INTRODUCTION

Nowadays, under 4.0 industry and Basel impacts, Vietnam banks such as Vietcombank (VCB), Asia Commercial Bank (ACB) and Sacombank (STB) pay attention more to risk management, esp. New perspectives in governance, management and risk models. This is the 1st reason we conduct this research paper. Second, macro policy makers will need to look at risk management in banking industry and impacts of macro factors on market risk in order to adjust macro policies. What we need to adjust in trade balance, exchange rate, lending rate and risk free rate policies? This is the 2nd reason for us to conduct this study. Third, how does effective internal control link to market risk in banks?

Therefore, this study will calculate and figure out not only inflation but other macro factors, both internal and external, such as GDP growth, risk free rate, lending rate, SP500, trade balance and exchange rate, etc. affecting the market risk level during the pre-low (L) inflation period (2011-2015). The paper is organized as follows: after the introduction it is the research issues, literature review, conceptual theories and methodology. Next, section 3 will cover main research findings/results. Section 4 gives us some discussion and conclusion and policy suggestion will be in the section 5.

BODY OF MANUSCRIPT

Research Issues

The scope of this study is:

- Issue 1: What are impacts of internal macro variables such as inflation, GDP growth, VN-Index, risk free rate… on market risk of 3 big banks, VCB, ACB and STB?
- Issue 2: Evaluating impacts of external macro variables such as balance of trade, exchange rate and S&P500 on market risk of VCB, ACB and STB measured by Beta CAPM
- Issue 3: Better risk management by reducing risk will establish internal control effectively in banks.

This paper also tests two (2) below hypotheses:

- Hypothesis 1: the beta or risk level of listed bank (VCB, ACB and STB) will increase if inflation increase and it will decrease if GDP growth increases.
- Hypothesis 2: If exchange rate decreases (VND appreciation), beta CAPM will decrease.

LITERATURE REVIEW

Fama, Eugene F., and French, Kenneth R., (2004) also indicated in the three factor model that “value” and “size” are significant components which can affect stock returns. They also mentioned that a stock’s return not only depends on a market beta, but also on market capitalization beta. The market beta is used in the three factor model, developed by Fama and
French, which is the successor to the CAPM model by Sharpe, Treynor and Lintner. Dimitrov (2006) documented a significantly negative association between changes in financial leverage and contemporaneous risk-adjusted stock returns.

Umar (2011) found that firms which maintain good governance structures have leverage ratios that are higher (forty-seven percent) than those of firms with poor governance mechanisms per unit of profit. Chen et al (2013) supported regulators’ suspicions that over-reliance on short-term funding and insufficient collateral compounded the effects of dangerously high leverage and resulted in undercapitalization and excessive risk exposure for Lehman Brothers. The model reinforces the importance of the relationship between capital structure and risk management. And Gunaratha (2013) revealed that in different industries in Sri Lanka, the degree of financial leverage has a significant positive correlation with financial risk.

During the financial crisis 2007-2009 in Viet Nam and global financial markets, high inflation causing high lending rates have created risks for many industries such as medicine and the whole economy. Mohamad et al (2014) showed that financial risk is vital through using both return on asset and return on equity in the performance equation. This result also implied that we cannot avoid the inverse relation of financial risk and performance; therefore, bank system would be better to make a trade-off between risk and performance.

Wang et al (2014) presented results showing that firms with long-term institutional investors receive significantly positive abnormal returns around the offering announcement. Then, Gunarathna (2016) revealed that whereas firm size negatively impacts on the financial risk, financial leverage and financial risk has positive relationship. Hami (2017) showed that financial depth has been affected negatively by inflation in Iran during the observation period. The below table will summarize previous studies relating to risk management under macro impacts topic:

**Table 1 - Summarize previous studies**

<table>
<thead>
<tr>
<th>Domestic researches</th>
<th>Authors name</th>
<th>Results, contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Systemic risk and the problem of determining Beta coefficient in Vietnam</td>
<td>Vương Đức Hoàng Quân (2012)</td>
<td>In the first stage, in general, the information from the Vietnam stock market is not sufficient in quantity and quality to estimate the beta coefficient according to the traditional method, which is regression analysis of stock returns volatility compared to indices. VN-Index to value the listed companies and stocks.</td>
</tr>
<tr>
<td>2. Fama-French 3-Factor Model: The empirical evidence from the Ho Chi Minh City Stock Exchange</td>
<td>Trương Đăng Lộc and Dương Thị Hoàng Trang (2014)</td>
<td>The research results show that earnings of stocks are positively correlated with market risk, firm size and the book value to market value (BE / ME) ratio. In other words, the Fama - French 3-factor model is suitable in explaining the change in profits of stocks listed on HOSE.</td>
</tr>
<tr>
<td>3. The econometric model for stock prices in the period 2008-2011 - Case of stock prices ACB, VN-Index, risk free rate and S&amp;P 500</td>
<td>Binh Trần Ngọc Huy (2015)</td>
<td>Analyze the impact of VN-Index and internal and external macro variables on the stock price of ACB.</td>
</tr>
<tr>
<td>4. The theory of average return of K.Marx and model of capital asset pricing</td>
<td>Nguyễn Thị Hương (2017)</td>
<td>The limitation of Vietnam’s stock market is the lack of beta in stock analysis. However, as the market portfolio matures, beta will keep pace with the development of the market.</td>
</tr>
<tr>
<td>5. Analyzing Accounting Profit of Vietinbank under Effects of Internal Factors - A Case Study in Vietnam Listed Banks</td>
<td>Hoàng Thanh Hạnh, Bình Trần Ngọc Huy (2021)</td>
<td>Presenting a regression model analyzing the impact of internal macro variables (inflation in Vietnam, lending rate, risk-free rate) and external (US inflation, exchange rate, S&amp;P 500) on stock prices CTG.</td>
</tr>
</tbody>
</table>
| 6. Systemic risks in banking business - periods of crisis                  | Nguyễn Thành Bé, Bùi Quang Hưng (2019)                                      | Presented in Vietnam, the risk management system at commercial banks has been paid attention to a certain extent in the past few years, but due to its structural and technical }
CONCEPTUAL THEORIES

Positive sides of low inflation: Low (not negative) inflation reduces the potential of economic recession by enabling the labor market to adjust more quickly in a downturn, and reduces the risk that a liquidity trap prevents monetary policy from stabilizing the economy. This is explaining why many economists nowadays prefer a low and stable rate of inflation. It will help investment, encourage exports and prevent boom economy. Negative side of low inflation: it...
leads to low aggregate demand and economic growth, recession potential and high unemployment. Production becomes less vibrant. Low inflation makes real wages higher. Workers can thus reduce the supply of labor and increase rest time. On the other hand, low product prices reduce production motivation.

The central bank can use monetary policies, for instance, increasing interest rates to reduce lending, control money supply or the Ministry of finance and the government can use tight fiscal policy (high tax) to achieve low inflation. According to the International Federation of Accountants (IFAC), "The internal control system is the plan of the entity and all the methods and work steps that the managers of the business adhere. The Internal Control System helps managers achieve their objectives with certainty in order and business efficiency, including respecting management regulations; keep assets safe, prevent and detect wrongdoing and fraud; make complete and accurate planning records, timely and reliable financial statements. So internal control focuses on reducing bank risk.

**METHODOLOGY**

We use the data from the stock exchange market in Viet Nam (HOSE and HNX) during the pre-low (L) inflation period 2011-2015 in order to estimate systemic risk results. We perform both fundamental data analysis and financial techniques to calculate beta CAPM values. In this study, analytical research method and specially, comparative analysis method is used, combined with quantitative data analysis. Analytical data is from the situation of listed bank (VCB and STB) in Vietnam stock exchange.

Analysis of the effects of 9 macro variables on market risk of listed commercial bank, VCB, ACB and STB. Weekly data collected from 2011-2015 for bank stock price to measure Beta and other macro data from reliable sources such as the General Statistics Office and commercial banks. Beta CAPM is a function with 9 macro variables (x1: GDP growth rate (g), x2: Risk-free rate Rf (i), x3: Loan interest rate (r), x4: Exchange rate (ex-rate), x5: S&P 500, x6: VN-index, x7: trade balance, x8: industrial production index, x9: CPI). We use OLS regression. Finally, we use the results to suggest policy for 3 banks VCB, ACB and STB, relevant organizations and government. Total 9 macro variables are described with sources in the below table:

**Table 1 - Variables description**

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Sign</th>
<th>Data source</th>
<th>Reference source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market risk (BetaCAPM)</td>
<td>BetaCAPM</td>
<td>HOSE and HNX</td>
<td>William F. Sharpe (1964), John Lintner (1964) and Jan Moslin (1966)</td>
</tr>
<tr>
<td>Independent variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP growth</td>
<td>g</td>
<td>Bureau statistics</td>
<td>Dinh Tran Ngoc Huy (2021, Springer Verlag book chapter) &quot;Impacts of Internal and External Macro Factors on Firm Stock Price in An Econometric Model - A Case In Viet Nam Real Estate Industry&quot;</td>
</tr>
<tr>
<td>VNindex</td>
<td>VNindex</td>
<td>HOSE and HNX</td>
<td>Dinh Tran Ngoc Huy &quot;Econometric model for ACB bank stock price 2008-2011, Sai Gon university journal, No.22, 2015&quot;</td>
</tr>
<tr>
<td>Lending rate</td>
<td>r</td>
<td>Commercial bank</td>
<td>Dinh Tran Ngoc Huy (2021, Springer Verlag book chapter) &quot;Impacts of Internal and External Macro Factors on Firm Stock Price in An Econometric Model - A Case In Viet Nam Real Estate Industry&quot;</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>Ex-rate</td>
<td>Commercial bank</td>
<td>Dinh Tran Ngoc Huy (2021, Springer Verlag book chapter) &quot;Impacts of Internal and External Macro Factors on Firm Stock Price in An Econometric Model - A Case In Viet Nam Real Estate Industry&quot;</td>
</tr>
<tr>
<td>S&amp;P500</td>
<td>SP500</td>
<td>NYSE</td>
<td>Dinh Tran Ngoc Huy &quot;Econometric model for ACB bank stock price 2008-2011, Sai Gon university journal, No.22, 2015&quot;</td>
</tr>
<tr>
<td>BOT(trade balance)</td>
<td>BOT</td>
<td>Bureau statistics</td>
<td>Author synthesis</td>
</tr>
<tr>
<td>IM (Industrial manufacturing index)</td>
<td>IM</td>
<td>Bureau statistics</td>
<td>Author synthesis</td>
</tr>
</tbody>
</table>

**Source:** Search data.
In the below table (VCB), we see statistics for 9 variables. We find our standard deviation of Exchange rate and trade balance with highest values, while std. deviation of CPI, GDP growth, and Rf as lowest values.

![Figure 1 - Descriptive statistics for 9 macro variables - Case VCB](source)

In case of STB, we see statistics for 9 variables. We find our standard deviation of Exchange rate and trade balance and SP500 with highest values, while std. deviation of CPI, GDP growth, and Rf as lowest values.

Comparing 3 cases, we find out std. deviation of beta of STB is smaller than (:) that of VCB (:) that of ACB (0.38 < 0.6 < 0.78).

![Figure 2 - Descriptive statistics - Case STB](source)

![Figure 3 - Descriptive statistics - Case ACB](source)

**MAIN RESULTS**

**General Data Analysis**

First, we look at the below figure, we find out correlation matrix of internal variables. We see that in case of VCB, increase in industrial manufacturing index and CPI will cause Beta CAPM decreases while decrease in SP500 will make it decreases.
Figure 4 - Macro external and internal variables correlation matrix - Case VCB

Source: Search data.

Second, in case of STB, we find out that Increase in industrial manufacturing index and lending rate will cause Beta CAPM increases while decrease in SP500 will make it decreases.

Figure 5 - Macro external and internal variables correlation matrix - Case STB

Source: Search data.

Third, in case of ACB, we find out that Increase in industrial manufacturing index and lending rate will cause Beta CAPM increases while decrease in SP500 will make it increases.

Figure 6 - Macro external and internal variables correlation matrix - Case ACB

Source: Search data.

Empirical Research Findings and Discussion

In the below section, data used are from 2011-2015 with weekly data for stock price of VCB and STB, live data on VN stock exchange (HOSE and HNX mainly). Different scenarios are created by comparing 2 scenarios: macro internal factors impacts and macro external variables effects. We model our data analysis as in the below figure:

Figure 7 - Analyzing market risk under impacts from macro factors in 2 scenarios

Source: Search data.

Using OLS regression from EViews, we find out: industrial production and VN-Index have positive correlation with market risk of VCB while CPI, GDP growth and risk free rate has negative correlation with Beta CAPM of CTG.
Figure 8 – Internal impacts on Beta CAPM – Case VCB

![Table showing the results of an internal analysis of VCB's Beta CAPM]

Source: Search data.

For external effects in case VCB, we recognize all factors (exchange rate, SP500 and trade balance) have positive correlation with VCB Beta.

Figure 9 – External impacts on Beta CAPM – Case VCB

![Table showing the results of an external analysis of VCB's Beta CAPM]

Source: Search data.

Looking at the below figure we see internal effects on Beta CAPM of STB: Industrial product, Risk free rate, lending rate and VN-Index have positive correlation with Beta, then CPI and GDP growth have negative correlation with Beta CAPM. If risk free rate increases, market risk will increase.

Figure 10 – Internal impacts on Beta CAPM – Case STB

![Table showing the results of an internal analysis of STB's Beta CAPM]

Source: Search data.

Next, we figure out that SP500 and trade balance have positive correlation with Beta CAPM.
Looking at the below figure we see internal effects on Beta CAPM of ACB: Industrial product, Risk free rate, and exchange rate have positive correlation with Beta, then CPI and GDP growth have negative correlation with Beta CAPM. If risk free rate increases, market risk will increase.

Source: Search data.

**DISCUSSION FOR FURTHER RESEARCHES**
We can continue to analyze risk factors behind the risk scene (FDI, public debt, etc.) in order to recommend suitable policies and plans to control market risk better. In order to enhance risk management culture at VCB, ACB and STB, big listed joint stock commercial banks in Vietnam, we have to consider some following action plans:

- improving risk management processes
- enhancing risk management models

**CONCLUSION AND POLICY SUGGESTION**
As shown from the above regression model and equation, Government and Ministry of Finance need to increase GDP growth and reduce CPI for lower market risk. GDP growth might increase more than trade balance increase.
This research paper provides evidence that the market risk is affected much more by CPI, GDP growth, risk-free rate and lending rate. It means that the role of bank system in trying to control credit growth and rates reasonably. Our model also shows that other macro factors such as VN-Index and exchange rate just have slight impact on Beta CAPM. And macro external factors have small effects on market risk of 3 banks.

Good market risk management of banks will enhance internal control.

Management implications
Suggestions, to establishing internal control to effective risk management at enterprise and bank level, are the following risk management activities:

- Make a risk recognition report; Promulgating the Code of Professional Ethics; Regulations that employees are not allowed to disclose internal information; Strengthen legal communication to raise awareness and compliance; Issue the Internal Control Procedures
- With the application of macro-variable impact analysis on Beta CAPM, businesses and banks need to develop two risk causation analyzes according to the 5M model as follows (from which proposing solutions to minimize risks): Man-Machine-Method-Material-Money.

ACKNOWLEDGEMENTS
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Linkages between Effective Internal Control and Evaluating Market Risk Via Beta CAPM of Listed Banks in Vietnam Under Macro Effects During Pre-Low Inflation Period - Case of VCB, STB and ACB

Resumo
Este artigo de pesquisa tem como objetivo descobrir e fazer comparações sobre quanto efeitos no risco de mercado de dois grandes bancos comerciais vietnamitas listados, VCB e STB com dados semestrais. Por meio da análise, métodos estatísticos de síntese e método de materialismo dialético, combinado com modelo econométrico com 9 variáveis macro, descobrimos que o crescimento do IPC e do PIB, taxa de empréstimos e taxa livre de risco (Rf) têm muito mais impactos no risco de mercado, enquanto fatores externos como câmbio e SP500 apenas têm pequeno efeito no BETA CAPM. Em seguida, uma de suas principais descobertas é a sugestão de políticas macro e de gestão de riscos para agências bancárias e governamentais relevantes. Nossa recomendação pode ser usada para referência em muitos outros mercados em desenvolvimento.


Abstract
This research paper aims to figure out and make comparison on how much effects in the market risk of two big listed Vietnam commercial bank, VCB and STB with semiannual data. Through using analysis, synthesis statistics methods, and dialectical materialism method, combined with econometric model with 9 macro variables, we figure out that CPI and GDP growth, lending rate and risk free rate (Rf) have much more impacts on market risk while external factors such as exchange rate and SP500 just have small effect on beta CAPM. Then, one of its major findings is the suggestion of macro and risk management policies for bank and relevant government agencies. Our recommendation can be used for reference in many other developing markets.

Keywords: Market risk management. Beta CAPM. Low inflation. Banking industry. Vietnam.

Resumen
Este trabajo de investigación tiene como objetivo averiguar y hacer una comparación sobre la cantidad de efectos en el riesgo de mercado de dos grandes bancos comerciales de Vietnam cotizados, VCB y STB con datos semestrales. A través del uso de análisis, métodos de estadísticas de síntese y método de materialismo dialéctico, combinado con el modelo econométrico con 9 variables macro, descubrimos que el ipc y el crecimiento del PIB, la tasa de préstamos y la tasa libre de riesgo (Rf) tienen mucho más impacto en el riesgo de mercado, mientras que los factores externos como el tipo de cambio y SP500 solo tienen un pequeño efecto en la BETA CAPM. Luego, una de sus principales conclusiones es la sugerencia de políticas macro y de gestión de riesgos para los bancos y las agencias gubernamentales pertinentes. Nuestra recomendación se puede utilizar como referencia en muchos otros mercados en desarrollo.

Exhibit 1 - Inflation, CPI over past 10 years (2007-2017) in Vietnam

Exhibit 1 - Loan/Credit growth rate in the past years (2012-2018) in Vietnam