Impact of exchange rate dynamics on Vietnam's regulation exports to the U.S.: Insights from VAR and VECM analysis

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ABSTRACT:- This study fills an important gap in the literature by disentangling the short- and long-term effects of exchange rate fluctuations on Vietnam's merchandise exports to the United States, an issue that macro-level studies have yet to address in the context of deep GVC integration and imported input reliance. We employ Vector Autoregression (VAR) and Vector Error Correction Model (VECM) techniques on quarterly data to quantify how exchange rate volatility, differentials, inflation, and GDP dynamics shape export performance. Our results indicate that exchange rate movements account for roughly 10 percent of long-term export variation, while structural factors, particularly heavy reliance on imported intermediate goods and FDI-driven production, dampen the expected depreciation effect. In the short run, export sensitivity to currency shocks is negligible, suggesting that aggressive devaluation offers limited benefits. We recommend a managed floating exchange rate regime, coordinated with fiscal and monetary instruments, alongside regulatory policies to strengthen domestic value-addition. These findings advance our understanding of currency policy as a trade-promotion tool in emerging economies.

Keywords:- Exchange Rate Fluctuations, Vietnam-U.S. Trade, Export Competitiveness, Global Value Chains (GVCs)

I. INTRODUCTION

Exchange rates are a key determinant of international trade flows, shaping the relative prices of goods and services across borders. For export-oriented, developing economies such as Vietnam, where outward shipments have become the engine of GDP growth, understanding currency dynamics is especially critical. Over the past two decades, Vietnam's merchandise exports to the United States have expanded rapidly—driven by liberalized trade policies, deeper integration into global value chains (GVCs), and a managed-floating exchange rate that has helped maintain macroeconomic stability. Yet, despite this export boom, policy debates persist over how—and how much—exchange rate movements truly influence Vietnam's export performance.

Classical theories like the Marshall-Lerner condition and the J-curve hypothesis provide a framework for expecting that currency depreciation can eventually enhance a nation's trade balance. However, empirical evidence is far from uniform: cross-country studies yield mixed results, and sectoral analyses often point in different directions. In Vietnam's case, the interplay between exchange rate policy, export composition, and the predominance of foreign-invested enterprises—many of which rely heavily on imported inputs—complicates the expected pass-through from currency shifts to export volumes and values.

This paper addresses an important gap in the literature by disentangling the short- and long-term effects of exchange rate fluctuations on Vietnam's U.S. exports, accounting explicitly for volatility, relative price differentials, inflation, and GDP dynamics. Given the structural reliance on imported intermediate goods and the policy emphasis on exchange rate stability, it remains unclear whether depreciation delivers the conventional export boost or instead raises production costs and undermines competitiveness. By applying Vector Autoregression (VAR) and Vector Error Correction Model (VECM) techniques to quarterly data, we isolate the dynamic transmission mechanisms and quantify their relative magnitudes.

Our findings will offer fresh empirical insights to inform exchange rate and trade policy in Vietnam and similar emerging markets. Specifically, we aim to (1) estimate the speed and size of export responses to exchange rate shocks in both the short and long run, (2) assess how exchange rate volatility and differentials alter this relationship, and (3) draw policy implications for leveraging currency policy alongside investment in domestic value-addition. The remainder of the article is structured as follows: Section 2 reviews relevant literature and theoretical underpinnings; Section 3 outlines the data and econometric methodology; Section 4 presents empirical results and interpretation; and Section 5 concludes with policy recommendations and avenues for future research.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The Marshall-Lerner condition, established by Marshall (1923) and Lerner (1944), states that currency depreciation improves the trade balance if the sum of the absolute values of the price elasticities of exports and imports exceeds one. This principle is fundamental in analyzing exchange rates and trade dynamics. The J-curve

hypothesis, introduced by Magee (1973) and Bahmani-Oskooee & Ratha (2004), suggests that trade balance initially deteriorates after depreciation before improving due to delayed adjustments in trade volumes and contractual obligations.

Studies by Krugman & Baldwin (1987) and Goldstein & Khan (1985) show that export responsiveness to exchange rate changes varies across countries and industries. Developing economies, reliant on price-sensitive goods, often exhibit higher elasticities, while advanced economies show mixed results due to their focus on high-value-added exports. Research on exchange rate volatility by Ethier (1973), Hooper & Kohlhagen (1978), and McKenzie (1999) highlights its adverse effects on exports, as uncertainty leads to risk-averse behavior among exporters. However, the impact depends on industry characteristics and hedging availability. Regarding real exchange rates and competitiveness, Dornbusch (1988), Edwards (1989), and Rodrik (2008) demonstrate that competitive real exchange rates enhance export performance, especially in developing economies. However, prolonged misalignments can cause structural trade imbalances. Amiti et al. (2014) and Bems & Johnson (2015) argue that global value chains (GVCs) have weakened the traditional exchange rate-export relationship, as imported intermediate goods offset the benefits of currency depreciation.

Industry-specific analyses by Belke et al. (2013) and Cheung & Sengupta (2013) reveal that industries with high price elasticity, such as textiles and agriculture, are more sensitive to exchange rate fluctuations. In contrast, sectors like pharmaceuticals and high-tech goods are less affected due to their reliance on non-price competitive factors. Cheung et al. (2010) found that RMB undervaluation significantly boosted China's exports in the 2000s. Research on the Eurozone by Berthou & Fontagné (2013) shows that euro appreciation dampens exports, particularly for peripheral economies. Bahmani-Oskooee & Ardalani (2006) documented a strong link between exchange rate movements and export performance in commodity-dependent developing nations. Williamson (1994) and Frankel (1999) discuss how fixed and floating exchange rate regimes influence exports: flexible regimes allow natural adjustments to external shocks, while pegged rates provide stability but can undermine competitiveness. Recent discussions by Stephen Miran (2025) and the Wall Street Journal (2025) highlight the interplay between trade policies, exchange rates, and competitiveness, emphasizing strategic currency management.

A study by Vinh Nguyen Thi Thuy and Duong Trinh Thi Thuy (2019) on Vietnam's exports (2000–2014) found that exchange rate volatility negatively impacts exports in the long run. Currency depreciation aligns with the J-curve hypothesis, initially reducing exports but yielding positive effects over time. Research on Indonesia's commodity exports (2022) shows mixed impacts of Rupiah fluctuations across commodities. A 2010 review of exchange rate-trade relationships underscores complexities influenced by trade agreements, product characteristics, and market structures.

This research highlights the intricate relationship between exchange rates and exports. Factors such as elasticity, volatility, real exchange rates, and GVC integration shape trade outcomes. Policymakers must adopt tailored strategies to enhance export performance amid exchange rate fluctuations, balancing flexibility and stability in currency management.

III.   RESEARCH METHOD

This study employs Vector Autoregression (VAR) and Vector Error Correction Model (VECM) techniques to analyze the short- and long-term effects of exchange rate fluctuations on Vietnam's merchandise exports to the U.S. The proposed econometric model considers key macroeconomic variables: Vietnam's export turnover (XK), USD/VND exchange rate (TG), exchange rate differential (CLTG), Consumer Price Index (CPI), and Gross Domestic Product (GDP). Data is processed using EViews software, with variables transformed logarithmically to ensure stationarity. The Johansen cointegration **test** confirms long-term relationships, validating the use of VECM. Additionally, impulse response functions and variance decomposition assess the influence of shocks over time.

From above theoretical framework, and as well as based on the result of empirical research (Nguyen, 2021), a model is proposed to evaluate the impact of various factors on Vietnam–U.S. exports as follows:

$$XK = f(TG,CLTG,CPI,GDP) (*)$$

Where:
- *XK: Vietnam's export turnover to the U.S.*
- *TG: USD/VND exchange rate provided by the Joint Stock Commercial Bank for Foreign Trade of Vietnam (Vietcombank), which serves as a reference rate for pricing in international trade transactions.*
- *CLTG: The difference between the ceiling exchange rate and the floor exchange rate, calculated based on the official exchange rate (central rate) and the margin set by the State Bank of Vietnam.*
- *CPI: Consumer Price Index.*
- *GDP: Gross Domestic Product.*

The data in equation (*) is input into the EViews software. The variables in the model are transformed into logarithmic values to reduce trends, except for the CPI variable, which cannot be logarithmically transformed due to the presence of negative values during certain periods.

The proposed econometric model is as follows:

$$LNXK_t = \alpha_0 + \alpha_1 lnTG_t + \alpha_2 LNCLTG_t + \alpha_3 CPI_t + \alpha_4 LNGDP_t + \varepsilon t \quad (**)$$

Research hypotheses

- Exchange Rate (TG): A stronger VND (lower USD/VND exchange rate) raises the price of Vietnamese goods abroad, reducing competitiveness and hindering exports. Thus, $\alpha_1 < 0$.
- Exchange Rate Differential (CLTG): A wider gap between ceiling and floor rates signals policy instability, potentially disrupting trade. Hence, $\alpha_2 < 0$.
- Inflation (CPI): Studies (e.g., Raphael & Ajina, 2021) show inflation negatively impacts exports. While not Vietnam-specific, a similar inverse relationship is expected, $\alpha_3 < 0$.
- Gross Domestic Product (GDP): Prior research (Sumiyati, 2020; Diep et al., 2018; Nguyen Huy, 2014) confirms GDP growth boosts exports, supporting $\alpha_4 > 0$.

IV. RESULTS AND DISCUSSION

Model Analysis

This study employs a descriptive statistical analysis to assess the impact of exchange rate fluctuations on Vietnam's goods exports to the U.S. using a vector regression model. The results indicate a significant difference between the maximum and minimum values of the LNXK and LNGDP variables, reflecting the diversity in the randomly selected sample.

While some variations exist in left- or right-skewed distributions, their frequency is low and does not significantly affect the overall sample. As shown in Table 3.6, the average CPI from 2016 to 2022 is 0.5%, with a maximum of 3.44% and a minimum of -0.72%.

Table 1. Descriptive Statistics for the Variables

Value	Export value (Mil. USD)	GDP (Bil VND)	Exchange rate (USD/VND)	Exchange rate difference (USD/VND)	CPI (%)
Minimum value	11.067,78	804.707	21.690,66	1265,216	0,5%
Minimum value	8.722,846	776.703,3	22.267,5	1.333,050	0,375%
Minimum value	30.641,38	1.986.950	23.700	2.361,2	3,44%
Minimum value	2.305,104	97.865	17.710	420,72	-0,72%
Standard deviation	7.682,071	491.338	1.568,536	327,2032	0,0077
Number of observations	56	56	56	56	56

Results Estimated Using the VAR Model

The Augmented Dickey-Fuller (ADF) test confirms that LNXK, LNTG, LNCLTG, CPI, and LNGDP are non-stationary in their original series but become stationary after first-order differencing. This indicates all variables are integrated of order 1 (I(1)) at the 1% significance level.

For instance, LNXK has a p-value of 0.0917 (>0.05) at its original level, indicating non-stationarity. After first-order differencing, the p-value drops to 0.0000 (<0.05), confirming stationarity. The same pattern holds for LNTG, LNCLTG, CPI, and LNGDP (see Appendix 01).

The requirement for estimating the VAR model is that all variables included must be stationary. Based on the above results, all variables—LNXK, LNTG, LN CLTG, CPI, and LN GDP—satisfy the conditions for inclusion in the model.

Table 2. Results of Augmented Dickey-Fuller Unit Root Test for Variables in the Model

Variables	Initial level		First-order differentiation error		Results
	t-statistic	Prob.	t-statistic	Prob.	
LNXK	-3.225238	0.0917	-6.267982	0.0000	I(1)
LNTG	2.553349	0.9970	-7.291981	0.0000	I(1)
LNCLTG	0.085504	0.7058	-7.696900	0.0000	I(1)
CPI	-1.670417	0.0893	-9.430355	0.0000	I(1)
LNGDP	-2.275084	0.4394	-4.639845	0.0025	I(1)

Source: Author's calculations on Eviews

Determining the optimal lag

To determine the optimal lag length, the author first sets the maximum lag allowed by EViews 12, which is 4 for the model with D(LNXK), D(LNCLTG), D(LNTG), D(LNGDP), and D(CPI) (see Appendix 02). Next, lag exclusion tests are conducted using five selection criteria: LR, FPE, AIC, SC, and HQ. These criteria balance explanatory power with parameter efficiency. Results show that four criteria (LR, FPE, AIC, HQ) favor a lag length of 3, which is selected for the VAR model.

Table 3. Selecting the Optimal Lag

latency	LR	FPE	AIC	SC	HQ
0	NA	5,49e-12	-11,738620	-11,54922*	-11,666240
1	58,256150	4,03e-12	-12,052810	-10,916440	-11,618570
2	23,415530	6,16e-12	-11,657800	-9,574462	-10,861700
3	82,90588*	1,66e-12*	-13,04615*	-10,015840	-11,88818*
4	29,292140	1,93e-12	-13,042160	-9,064875	-11,522320

Source: Author's calculations on Eviews

Latency: *Time delay in the system you're analyzing, though the exact context isn't clear.*
LR: *Likely refers to the likelihood ratio test, used for model comparison.*
FPE: *Final Prediction Error, used for assessing the fit of a model.*
AIC: *Akaike Information Criterion, a measure used for model selection; lower values suggest a better model.*
SC (BIC): *Schwarz Criterion, also used for model selection; lower values suggest better models.*
***HQ***: *Hannan-Quinn criterion, another model selection measure, also favoring lower values.*

Running the VAR Model

The estimation of the VAR model (Appendix 03) with a lag length of 3 yields an Adjusted R-squared value of 0.463, indicating that the independent variables in the model explain 46.3% of the variation in exports. Exports at lag 1 have a significant impact on themselves. Additionally, the exchange rate at lag 1 has an inverse effect on exports (details in Appendix 03). To assess whether the selected VAR model is appropriate, the author conducts tests for the model's stability and checks for autocorrelation in the residuals.

Stability Test of the Model: The AR test results from EViews show that all eigenvalues lie within the unit circle, confirming that the estimated model possesses the necessary stability to ensure the reliability of the results.
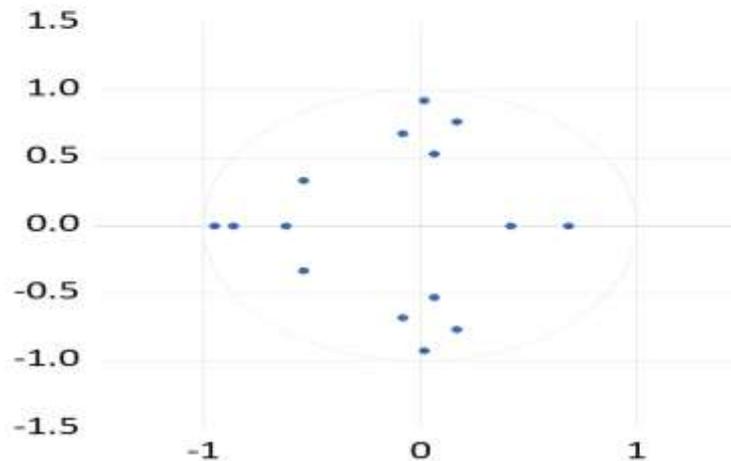
Source: Author's calculations on Eviews

Testing for residual autocorrelation. The hypotheses for the test are as follows:

H0: Residuals have no autocorrelation.
H1: Residuals have autocorrelation up to lag h.

The results of the residual autocorrelation test for the model (Appendix 04) indicate that the Prob. values for lags 1, 2, 3, and 4 in the LM Test are all greater than 5%. Therefore, there is insufficient evidence to reject the null hypothesis H0. Thus, at the 5% significance level, the residuals do not exhibit autocorrelation up to lag 3. As a result, the selected lag length is appropriate.

Table 4. Results of Residual Autocorrelation Test

Lag	LRE Statistic (LRE*stat).	df	P value (Prob.)	Rao-F Statistic (Rao F-Stat)	df	P value (Prob.)
1	29,40388	25	0,2474	1,206577	(25, 101.8)	0,2524
2	47,07243	50	0,5916	0,924453	(50, 103.7)	0,6147
3	88,56833	75	0,1354	1,216106	(75, 85.6)	0,1899
4	128,71210	100	0,0281	1,358338	(100, 63.2)	0,0953

Source: Author's calculations on Eviews

Granger Causality Test

The results of the Granger causality test (Appendix 05) indicate that, in the short term, the exchange rate factor, represented by the variable D(LNTG), has an impact on the export value from Vietnam to the United States, represented by the variable D(LNXK), at a 5% significance level. However, other factors, such as exchange rate differential, GDP, and CPI, do not have an impact on the export variable.

**Table 5. Results of the Granger Causality Test**

Dependent variable D(LNXK)			
Independent variables	**Statistics (Chi-sq)**	**df**	**Value of P (Prob.)**
D(LNCLTG)	0,27408	3	0,9648
D(LNTG)	8,25084	3	0,0411
D(LNGDP)	3,78652	3	0,2855
D(CPI)	5,27748	3	0,1526
All	14,20092	12	0,2881

Source: Author's calculations on Eviews

Impulse Response Analysis and Variance Decomposition

Impulse Response Analysis (Reaction of Exports to Shocks from Other Variables) In the selected VAR model, with numerous parameters and interrelated variables, analyzing the relationships between variables is often challenging. Therefore, these relationships are examined through impulse response functions. Any shock to a variable in the VAR model can be analyzed for its impact on other variables. Furthermore, the impulse response function reveals the trend of these effects, whether the impacts diminish over time, and how long they take to subside.

- *Reaction of Exports to Shocks from Exchange Rate Differentials:* The results show that exchange rate differentials affect exports starting from the first quarter. Specifically, a shock to exchange rate differentials causes a slight decline in exports in the second quarter. Exports then show an upward trend from the second quarter onward, with a decrease and minimal fluctuations beginning from the sixth quarter.
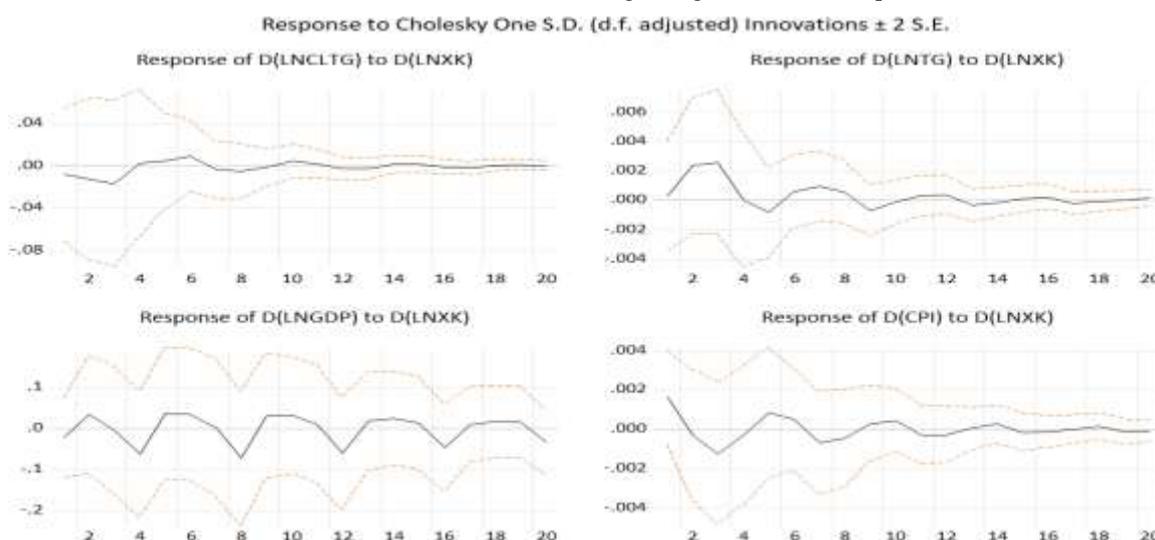
Source: Author's calculations on Eviews

- *Reaction of Exports to Shocks from Exchange Rates:* Exports respond to exchange rate shocks immediately in the first period and stabilize only after the 14th period.
- *Reaction of Exports to Shocks from GDP:* Exports fluctuate rapidly in response to shocks from GDP and exhibit consistent ups and downs with changes in GDP.
- *Reaction of Exports to Shocks from CPI:* CPI causes an immediate shock to exports in the first period. Exports then continuously fluctuate until the 8th period, eventually returning to equilibrium from the 10th quarter onward.

Variance Decomposition Analysis

Export fluctuations are primarily self-driven, with macroeconomic factors playing a minor role. Their explanatory power increases over time but remains limited. Among them, CPI and the exchange rate have a greater impact than exchange rate differentials and GDP. In the first quarter, exports account for 100% of their own changes. This effect declines over time, dropping from 83.87% in the 12th quarter to 65.67% after 12 quarters. Exchange rate shocks have no immediate effect but start influencing exports from the second quarter onward, peaking at 12.73% by the third quarter and stabilizing at 10–12% thereafter. In contrast, exchange rate differentials have minimal impact, contributing less than 1% over the first four quarters, with only slight growth beyond that. In the short term (2 quarters), past exports dominate at 84%, while exchange rates, exchange rate differentials, GDP, and CPI contribute 9.58%, 0.19%, 0.016%, and 6.34%, respectively. Over three years, past exports still exert the most influence (66%), but CPI (22.24%), exchange rates (10.37%), exchange rate differentials (1.16%), and GDP (0.55%) gain more significance.

Table 6. Results of the Variance Decomposition of the Model

Period	Standard deviation	LNXK	LNCLTG	LNTG	LNGDP	CPI
1	0,0723	100,0000	0,0000	0,0000	0,0000	0,0000
2	0,0827	83,8730	0,1876	9,5815	0,0163	6,3417
3	0,0900	74,1181	0,4263	12,7346	0,2164	12,5047
4	0,0912	74,5365	0,4822	12,4097	0,2109	12,3608
5	0,0937	74,3843	1,0468	11,7785	0,3132	12,4772
6	0,0974	69,2935	1,9701	10,9212	0,3145	18,2738
7	0,0988	67,4975	1,1726	10,6413	0,4516	20,2370
8	0,0991	67,6150	1,1855	10,6298	0,4490	20,1208
9	0,0994	67,1718	1,1848	10,5640	0,4573	20,6222
10	0,1004	65,9863	1,1626	10,3640	0,4955	21,9915
11	0,1006	65,7253	1,1578	10,3345	0,5519	22,2305
12	0,1007	65,6700	1,1604	10,3747	0,5514	22,2435

Source: Author's calculations on Eviews

VECM Model Results

Alongside the **VAR model**, this study employs the **Vector Error Correction Model (VECM)** to account for long-term relationships in non-stationary data. The **Johansen cointegration test** (Appendix 06) confirms the presence of **five cointegrating relationships** at a **95% confidence level**, validating the use of **VECM**. This indicates that the variables in the model are **cointegrated**, making VECM an appropriate method for analyzing long-term dynamics.

Table 7. Results of the Cointegration Test

John Hansen test				
Hypothesis		**Trace**	**0,05**	
Number of Cointegrating Equations (CE)	**Eigenvalue**	**Statistic Value**	**Statistic Value**	**Statistic Value**
No asterisk	0,922336	238,2283	69,81889	0,0000
At most 1 asterisk	0,631274	105,3494	47,85613	0,0000
At most 2 asterisks	0,434387	53,46894	29,79707	0,0000
At most 3 asterisks	0,261195	23,83699	15,49471	0,0022

At most 4 asterisks	0,144169	8,095501	3,841465	0,0044
Trace test indicates 5 cointegrating relations at the 5% significance level.				

Source: Author's calculations using Eviews

VECM Estimation Results

Given the presence of cointegration**,** the VECM model is used to estimate both short- and long-term effects. Results (Appendix 07) show that **C(1) = -0.037 < 0** with a P-value of 0.0144 (< 0.05)**,** confirming that independent variables have **a** significant long-term impact on Vietnam's exports to the U.S.

In the short term, past export values negatively affect current exports with a 2-period lag**,** while the exchange rate (1-period lag) also influences Vietnam's exports to the U.S.

SYNTHESIS AND POLICY DISCUSSIONS

Short- and long-term influences on exports

Estimation results indicate that in the short term, fluctuations in exports are primarily influenced by past export values, while exchange rates, exchange rate differentials, and GDP have a lesser impact. Over time, the effect of past exports diminishes, though it remains significant, with other factors continuing to influence exports. Compared to Nguyen (2021), this study similarly finds that past exports play a major role in current export fluctuations and that exchange rate differentials and GDP exert only minor effects. However, unlike Nguyen (2021), the findings suggest that exchange rate shocks explain over 10% of export variations but decrease over time, whereas Nguyen (2021) found an increasing trend.

Variance decomposition analysis confirms that past exports consistently account for over 60% of current export value, although their influence weakens over time. These findings reinforce the notion that historical export performance is a key determinant of future exports.

Exchange rate trends and export performance

A qualitative study of secondary data from 2009 to 2023 reveals that the VND/USD exchange rate has remained relatively stable, closely tracking Vietnam's exports to the U.S. With the gradual appreciation and stabilization of the exchange rate, Vietnam's exports to the U.S. have increased, shifting from raw and agricultural products toward manufacturing and high-tech goods. This shift has facilitated deeper integration into global supply chains.

Despite this, quantitative results suggest that short-term exchange rate fluctuations have little to no impact on Vietnam's exports to the U.S. A wider gap between ceiling and floor exchange rates slightly reduces exports, but the effect is insignificant. Over the study period, exchange rate contributions to export performance have declined, comprising only 10.37% in the final period. This evidence supports Vietnam's assertion that it does not manipulate its currency for trade advantages.

From 2016 to 2023, Vietnam's exchange rate movements closely followed both domestic and global foreign exchange market developments. The relatively stable exchange rate has had a positive effect on exports, which have grown steadily. However, the impact of exchange rates remains limited and lagged, meaning Vietnam has yet to fully capitalize on its export advantages.

Factors limiting the exchange rate's effectiveness

U.S. Inflation and Exchange Rate Policy: Post-pandemic U.S. inflation remained high, averaging over 6% monthly, peaking at 9.1% in June 2023. Given Vietnam's much lower inflation rate (3.15% in 2022), the VND should have appreciated against the USD. However, the State Bank of Vietnam (SBV) prioritized the policy of exchange rate stability to maintain credibility with the U.S. Treasury and avoid currency manipulation allegations. As a result, the VND was kept relatively weak, reducing Vietnam's export competitiveness. Over time, this could challenge trade surpluses and inhibit long-term export growth.

Role of FDI in Exports: Foreign direct investment (FDI) remains a major driver of exports, particularly in high-tech manufacturing (e.g., mobile phones, computers, and electrical machinery). While these industries have significantly contributed to Vietnam's export value to the U.S., they have also increased reliance on imported raw materials and components. This global integration reduces the effectiveness of exchange rate policies, particularly currency devaluation. Furthermore, a large share of Vietnam's exports consists of low-value-added processing activities, making them more vulnerable to external economic shifts and FDI firms' strategic decisions.

Global Economic Sensitivity and Trade Liberalization: Vietnam's deeper global integration has heightened its exposure to external fluctuations. Since economic reforms began in 1986, Vietnam has successfully attracted FDI due to a favorable investment climate, political stability, and strong economic growth potential. By 2022, total registered FDI reached nearly USD 27.72 billion, with actual capital inflows hitting a record USD 22.4 billion. Trade liberalization has progressed significantly, but rising protectionism, technical barriers, and trade defense measures pose new challenges for Vietnam's exports to the U.S.

Weak Foreign Exchange Market Development: Vietnam's foreign exchange market remains underdeveloped, with weak regulatory oversight on foreign currency flows. Exchange rate management is still largely

administrative. While devaluation is often seen as a tool to boost exports, it does not always yield positive results for Vietnam. In some cases, devaluation worsens export performance, while for less exchange rate-sensitive products, an appreciating currency negatively impacts export turnover.

While exchange rates influence Vietnam's exports to the U.S., their impact is weaker than expected. Past export performance remains the dominant factor, with exchange rate contributions declining over time. FDI-driven exports and a heavy reliance on imported inputs reduce the effectiveness of currency devaluation as a competitive tool. Additionally, Vietnam's commitment to maintaining a stable exchange rate, partly to avoid U.S. scrutiny, has limited potential benefits.

For Vietnam to enhance export performance, policies should prioritize technological upgrades, value-added production, and reduced dependence on imported inputs. Strengthening the foreign exchange market and improving exchange rate management could also help maximize trade benefits in the long term.

Vietnam's banking sector strategy and exchange rate management

On August 8, 2018, the Government issued Decision No. 986/QD-TTg outlining the Development Strategy for Vietnam's Banking Sector until 2025, with a vision toward 2030. The strategy focuses on renewing the monetary policy framework and foreign exchange management to ensure inflation control, currency stability, macroeconomic equilibrium, and efficient capital allocation.

The State Bank of Vietnam (SBV) aims to enhance the flexibility of the managed floating exchange rate system while aligning with domestic and global financial markets. It also seeks to modernize foreign exchange reserve management to balance safety, liquidity, and profitability. A key goal is reducing dollarization in the economy by 2030 through capital account liberalization. The SBV coordinates monetary policy with fiscal and macroeconomic policies to stabilize inflation, support economic recovery, and adapt to market fluctuations.

Exchange rate management for export led growth

Vietnam has prioritized exports for economic growth and international integration. To prevent allegations of currency manipulation while maintaining export competitiveness, the following measures should be adopted:

It should be understood that there has been no devaluation of the Vietnamese Dong (VND)**.** While a devaluation was considered or assumed in analysis, it was ultimately not implemented**.** Although the VND is relatively overvalued against the US dollar, research suggests that devaluation has limited and delayed effects on exports. Short-term fluctuations in the exchange rate have minimal impact, with the exchange rate contributing only 8.2% to exports in the final study period.

A sharp devaluation of the VND is not recommended, as it could invite accusations of currency manipulation, leading to potential US trade sanctions. Instead, Vietnam should pursue a gradual, market-aligned exchange rate policy.

A narrower exchange rate band stabilizes the currency in the short term, while a more flexible approach in the long term fosters a well-developed foreign exchange market. Vietnam should maintain a managed floating exchange rate system, using the central exchange rate to track market developments.

Exchange rate acts as an important policy tool

The SBV works with the exchange rate through direct market interventions, including buying and selling foreign currency and adjusting the exchange rate band when necessary. However, prolonged one-way interventions should be avoided.

Gradual reduction of direct administrative tools in favor of market-based instruments, such as interest rates, is recommended. This shift will enhance monetary policy effectiveness and economic stability.

Optimization of exchange rate management mechanism

To optimize the exchange rate's role in export growth, Vietnam adopts a transparent and consistent monetary policy while be able to maintain a stable yet flexible exchange rate will help mitigate risks associated with global market volatility.

Given that up to 70% of Vietnam's exports depend on imported inputs, devaluation could drive up import costs, leading to inflationary pressures. Many consumer goods also rely on imported raw materials, making exchange rate stability crucial for overall economic health.

A gradual expansion of the exchange rate band would allow commercial banks to price foreign currencies more accurately, reducing the gap between official and market exchange rates and curbing black-market foreign exchange activities.

Coordinating policies toward foreign exchange market stability

Interest rate and exchange rate policies must be synchronized. When interest rates are higher than the exchange rate movement, foreign currency holders convert their assets into VND, increasing its supply and stabilizing the foreign exchange market. Conversely, if the exchange rate rises faster than interest rates, speculation and hoarding of foreign currency may occur, leading to volatility. It observed that the SBV should manage interest rate and exchange rate policies flexibly while strengthening economic forecasting. Public confidence in the

VND must be reinforced to stabilize the exchange rate and create a predictable trade and investment environment.

Additional support measures

Coordinating exchange rate policies with other economic policies, a well-coordinated approach between exchange rate policy, monetary policy, fiscal policy, and government expenditure ensures macroeconomic stability and a favorable trade balance.

Reforming the export growth model, Vietnam should prioritize high-value-added industries and reduce reliance on imported raw materials. A shift toward productivity-driven growth will enhance export efficiency and sustainability.

Developing the supporting industry, strengthening domestic supply chains reduces dependence on imports and enhances export competitiveness. Sectors like electronics, footwear, textiles, and apparel should be prioritized, with incentives for domestic production.

Cautious foreign direct investment (FDI) policies, while FDI has fueled economic growth, policies must encourage technology transfer and collaboration with local suppliers. Strengthening regulations ensures that FDI benefits both foreign investors and the domestic economy.

Developing human resources and labor productivity, investing in skills training and technological expertise enhances labor productivity, improving export competitiveness in global markets. By implementing these measures, Vietnam can ensure stable economic growth, enhance its export sector, and strengthen its position in international trade while maintaining a balanced and sustainable monetary policy.

V.   CONCLUSION

This study examines the impact of exchange rate fluctuations on Vietnam's merchandise exports to the U.S., using VAR and VECM models. The findings show past export performance as the primary driver of current trends, though its influence weakens over time. Exchange rate fluctuations account for 10% of long-term export variations, while GDP and CPI have minimal effects.

Vietnam's heavy reliance on FDI enterprises and imported inputs limits the benefits of currency depreciation, reducing the effectiveness of traditional exchange rate adjustments. The study highlights limited short-term sensitivity to exchange rate changes, questioning the viability of aggressive devaluation strategies, which could provoke trade disputes without ensuring immediate export growth. A managed floating exchange rate regime balancing stability and flexibility emerges as a preferable approach.

Policy implications include integrating exchange rate management with fiscal and monetary policies, reducing import dependency, and improving labor productivity. Enhancing transparency in foreign exchange markets is crucial for stabilizing trade. Future research should explore sector-specific exchange rate impacts and the role of regional trade agreements in shaping Vietnam's exports. Addressing structural constraints through coordinated policies will optimize exchange rate management, supporting long-term export growth and economic development.

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Appendix 1: Testing the stationarity of variables in the model

❖ **LNXK VARIABLE**

Null Hypothesis: LNXK has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.225238	0.0917
Test critical values:	1% level	-4.161144	
	5% level	-3.506374	
	10% level	-3.183002	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNXK) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.267982	0.0000
Test critical values:	1% level	-4.144584	
	5% level	-3.498692	
	10% level	-3.178578	

*MacKinnon (1996) one-sided p-values.

❖ **LNTG VARIABLE**

Null Hypothesis: LNTG has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.553349	0.9970
Test critical values:	1% level	-2.607686	
	5% level	-1.946878	
	10% level	-1.612999	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNTG) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.291981	0.0000
Test critical values:	1% level	-2.608490	
	5% level	-1.946996	
	10% level	-1.612934	

*MacKinnon (1996) one-sided p-values.

❖ **LNTG VARIABLE**

Null Hypothesis: LNCLTG has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.085504	0.7058
Test critical values:	1% level	-2.607686	
	5% level	-1.946878	
	10% level	-1.612999	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNCLTG) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.696900	0.0000
Test critical values:	1% level	-2.608490	
	5% level	-1.946996	
	10% level	-1.612934	

*MacKinnon (1996) one-sided p-values.

❖ **CPI VARIABLE**

Null Hypothesis: CPI has a unit root
Exogenous: None
Lag Length: 3 (Automatic - based on AIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.670417	0.0893
Test critical values:	1% level	-2.610192	

5% level	-1.947248
10% level	-1.612797

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CPI) has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on AIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.430355	0.0000
Test critical values: 1% level	-2.610192	
5% level	-1.947248	
10% level	-1.612797	

*MacKinnon (1996) one-sided p-values.

❖ **GDP VARIABLE**

Null Hypothesis: LNGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on AIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.275084	0.4394
Test critical values: 1% level	-4.148465	
5% level	-3.500495	
10% level	-3.179617	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on AIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.639845	0.0025
Test critical values: 1% level	-4.148465	
5% level	-3.500495	
10% level	-3.179617	

*MacKinnon (1996) one-sided p-values.

Appendix 2: Testing the unicity of the model

Vector Autoregression Estimates
Date: 08/13/23   Time: 13:54
Sample (adjusted): 2009Q4 2022Q4
Included observations: 53 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(LNXK)	D(LNCLTG)	D(LNTG)	D(LNGDP)	D(CPI)
D(LNXK(-1))	-0.263959	-0.230554	0.036738	-0.406885	0.007090
	(0.16126)	(0.47396)	(0.03179)	(1.88806)	(0.02109)
	[-1.63685]	[-0.48644]	[1.15565]	[-0.21550]	[0.33618]
D(LNXK(-2))	-0.158335	-0.476612	0.041906	1.304652	-0.021048
	(0.14784)	(0.43451)	(0.02914)	(1.73091)	(0.01933)
	[-1.07100]	[-1.09690]	[1.43788]	[0.75374]	[-1.08866]

D(LNCLTG(-1))	-0.012675	0.009349	0.007567	0.079969	-0.002615
	(0.05150)	(0.15136)	(0.01015)	(0.60294)	(0.00673)
	[-0.24613]	[0.06177]	[0.74535]	[0.13263]	[-0.38831]
D(LNCLTG(-2))	0.013645	0.025451	0.007794	0.134938	0.000830
	(0.04854)	(0.14267)	(0.00957)	(0.56833)	(0.00635)
	[0.28109]	[0.17840]	[0.81451]	[0.23743]	[0.13080]
D(LNTG(-1))	-2.269670	0.328464	-0.089401	-4.325649	0.058339
	(0.74791)	(2.19819)	(0.14744)	(8.75670)	(0.09781)
	[-3.03466]	[0.14942]	[-0.60635]	[-0.49398]	[0.59646]
D(LNTG(-2))	0.704497	-1.417063	0.249334	-20.56381	-0.117368
	(0.79198)	(2.32770)	(0.15613)	(9.27263)	(0.10357)
	[0.88954]	[-0.60878]	[1.59699]	[-2.21769]	[-1.13320]
D(LNGDP(-1))	-0.009670	0.004006	0.005720	-0.770978	-0.000831
	(0.01262)	(0.03709)	(0.00249)	(0.14776)	(0.00165)
	[-0.76621]	[0.10800]	[2.29915]	[-5.21760]	[-0.50321]
D(LNGDP(-2))	0.013540	-0.025623	0.001970	-0.348939	-0.003343
	(0.01379)	(0.04053)	(0.00272)	(0.16147)	(0.00180)
	[0.98174]	[-0.63213]	[0.72470]	[-2.16099]	[-1.85366]
D(CPI(-1))	2.264559	4.564563	0.082617	14.78455	-0.543890
	(1.10339)	(3.24296)	(0.21752)	(12.9187)	(0.14430)
	[2.05236]	[1.40753]	[0.37982]	[1.14443]	[-3.76923]
D(CPI(-2))	-0.133383	2.185104	0.080835	3.439293	-0.215049
	(1.18286)	(3.47651)	(0.23318)	(13.8490)	(0.15469)
	[-0.11276]	[0.62853]	[0.34666]	[0.24834]	[-1.39020]
C	0.067125	0.034549	0.000442	0.180866	0.001040
	(0.01706)	(0.05013)	(0.00336)	(0.19968)	(0.00223)
	[3.93576]	[0.68924]	[0.13134]	[0.90576]	[0.46628]

R-squared	0.374909	0.080808	0.250004	0.445680	0.405659
Adj. R-squared	0.226077	-0.138047	0.071434	0.313699	0.264150
Sum sq. resids	0.219889	1.899450	0.008545	30.14252	0.003761
S.E. equation	0.072356	0.212662	0.014264	0.847159	0.009462
F-statistic	2.519018	0.369231	1.400031	3.376847	2.866654
Log likelihood	70.14677	13.00754	156.2116	-60.24833	177.9630
Akaike AIC	-2.231954	-0.075756	-5.479684	2.688616	-6.300489
Schwarz SC	-1.823025	0.333172	-5.070755	3.097545	-5.891560
Mean dependent	0.040056	-0.003559	0.005102	0.046697	-0.000119
S.D. dependent	0.082249	0.199347	0.014802	1.022605	0.011031

Determinant resid covariance (dof adj.)	2.88E-12
Determinant resid covariance	9.01E-13
Log likelihood	358.9718
Akaike information criterion	-11.47063
Schwarz criterion	-9.425992
Number of coefficients	55

**The designed model inputted into the Eviews software
has an optimal lag of 3.**
VAR Lag Order Selection Criteria
Endogenous variables: D(LNXK) D(LNCLTG) D(LNTG) D(LNGDP) D(CPI)
Exogenous variables: C

Date: 08/13/23   Time: 13:57
Sample: 2009Q1 2022Q4
Included observations: 51

Lag	LogL	LR	FPE	AIC	SC	HQ
0	304.3348	NA	5.49e-12	-11.73862	-11.54922*	-11.66624
1	337.3466	58.25615	4.03e-12	-12.05281	-10.91644	-11.61857
2	352.2740	23.41553	6.16e-12	-11.65780	-9.574462	-10.86170
3	412.6768	82.90588*	1.66e-12*	-13.04615*	-10.01584	-11.88818*
4	437.5752	29.29214	1.93e-12	-13.04216	-9.064875	-11.52232

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 3: The estimation results of the VAR model with an optimal lag of 3
Vector Autoregression Estimates
Date: 08/13/23   Time: 14:13
Sample (adjusted): 2010Q1 2022Q4
Included observations: 52 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(LNXK)	D(LNCLTG)	D(LNTG)	D(LNGDP)	D(CPI)
D(LNXK(-1))	-0.361090	-0.271899	0.031815	0.386818	0.011719
	(0.16634)	(0.52507)	(0.03089)	(0.80668)	(0.02000)
	[-2.17080]	[-0.51783]	[1.02982]	[0.47952]	[0.58598]
D(LNXK(-2))	-0.266786	-0.331766	0.045669	0.473934	-0.008013
	(0.18424)	(0.58158)	(0.03422)	(0.89349)	(0.02215)
	[-1.44803]	[-0.57046]	[1.33461]	[0.53043]	[-0.36172]
D(LNXK(-3))	-0.277211	0.042756	0.016260	-0.442735	-0.007602
	(0.16134)	(0.50930)	(0.02997)	(0.78245)	(0.01940)
	[-1.71813]	[0.08395]	[0.54260]	[-0.56583]	[-0.39187]
D(LNCLTG(-1))	-0.021832	0.021282	0.009453	0.014796	-0.001342
	(0.05244)	(0.16554)	(0.00974)	(0.25432)	(0.00631)
	[-0.41631]	[0.12856]	[0.97058]	[0.05818]	[-0.21284]
D(LNCLTG(-2))	0.000613	0.027065	-0.000113	-0.099800	0.000469
	(0.05197)	(0.16405)	(0.00965)	(0.25203)	(0.00625)
	[0.01179]	[0.16499]	[-0.01175]	[-0.39599]	[0.07501]
D(LNCLTG(-3))	-0.014924	0.003804	-0.014788	0.033148	-0.002422
	(0.04894)	(0.15450)	(0.00909)	(0.23736)	(0.00588)
	[-0.30493]	[0.02462]	[-1.62681]	[0.13965]	[-0.41164]
D(LNTG(-1))	-2.202407	-0.081883	-0.126555	-1.424823	0.123766
	(0.79600)	(2.51268)	(0.14784)	(3.86027)	(0.09570)
	[-2.76684]	[-0.03259]	[-0.85602]	[-0.36910]	[1.29322]
D(LNTG(-2))	0.424197	-1.570731	0.237479	-4.163244	-0.079288
	(0.84384)	(2.66370)	(0.15673)	(4.09229)	(0.10146)
	[0.50270]	[-0.58968]	[1.51524]	[-1.01734]	[-0.78151]

D(LNTG(-3))	0.977966	1.932716	0.265339	1.743448	-0.058230
	(0.87752)	(2.77001)	(0.16298)	(4.25561)	(0.10550)
	[1.11446]	[0.69773]	[1.62803]	[0.40968]	[-0.55192]
D(LNGDP(-1))	0.000184	0.012894	0.007184	-0.858183	-0.000873
	(0.01346)	(0.04249)	(0.00250)	(0.06528)	(0.00162)
	[0.01364]	[0.30344]	[2.87324]	[-13.1458]	[-0.53967]
D(LNGDP(-2))	0.026429	-0.007970	0.003969	-0.776559	-0.003107
	(0.01711)	(0.05402)	(0.00318)	(0.08300)	(0.00206)
	[1.54429]	[-0.14754]	[1.24881]	[-9.35654]	[-1.51010]
D(LNGDP(-3))	0.017907	0.020428	0.002974	-0.787471	-0.000447
	(0.01518)	(0.04791)	(0.00282)	(0.07361)	(0.00182)
	[1.17978]	[0.42637]	[1.05483]	[-10.6983]	[-0.24474]
D(CPI(-1))	2.486473	4.965960	0.220535	-7.729897	-0.714849
	(1.20742)	(3.81139)	(0.22426)	(5.85551)	(0.14517)
	[2.05932]	[1.30292]	[0.98341]	[-1.32011]	[-4.92424]
D(CPI(-2))	0.394616	1.956125	0.159371	-9.272934	-0.542199
	(1.41362)	(4.46228)	(0.26255)	(6.85547)	(0.16996)
	[0.27915]	[0.43837]	[0.60701]	[-1.35263]	[-3.19015]
D(CPI(-3))	0.456446	-0.680641	0.241909	-3.892076	-0.476005
	(1.22287)	(3.86015)	(0.22712)	(5.93040)	(0.14703)
	[0.37326]	[-0.17633]	[1.06510]	[-0.65629]	[-3.23755]
C	0.083074	0.019533	-0.002005	0.113804	0.000223
	(0.02178)	(0.06874)	(0.00404)	(0.10560)	(0.00262)
	[3.81499]	[0.28417]	[-0.49570]	[1.07765]	[0.08518]
R-squared	0.463018	0.093698	0.383723	0.907847	0.566456
Adj. R-squared	0.239275	-0.283928	0.126941	0.869450	0.385813
Sum sq. resids	0.187949	1.872783	0.006483	4.420267	0.002717
S.E. equation	0.072255	0.228083	0.013420	0.350407	0.008687
F-statistic	2.069423	0.248123	1.494351	23.64373	3.135769
Log likelihood	72.40877	12.63446	159.9486	-9.693670	182.5626
Akaike AIC	-2.169568	0.129444	-5.536486	0.988218	-6.406253
Schwarz SC	-1.569185	0.729826	-4.936103	1.588601	-5.805871
Mean dependent	0.039256	-0.003670	0.004539	-0.001533	-0.000267
S.D. dependent	0.082843	0.201290	0.014362	0.969807	0.011085

Determinant resid covariance (dof adj.)	4.13E-13
Determinant resid covariance	6.57E-14
Log likelihood	420.2836
Akaike information criterion	-13.08783
Schwarz criterion	-10.08592
Number of coefficients	80

Appendix 4: Testing for residual autocorrelation

VAR Residual Serial Correlation LM Tests
Date: 08/28/23   Time: 14:16
Sample: 2009Q1 2022Q4
Included observations: 52

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	29.40388	25	0.2474	1.206577	(25, 101.8)	0.2524
2	20.27006	25	0.7325	0.797740	(25, 101.8)	0.7363
3	23.13823	25	0.5695	0.922589	(25, 101.8)	0.5746
4	29.95221	25	0.2261	1.232185	(25, 101.8)	0.2309

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	29.40388	25	0.2474	1.206577	(25, 101.8)	0.2524
2	47.07243	50	0.5916	0.924453	(50, 103.7)	0.6147
3	88.56833	75	0.1354	1.216106	(75, 85.6)	0.1899
4	128.7121	100	0.0281	1.358338	(100, 63.2)	0.0953

*Edgeworth expansion corrected likelihood ratio statistic.

Appendix 5: Granger causality test

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 08/13/23   Time: 14:18

Sample: 2009Q1 2022Q4

Included observations: 52

Dependent variable: D(LNXK)

Excluded	Chi-sq	df	Prob.
D(LNCLTG)	0.274081	3	0.9648
D(LNTG)	8.250841	3	0.0411
D(LNGDP)	3.786517	3	0.2855
D(CPI)	5.277476	3	0.1526
All	14.20092	12	0.2881

Appendix 6: Testing for cointegration using the Johansen test

Date: 08/13/23   Time: 14:50

Sample (adjusted): 2010Q1 2022Q4

Included observations: 52 after adjustments

Trend assumption: Linear deterministic trend

Series: D(LNXK) D(LNCLTG) D(LNTG) D(LNGDP) D(CPI)

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.922336	238.2283	69.81889	0.0000
At most 1 *	0.631274	105.3494	47.85613	0.0000
At most 2 *	0.434387	53.46894	29.79707	0.0000
At most 3 *	0.261195	23.83699	15.49471	0.0022
At most 4 *	0.144169	8.095501	3.841465	0.0044

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Appendix 7: Estimation results with the VECM model

Estimation Method: Least Squares
Date: 08/13/23   Time: 14:59
Sample: 2010Q2 2022Q4
Included observations: 51
Total system (balanced) observations 51

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.373932	0.250197	-1.494549	0.0144
C(2)	-0.600827	0.261203	-2.300230	0.0277
C(3)	-0.367732	0.244852	-1.501854	0.1424
C(4)	-0.202744	0.160110	-1.266280	0.2140
C(5)	0.044433	0.061183	0.726228	0.4727
C(6)	0.063735	0.066449	0.959151	0.3443
C(7)	0.041432	0.055371	0.748265	0.4594
C(8)	-2.886743	1.012690	-2.850568	0.0074
C(9)	-1.473765	1.338333	-1.101194	0.2785
C(10)	-0.030061	1.076850	-0.027915	0.9779
C(11)	-0.074728	0.041796	-1.787930	0.0827
C(12)	-0.033210	0.030403	-1.092330	0.2824
C(13)	-0.006984	0.018196	-0.383802	0.7035
C(14)	7.358923	3.538252	2.079819	0.0452

C(15)	4.688814	2.644433	1.773089	0.0852
C(16)	2.038126	1.545788	1.318503	0.1961
C(17)	-0.005493	0.012308	-0.446293	0.6582

Determinant residual covariance	0.005113

Equation: D(LNXK,2) = C(1)*(D(LNXK(-1)) + 0.131780895312
  *D(LNCLTG(-1)) - 1.20395764003*D(LNTG(-1)) - 0.218241187477
  *D(LNGDP(-1)) + 17.8840034264*D(CPI(-1)) - 0.033017391284) +
  C(2)*D(LNXK(-1),2) + C(3)*D(LNXK(-2),2) + C(4)*D(LNXK(-3),2) +
  C(5)*D(LNCLTG(-1),2) + C(6)*D(LNCLTG(-2),2) + C(7)
  *D(LNCLTG(-3),2) + C(8)*D(LNTG(-1),2) + C(9)*D(LNTG(-2),2) +
  C(10)*D(LNTG(-3),2) + C(11)*D(LNGDP(-1),2) + C(12)*D(LNGDP(
  -2),2) + C(13)*D(LNGDP(-3),2) + C(14)*D(CPI(-1),2) + C(15)
  *D(CPI(-2),2) + C(16)*D(CPI(-3),2) + C(17)

Observations: 51

R-squared	0.708066	Mean dependent var	-0.002161
Adjusted R-squared	0.570686	S.D. dependent var	0.133660
S.E. of regression	0.087577	Sum squared resid	0.260768
Durbin-Watson stat	2.133223		

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