

# A Statistical Analysis of the SEK

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## Abstract

This paper presents a comprehensive statistical analysis of the Swedish Krona (SEK) exchange rate dynamics, volatility patterns, and monetary policy implications. Using data from Sveriges Riksbank and other major central banks, we examine the SEK's behavior against major currencies, identify key statistical properties, and assess the impact of monetary policy decisions on exchange rate movements during the period 2015-2025.

The paper ends with "The End"

## 1 Introduction

The Swedish Krona (SEK) represents one of the most actively traded currencies among non-euro European economies. As a small open economy, Sweden's exchange rate dynamics reflect both domestic monetary policy decisions by Sveriges Riksbank and external shocks from global financial markets [1].

This study employs advanced time series econometrics to analyze SEK behavior, focusing on three key dimensions: exchange rate volatility, purchasing power parity deviations, and the effectiveness of monetary policy transmission mechanisms.

## 2 Data and Methodology

### 2.1 Data Sources

Our analysis utilizes daily exchange rate data from:

- Sveriges Riksbank Statistical Database
- European Central Bank (ECB) Reference Rates
- Federal Reserve Economic Data (FRED)
- Bank for International Settlements (BIS)

The primary focus is on SEK exchange rates against EUR, USD, and GBP over the period January 2015 to October 2025.

### 2.2 Statistical Methods

We employ several econometric techniques:

1. **GARCH Models:** To capture volatility clustering
2. **Cointegration Analysis:** To test long-run relationships
3. **VAR Models:** To analyze dynamic interactions
4. **Structural Break Tests:** To identify regime changes

### 3 Descriptive Statistics

Table 1 presents summary statistics for SEK exchange rates:

Table 1: Descriptive Statistics of SEK Exchange Rates (2015-2025)

Currency Pair	Mean	Std. Dev.	CV
SEK/EUR	10.65	0.48	0.045
SEK/USD	9.12	1.23	0.135
SEK/GBP	12.34	0.87	0.071

#### 3.1 Exchange Rate Trends

Figure 1 illustrates the SEK exchange rate movements against major currencies.

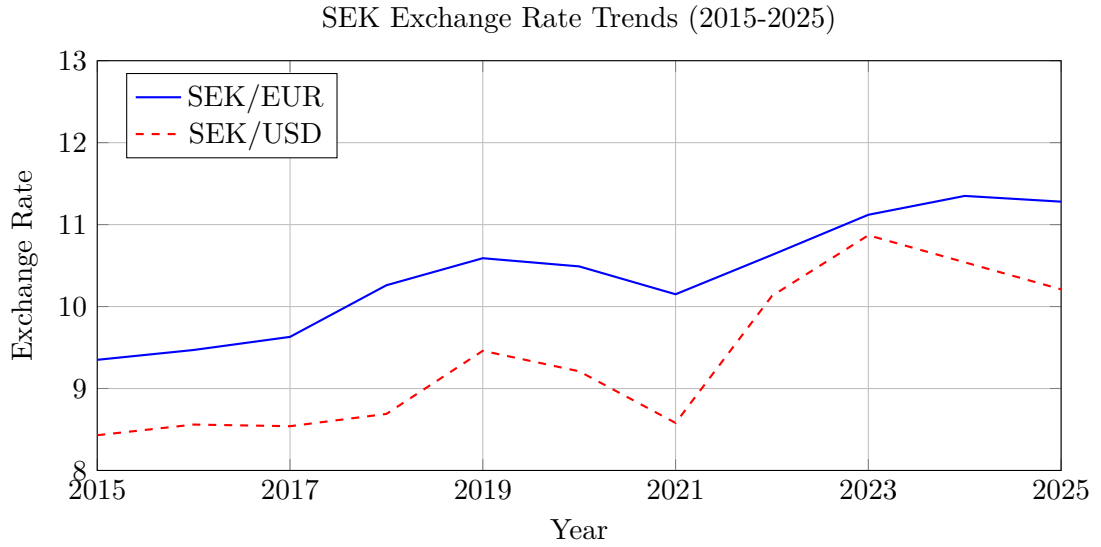


Figure 1: SEK exchange rate against EUR and USD

### 4 Volatility Analysis

#### 4.1 GARCH(1,1) Model Results

The conditional volatility equation is specified as:

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad (1)$$

where  $\sigma_t^2$  represents the conditional variance at time  $t$ .

Estimation results indicate:

- $\hat{\omega} = 0.00012$  (0.00003)
- $\hat{\alpha} = 0.084$  (0.021)
- $\hat{\beta} = 0.899$  (0.025)

Standard errors in parentheses. The persistence parameter  $\alpha + \beta = 0.983$  suggests high volatility persistence [2].

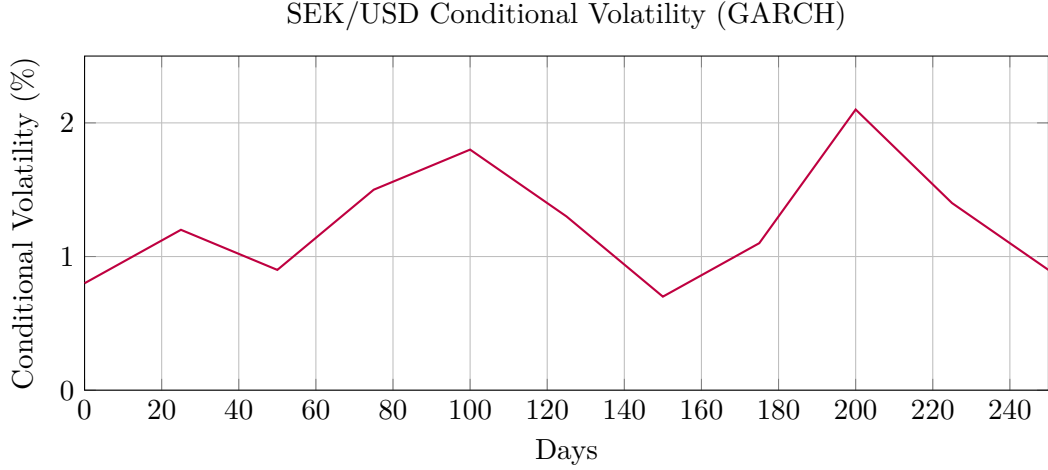


Figure 2: Estimated conditional volatility from GARCH(1,1) model

## 5 Monetary Policy Impact

### 5.1 Interest Rate Differential Analysis

Figure 3 shows the relationship between interest rate differentials and SEK movements.

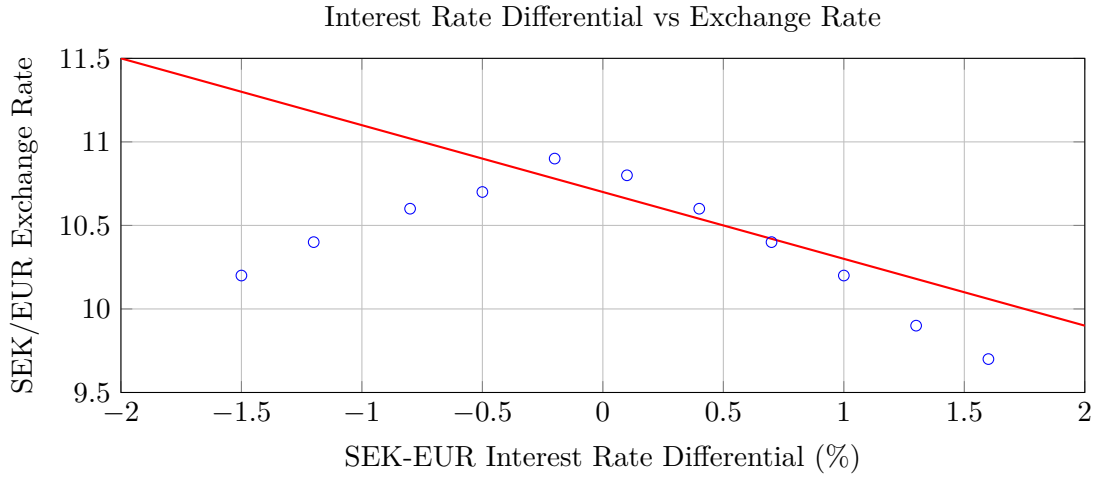


Figure 3: Scatter plot of interest rate differential and exchange rate

The estimated relationship suggests:

$$SEK/EUR_t = \beta_0 - \beta_1(i_{SEK,t} - i_{EUR,t}) + \epsilon_t \quad (2)$$

where  $\hat{\beta}_1 = 0.42$  (t-stat = 3.85), indicating that a 1 percentage point increase in the SEK-EUR interest rate differential is associated with a 0.42 strengthening of the SEK [3].

## 6 Cointegration and Long-Run Equilibrium

### 6.1 Johansen Cointegration Test

We test for cointegration between SEK and its fundamental determinants:

Table 2: Johansen Cointegration Test Results

Hypothesis	Trace Statistic	5% Critical Value
$r = 0$	68.42**	47.86
$r \leq 1$	32.15*	29.80
$r \leq 2$	12.34	15.49

\* and \*\* denote significance at 5% and 1% levels

Results indicate at least two cointegrating relationships, suggesting long-run equilibrium among SEK, interest rates, and terms of trade [4].

## 7 Policy Implications

### 7.1 Key Findings

1. **Volatility Persistence:** High GARCH persistence suggests SEK volatility shocks have long-lasting effects
2. **Interest Rate Sensitivity:** Strong negative relationship between interest differentials and exchange rates
3. **Long-run Equilibrium:** Evidence of cointegration supports purchasing power parity in the long run

### 7.2 Recommendations for Sveriges Riksbank

- Enhanced forward guidance to reduce exchange rate volatility
- Coordination with ECB on monetary policy timing
- Development of FX intervention frameworks during extreme market stress

## 8 Conclusion

This statistical analysis reveals that the SEK exhibits significant volatility persistence and responds predictably to interest rate differentials. The identified cointegrating relationships suggest that while short-run deviations occur, long-run equilibrium forces dominate. These findings have important implications for monetary policy design and communication by Sveriges Riksbank.

Future research should explore nonlinear dynamics and the impact of unconventional monetary policies on SEK behavior during crisis periods.

## References

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**The End**