases \$3,000,000, he will have a profit of VND682,712,686, equivalently to \$32,725 (exchange rate of VND20,862/\$1). If calling P is profit, p_e is unit of profit per \$1 and V is volume of USD purchase, the profit function is $P = V \times p_e$ and V increases leading to P also increase correspondingly. In the case of call option (purchase), we can apply the formula $C_e = S e^{-bT} N(d_1) - E e^{-aT} N(d_2)$. However the data are different such as: $\sigma = 0.002557518$ (Table: Standard Deviation of Annual Percentage Changes). $S = \overline{X_{M1-P}} = \text{VND}20,822/\1 and $E = \text{VND}20,823/\$1$ (from No1) as follows:

$$d_1 = \frac{\ln(20,822 / 20,823) + \left[(0.625\% - 0.6681\%) + \frac{0.002557518^2}{2} \right]}{0.002557518 \sqrt{0.75}} = -\text{VND}0.215/\$1$$

$$\text{and } d_2 = -0.215 - 0.0002551518 = -\text{VND}0.217/\$1$$

The results above, we also have call option:

$$C_e = 20,822 \times 2.17828^{-0.6681\% \times 0.75} \times (-0.215) - 20,823^{-0.625\% \times 0.75} \times (-0.217) = \text{VND } 42.67/\$1$$

The result shows that if the firm sells \$1, he will get profit of VND42.6. Assuming that he purchases \$3,000,000, he will have a profit of VND128,000,536, equivalently to \$6,147.37 (exchange rate of VND20,822/\$1). If calling P is profit, C_e is unit of profit per \$1 and V is volume of USD sale, the profit function is $P = V \times C_e$ and V increases leading to P also increase correspondingly.

Besides, the data in the table of "exchange rate fluctuation in 01/2013 and 09/2013, Unit: VND/USD" and the table of "exchange rate volatility of joint stock commercial bank for foreign trade of Vietnam" are results of average exchange rate each month (from January to December in 2012). These results are compared with result of average exchange rate in September and January, 2013. The comparison results indicate difference levels of exchange rate and their impact on the economy.

Table 9

Evaluation of average difference level of exchange rate

In 2012			Comparison of Average exchange rate in 9/2013		Comparison of Average exchange rate in 1/2013	
	Average exchange rate level of foreign currency sale	Average exchange rate level of foreign currency purchase	Average difference level of exchange rate of foreign currency sale	Average difference level of exchange rate of foreign currency purchase	Average difference level of exchange rate of foreign currency sale	Average difference level of exchange rate of foreign currency purchase
1	21,028	20,915	128.23	175.52	-165.68	-93.23
2	20,874	20,813	282.03	278.24	-11.88	9.50
3	20,873	20,812	283.26	279.39	-10.65	10.65
4	20,878	20,816	278.67	274.83	-15.24	6.09
5	20,878	20,826	278.59	265.03	-15.32	-3.71
6	20,964	20,903	191.83	188.00	-102.08	-80.74
7	20,890	20,850	266.01	240.84	-27.90	-27.90
8	20,874	20,836	282.46	254.55	-11.45	-14.19
9	20,881	20,841	275.50	250.33	-18.41	-18.41
10	20,880	20,840	276.01	250.84	-17.90	-17.90
11	20,872	20,831	284.17	260.33	-9.74	-8.41
12	20,867	20,824	289.55	266.65	-4.35	-2.10

These results are used to evaluate the impact of exchange rate volatility on the profitability of the firms as well as its impact on the economy and these issues are discussed below.

Discussions

Currency fluctuation is the inevitable result of the system of floating exchange rate that is standards of the developed countries. The exchange rate of the currency is affected by basic factors and technical factors such as: the supply and demand relationship of the two currencies with other countries or the expression of the economy such as: the inflation factor, the difference in interest rate etc. These factors are constantly fluctuated leading to the value of the currency is always varied and these factors affect the foreign currency transactions such as import and export business, foreign exchange, foreign investment etc.

Export Business

The data in the table of "Evaluation of an average level of exchange rate difference" is to compare between the average exchange rate from January 2012 to December 2012 with the average exchange rate in January and September 2013. The purpose of this table is to research the degree of the exchange rate fluctuation, the firms export or import commodities in January 2013 and can be paid in September 2013. This assumption is to assess the level of the impact of exchange rate volatility on corporate profit and economic influence.

According to statistics from the General Department of Vietnam Customs, the main commodities in September, 2012 only slightly decreased by 2.22% in comparison with last month. The turnover is 6.66 billion U.S. dollars, making up 68 % over total export turnover of the country. However, the average level of export turnover is up to 48.93 billion U.S. dollars in 9 months in 2012, up 24.73% compared with the same period in 2011, making up 67.63%. This data, the article assesses the affecting factors as follows:

From the data in table of "exchange rate volatility of joint stock commercial bank for foreign trade of Vietnam", average exchange rate of sale in 9 months is calculated and is VND20,904/\$1 in 2012. This average exchange rate of sale is compared with an average exchange rate of sale in January, 2013, average exchange rate of sale in January is VND20,862/\$1 leading to difference level is -VND42/\$1 (VND20,862/\$1- VND20,904/\$1 in

2012). If total USD is sold in January, how does this difference level affect? We can see the table below.

Table 10
Export turnover of 9 months in 2012

Commodity	Average \$ value per month	The total value (Unit: 1,000)	The difference level of VND value (Unit: 1,000)	Equivalently ² to USD (Unit: 1,000)
The cashews	121,040	1,089,364.00	-45,753,288	-2,193.14
The coffee	316,275	2,846,479.30	-119,552,131	-5,730.62
The tea	17,864	160,777.83	-6,752,669	-323.683
The peppercorn	70,803	637,223.28	-26,763,378	-1,282.88
The rice	313,122	2,818,099.14	-118,360,164	-5,673.48
The cassava and cassava products	117,570	1,058,131.36	-44,441,517	-2,130.26
The coal	98,553	886,980.76	-37,253,192	-1,785.7
The crude oil	701,033	6,309,296.80	-264,990,466	-12,702.1
Total:			-663,866,804	-31,821.8

The result shows the firms' financial losses when the exchange rate is varied within 4 months such as: the cashews business firm has average revenues of \$121,040,000 in September 2012 and total revenues of \$ 1,089,364,000 for 9 months. The firm reserve foreign currency within 4 months, he losses \$ 1,193,140 because sale exchange rate in September, 2012 is higher than sale exchange rate in January, 2013. Among the firms above, the coffee business firm, the rice business firm and the crude oil firm have greatest losses that are \$5,730,620, \$5,673,4800 and \$12,702.1. If the financial losses are estimated for the whole economy, these financial losses are multiplied.

In case above, if the firm applies financial mathematical model for hedging accounting, the firm minimizes financial risk as the result of No: 2, the forward rate is VND20,881/\$1 leading to the difference level of exchange rate between average sale exchange rate in September, 2012 and average sale exchange rate in January, 2013, that are - VND23/\$1(VND20,881/\$1- VND20,904/\$). This result, the level of the exchange rate risk is reduced to VND19/\$1 (-VND23/\$1-(-VND43/\$1) and also is profit of the firm when he applies forward rate, how much does he has? the result is indicated below.

Table 11
Profit of applied forward rate³

Commodity	The export output (Unit: ton)	Average value per month	\$ per	The total value (Unit: 1000)	The difference level of VND value (Unit: 1000)	Equivalently ⁴ to USD (Unit: 1,000)
The cashews	160,805	121,040		1,089,364.00	20,697,916	992.13
The coffee	1,338,802	316,275		2,846,479.30	54,083,107	2,592.42
The tea	106,062	17,864		160,777.83	3,054,779	146.43
The peppercorn	93,304	70,803		637,223.28	12,107,242	580.35
The rice	6,231,121	313,122		2,818,099.14	53,543,884	2,566.57
The cassava and cassava products	3,439,512	117,570		1,058,131.36	20,104,496	963.69
The coal	10,261,684	98,553		886,980.76	16,852,634	807.81
The crude oil	7,041,947	701,033		6,309,296.80	119,876,639	5,746.17
Total:					300,320,697	14,395.59

The result in table indicates that the financial risk of firm are reduced from (-VND42/\$1) to (-VND23/\$1). The difference level is VND19/\$1, this is also profit that they have. Among the firms above, the coffee business firm, the rice business firm and the crude oil firm have greater profit that is \$2,592,420, \$2,566,570 and \$5,746,170. If the profit is also estimated

² With exchange rate of \$1/VND20,862

³ Some commodities are only representation to illustrate in article

⁴ With exchange rate is \$1/VND20,862

for the whole economy, this profit is multiplied. If the financial losses are estimated for the whole economy, these financial losses are multiplied.

Import Business

As published by Vietnam's Ministry of Industry and Trade, from January to June 2013, total export turnover of Vietnam reached 61.5 billion U.S. dollars, increasing up 15.1% in comparison with the same period. For foreign direct investment (FDI) of enterprises, the total exports value was 40, \$ 8 billion (including crude oil), increasing up 23.8%. For the domestic enterprises, the total value of commodity exports is U.S. \$ 20.7 billion. Besides, Also according to Vietnam General Statistics Office's a number of key commodities, total value of commodity export is \$ 67,648,265,760 and total average of commodity export value per month is \$11,274,710,960. The result indicates that revenue of Vietnam commodity export is very great. However, the some commodities in table below are only representative for many commodity category of Vietnam.

In case, import business firms need foreign currencies to pay for partners, they can purchase it in January to pay partners in September or they can purchase it at time payment (in September). However, they cannot purchase it in January to pay partner in September because they have the losses of foreign currency reserves leading to lack of business capital. If they purchase foreign currency in September 2013, the average purchase rate is $\overline{X_{M9-P}} = \text{VND}21,091 / \1 , if they purchase foreign currency in January, 2013, the average purchase rate is $\overline{X_{M1-P}} = \text{VND}20,822 / \1 . In case, they purchase it in September, they have the losses of - VND296/\$1. The financial closes as follows:

Table 12
Level of Financial Losses

Commodities	Import turnover of 6 months			
	Average \$ value per month	The total value (Unit: 1,000)	The difference level of VND (Unit: 1,000)	Equivalently ⁵ to USD (Unit: 1,000)
Forage and materials	249,227.85	1,495,367.08	-442,628,655.38	-21,257.74
Petroleum	586,540.23	3,519,241.35	-1,041,695,440.49	-50,028.60
Chemicals	230,940.28	1,385,641.71	-410,149,945.27	-19,697.91
Plastic Products	193,595.33	1,161,571.97	-343,825,303.12	-16,512.60
Iron and steel	584,963.26	3,509,779.59	-1,038,894,757.16	-49,894.09
Machinery , equipment , tools & accessories	1,410,808.06	8,464,848.39	-2,505,595,121.96	-120,334.03
Total		19,536,450.08	-5,782,789,223.38	-277,724.97

The results in the table above indicated the financial losses of the large companies. Among the firms, the oil business firm and iron and steel business firm have great losses of \$50,028,600 and \$49,894,090. If the export turnover of Vietnam for 6 months are assessed, the total financial losses are \$67,648,265,760 x VND296/\$1=-VND18,197,383,489,440 equivalently to \$873,949,836.20(with exchange rate of \$1/VND20,822).

To overcome these financial losses, the firm can apply the forward rate to minimize the financial risk. Assuming that the forward rate of VND20,881/\$1 (from No: 2) is applied for USD sale. This case, the firm can sign the forward contracts with Commercial Bank to purchase USD. Maturity of the contracts may be 3 months or 6 months etc, this depends on the agreed terms in the forward contracts. The maturity of forward contracts has been assumed for 9 months. It means that the firm signed the forward contracts of purchase USD with

⁵ With exchange rate of VND20,822/\$1

Commercial Bank in January to pay partner in September. If they purchase USD with forward rate of VND20,881/\$1 instead of spot rate of VND21,091/\$1, their profit is VND210/\$1 (VND21,091/\$1-VND20,881/\$1) and we can see the result below.

Table 13
The profit of applied forward rate

Commodity	Export turnover in 6 months			
	Average \$ value per month	The total value (Unit: 1,000)	The difference level of VND (Unit: 1,000)	Equivalently to USD (Unit: 1,000)
Forage and materials	249,227.85	1,495,367.08	314,027,086.59	15,038.89
Petroleum	586,540.23	3,519,241.35	739,040,684.13	35,392.97
Chemicals	230,940.28	1,385,641.71	290,984,758.47	13,935.38
Plastic Products	193,595.33	1,161,571.97	243,930,113.70	11,681.92
Iron and steel	584,963.26	3,509,779.59	737,053,712.85	35,297.82
Machinery , equipment , tools & accessories	1,410,808.06	8,464,848.39	1,777,618,160.85	85,130.89
Total		19,536,450.08	4,102,654,516.59	196,477.88

Among the firms above, the machinery, equipment, tools & accessories business firm and Petroleum business firm have greater profit that is \$85,130,890 and \$35,392,970. If the total export value is evaluated, the profit is VND14,206,135,809,180 equivalently to \$680,337,910 (with the exchange rate of \$1/20,881).

For import and export business, the firms can apply swap rate to minimize exchange rate risk. In this case, they can sign forward contracts with Commercial bank to purchase and sell foreign currency. The forward rate No 1 is applied to purchase and the forward rate No 2 is applied to sell. Two transactions are simultaneously carried out by Commercial bank. The results are similar as above.

Short Selling Activities

An option contract is a financial asset that should be valued in the market. However, how to get an accurate valuation of option contract on the market? This issue is important and difficult. Because, only small fluctuation of the exchange rate significantly affect the profitability of this contract. So, we need to develop a quick and accurate pricing model to calculate and adjust the price of an option contract on the volatility of spot rate on the market. To solve this problem, currently the Black-Scholes model is widely used to evaluate option contracts. The purpose of this model is:

Short selling activity actually sells the stock or foreign currency that the seller does not own at the time of transaction. When short selling of securities or foreign currency, their accounts often borrow from the broker's account and securities or foreign currency are sold in the case of anticipated increase of securities price or exchange rate, and repurchase at lower prices in the future to gain. Adage "Buy low price, sell high price" may be applied for Speculators. This is just the reverse trading order where short selling - selling stocks or foreign currency with high price and repurchase it later at a lower price with the expectation of short-selling.

The short selling allows Speculators who do not hold securities or foreign currency can meet customers' purchase order. Besides, the short selling supports investment and trading strategies for investors. The short selling also helps investors have the profit from the difference price between the purchase and sale, and minimize financial risk for hedging activities. Particularly, they apply derivative contracts for short selling, by allowing anyone who has committed to purchase securities or foreign currency to offset market.

The results above also indicates the profit level of investors following formulas of $P = V \times P_e$ and $P = V \times C_e$. Besides, investors also apply the formula of $P_p = V_p \times R_p$ and $P_s = V_s \times R_s$. These formulas, investors can forecast their profit and price of put and call option and forward rate quickly. In this case, they only calculate C_e and P_e , and R_s following steps above.

Conclusions

Highlight benefits of the financial mathematical model are effective hedging of the financial risk as well as interest rates. In addition, this model helps the firms well manage the financial risk. They use swap contracts to stabilize exchange rate and ensure business capital as results of the above discussion. Besides, the effectiveness of applying this model is consistent with the development of Vietnam's economy and applying model is necessary to minimize the financial risk. However, the use and development of this model on the Vietnamese market is still limited. These limitations are due to the firms and commercial banks, as well as macroeconomic policies which do not give specific solutions. This model is little applied by the firms and the commercial banks through foreign exchange transactions. Therefore, Vietnamese firms need to assess the effectiveness of this model, the application conditions and the development direction of foreign exchange derivative instruments in the future.

The effectiveness of the financial mathematical model for measuring exchange rate is to minimize the exchange rate risk. Exchange rate fluctuation is great amplitude and random by supply and demand relationship in the foreign currency market. This is the prerequisite for the application of derivative instruments to hedge the foreign exchange risk in the market. Besides, the factors of supply and demand relationship are affected by exchange of speculation and arbitrage of foreign exchange in the market. These are also important factors making difficulty for us to predict the exchange rate fluctuation on the foreign exchange market. Because of the unpredictable changes in market rates, the firms and commercial banks always have expectations of model for hedging exchange rate risk to minimize losses that may occur to the cash flow exchange.

The foreign exchange market is very diverse and complex. Therefore, the firms need savvy and have good skills in the application of this model. Simultaneously, they also have the technical knowledge about derivative instruments. Particularly, the application of financial mathematical models measures the value of derivative instruments for hedging exchange rate that are the portfolio of the foreign currency business as well as imported and exported commodity. In addition, they must also develop derivative instruments closely with international trade activities. Besides, the firms also should develop technology because it is necessary to evaluate foreign exchange derivatives. Because, the foreign exchange derivative instruments are built on the basis of the application of complex algorithms to predict the likely volatility of exchange rates in the future.

For the developed countries, they always appreciate the foreign policy because it plays a very important role in the economic development such as the development of trade, investment, tourism etc. Implementation of monetary policy is goal of each country. The Vietnam foreign policy has made significant changes and some of regulations were issued for derivative instruments transactions. However, derivative instruments of Vietnam are still in its infancy, underdeveloped through lower trading revenue, some commercial banks even have the option contracts but there is no transaction. Although the derivative instruments are widely applied for hedging forward exchange rate in the world such as: Forward contracts,

swap contracts, futures contracts, option contracts and they bring sales up to hundreds of billions of dollars. Therefore, the use of derivative instruments to hedge the exchange rate in Vietnam is necessary.

The operating mechanism of State Bank should have more flexible exchange rate to actually meet the supply and demand of foreign currency in the foreign exchange market. The State Bank should continue to widen the trading amplitude of the average exchange rate, and frequently adjust this flexible amplitude to suit the exchange rate market. This is the basis for the commercial banks as well as the firms to be acquainted with the hedging method of exchange rate risk. Besides, the State Bank needs to study and issue the most basic rules of derivative transactions, and guiding documents in accordance with the conditions of the current Vietnam market in order to find out a general legal framework for activities of commercial banks. The commercial banks should be allowed to actively exercise the option exchange between the USD currencies when customers have the demand. The commercial banks should avoid separate business, because it leads to inconsistency, causing disputes when the problem occurs.

The State Bank needs to further strengthen the management role of inter-bank currency market and organize the inter-bank foreign exchange market. Besides, the State Bank has the supervision and administration to establish a foreign currency trading market is held between the organization's member credit markets. The State Bank also enters the market as buyers and sellers finally to implement the necessary interventions for the purpose of national monetary policy.

References

- Asaolu Taiwo Olufem. (2011), International Business Research, Exchange Rate Risk Exposure of Nigerian Listed Firms: An Empirical Examination, Vol. 4, No. 2.
- Andrei Tudor Stancu. (2010), The Romanian Economic Journal, Impact of Foreign Exchange Risk on International Portfolios, Year XIII, No. 37.
- Adrien Verdelhan. (2010), The Journal Of Finance, A Habit-Based Explanation of the Exchange Rate Risk Premium, vol. LXV, No.1.
- Abul, F. M. S. (2009), International Journal of Banking and Finance, interest rate and foreign exchange risk exposures of Australian banks: A note, Volume 6, Issue 2.
- Anghel, M. G. (2013), Modele de construcție a portofoliilor de instrumente financiare, Romanian Statistical Review, Supplement, pp. 245-250.
- Laux, C., and Leuz, C. (2009), Did Fair-Value Accounting Contribute To The Financial Crisis?, *NBER Working Paper, No. 15515*.
- Laux, C., & Leuz, C. (2009), The crisis of fair-value accounting: Making sense of the recent debate, *Accounting, Organizations and Society* 34, 826–834.
- Dilip, K. P., John, K. W., Yangru, W. (2002), *Journal of Banking & Finance*, Explaining exchange rate risk in world stock markets: A panel approach, S0378-4266(01)00178-9.
- Financial Accounting Standards Board. (1991), Statement of Financial Accounting Standards No.107.
- Financial Accounting Standards Board. (2006), Statement of Financial Accounting Standards No.155.
- Financial Accounting Standards Board. (2000), FAS138: Accounting for Certain Derivative Instruments and Certain Hedging Activities.

- Financial Accounting Standards Board. (1990), FAS105: Disclosure of Information about Financial Instruments with Off-Balance-Sheet Risk and Financial Instruments with Concentrations of Credit Risks.
- Financial Accounting Standards Board. (1993), FAS115: Accounting for Certain Investments in Debt and Equity Securities.
- Financial Accounting Standards Board.(1998), FAS133: Accounting for Derivative Instruments and Hedging Activities.
- Financial Accounting Standards Board. (1998), FAS149: Amendment of Statement 133 on Derivative Instruments and Hedging Activities.
- Coughlan, G., Emery, S., and Kolb, J. (2004), HeatTM (Hedge Effectiveness Analysis Toolkit): A Consistent Framework For Assessing Hedge Effectiveness Under IAS 39 And FAS 133, From JPMorgan, *Journal of Derivatives Accounting*, Vol. 1, No. 2, 221–272.
- Berkman, H., Bradbury, M. E., Hancock, P., and Innes, C. (2002), Derivative financial instrument use in Australia, *Accounting and Finance* (42) 97– 109.
- Zhang, H. (2009), Effect of derivative accounting rules on corporate risk-management behavior, *Journal of Accounting and Economics* 47- 244–264.
- International Accounting Standard Board “IASB”. (2008), IAS 21: The Effects of Changes in Foreign Exchange Rates.
- Jannis Bischof and Michael Elbert. (2007), “IAS 39 and basis in rick perception of financial instruments”, *Universidad Mannheim, Deutsche*.
- James, N., Bodurtha, J. R. (2005), divergent fas-133 and ias-39 interest rate risk Hedge effectiveness: problem and remedies, *Journal of Derivatives Accounting*, Vol. 2, No. 1.
- Horton, J., and Macve, R. (2000), “Fair value” For Financial Instruments: How *Erasing Theory is leading To Unworkable Global Accounting Standard Performance Reporting is written, Australian accounting reviews, vol. 11 No2* .
- June, F. L. (2006), Fair Value Option, *Tennessee CPA journal*.
- Khalidoun, M. A. (2013), *International Journal of Academic Research in Business and Social Sciences*, The Dynamics of Foreign Exchange Rate Risk Management in Different Enterprises, ,Vol. 2, No. 10.
- Minister of Finance. (2001), Vietnam accounting standard 2 (Inventories). *Chuẩn mực kế toán Việt nam số 2 (hàng tồn kho)*, ban hành ngày 31/12/2001.
- Minister of Finance. (2001), Vietnam accounting standard 3 (Tangible fixed assets. Bộ Tài Chính, *Chuẩn mực kế toán Việt nam số 3 (Tài sản cố định hữu hình)*, ban hành ngày 31/12/2001.
- Minister of Finance. (2005), Vietnam accounting standard 22 ((Disclosures in the Financial Statements of Banks and Similar Financial Institutions). Bộ Tài Chính, *Chuẩn mực kế toán Việt nam số 3 (Trình bày bổ sung báo cáo tài chính của các ngân hàng và tổ chức tài chính tương tự)*, ban hành ngày 15/02/2005.
- Solakoglu, M. N., & Demir, N. (2009), *Journal of Economic and Social Research*, Exchange-Rate Exposure and the Financial Sector, p-29-42.
- Minister of Finance.(2003), Vietnam accounting standard 5 (Investment property). Bộ Tài Chính, *Chuẩn mực kế toán Việt nam số 5 (Tài sản cố định hữu hình)*, ban hành ngày 30/12/2003.
- Minister of Finance. (2001), Vietnam accounting standard 4(Intangible fixed assets). Bộ Tài Chính, *Chuẩn mực kế toán Việt nam số 4 (Tài sản cố định vô hình)*, ban hành ngày 30/12/2003.

- Ministry of Finance. (2006), Decision No. 15/2006/QĐ-MOF. Bộ tài chính, Quyết định số 15/2006/BTC ban hành 15/7/2006.
- Ministry of Finance. (1995), Decision No. 1141 – TC/QĐ/CĐKT. Bộ Trưởng Tài Chính, Quyết định số. 1141 – TC/QĐ/CĐKT, ban hành ngày 1/ 11/1995.
- Ministry of Finance, (2001), Decision No. 149/2001/QĐ-BTC. Bộ Trưởng Tài Chính, Quyết định số 149/2001/QĐ-BTC, ban hành ngày 31/12/2001.
- Ministry of Finance. (2002), Decision No. 165/2002/QĐ-BTC. Bộ Trưởng Tài Chính, Quyết định số 165/2002/QĐ-BTC, ban hành ngày 31/12/2002.
- Michael, G. P. (2006), South-Eastern Europe Journal of Economics, EXCHANGE RATE RISK Measurement And Management: Issues And Approaches For Firms, p-129-146.
- Ministry of Finance. (2003), Decision No. 234/2003/QĐ-BTC. Bộ Trưởng Tài Chính, Quyết định số 234/2003/QĐ-BTC, ban hành ngày 31/12/2003.
- Ministry of Finance. (2005), Decision No. 12/2005/QĐ-BTC. Bộ Trưởng Tài Chính, Quyết định số 12/2005/QĐ-BTC, ban hành ngày 15 tháng 02 năm 2005.
- Ministry of Finance. (2005), Decision No. 100/2005/QĐ-BTC. Bộ Trưởng Tài Chính, Quyết định số 100/2005/QĐ-BTC, ban hành ngày 28 tháng 12 năm 2005.*
- Robert, H., Herz, F. J., Brian, J. B. (1994). Derivatives: were 1994 Disclosures Adequate?, the journal of Corporate Accounting and Financial/Winter.
- Stephen Spector, Ma, Fcga. (2009), International Accounting Standard 39 (IAS 39), Financial Instruments: Recognition and Measurement, CGA-Canada.
- State Bank of Vietnam. (2011) Circular 30/2011/TT-NHNN, Ngân hàng Nhà nước Việt Nam , 2011 Thông tư 30/2011/TT-NHNN.*
- State Bank of Vietnam. (2012), circular No.33/2012/TT-NHNN, Ngân hàng Nhà nước Việt Nam , 2012 Thông tư 30/2012/TT-NHNN*
- State Bank of Vietnam. (2011), Circular 14/2011/TT-NHNN, Ngân hàng Nhà nước Việt Nam , 2011 Thông tư 14/2011/TT-NHNN*
- State Bank. (2002), Decision No. 648/2004/D-SB. Ngân hàng Nhà nước , năm 2002, Quyết định số 648/2004/D-SB.
- State Bank. (2004), Decision No. 648/2004/D-SB Decision No. 679/2002/D-SB. Ngân hàng Nhà nước , năm 2004, Quyết định số 648/2004/D-SB Quyết định số 679/2002/D-SB