FX VaR Calculator

User Manual

Value-at-Risk Calculation for Currency Portfolios

English

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1 Introduction

1.1 Purpose of the Calculator

The FX VaR Calculator is a tool for computing the Value-at-Risk (VaR) for currency positions. It has been specifically developed for analysing foreign exchange risks against the Uzbekistani Som (UZS) and is suitable for both learning purposes and practical applications in risk management.

1.2 Features

- VaR calculation using three methods: Variance-Covariance, Historical Simulation, Monte Carlo
- Expected Shortfall (CVaR) as a supplementary risk measure
- Multi-currency portfolio with diversification analysis
- Statistical key figures of exchange rate returns
- Graphical display of return distribution and time series
- CSV export and import for data analysis

1.3 Available Languages

The calculator is available in two language versions: German and Russian. Both versions have identical functionality.

2 System Requirements

2.1 Technical Requirements

The VaR Calculator is a standalone HTML file that works in any modern web browser:

- Google Chrome (recommended, version 90+)
- Mozilla Firefox (version 88+)
- Microsoft Edge (Chromium-based)
- Safari (version 14+)
- JavaScript must be enabled

2.2 No Installation Required

The calculator requires no installation and no internet connection after downloading. All calculations are performed locally in the browser.

3 Starting the Programme

3.1 Opening the File

1. Save the HTML file on your computer
2. Navigate to the location of the file
3. Double-click the file – it opens automatically in the default browser
4. Alternative: right-click → "Open with" → select browser

Tip

Create a shortcut on the desktop for quick access. The file can also be saved on a USB stick and used on different computers.

4 User Interface Overview

The user interface is divided into several areas:

Area	Description
Parameter Input	Left panel: currency selection, position size, confidence level, holding period, volatility settings
VaR Results	Main area: VaR for all three methods, Expected Shortfall, confidence intervals
Statistics	Statistical key figures: volatility, skewness, kurtosis, minimum/maximum of returns
Charts	Visualisations: exchange rate history, return distribution (histogram), VaR comparison
Portfolio	Lower section: portfolio composition, diversification effect, total VaR

Table 1: Structure of the User Interface

5 Input Parameters

5.1 Currency Selection

Select the foreign currency from the dropdown menu:

Currency	Name	Typical Volatility
USD	US Dollar	∼0.3% daily
EUR	Euro	∼0.35% daily
CNY	Chinese Yuan	∼0.25% daily
GBP	British Pound	∼0.4% daily

Table 2: Supported Currency Pairs

5.2 Position Size

Enter the notional value of your currency position in the selected foreign currency.

Example: 1,000,000 for a position of 1 million USD.

5.3 Confidence Level

The confidence level determines the statistical certainty of the VaR statement:

95% Standard value for internal risk management

99% Regulatory standard (Basel)

5.4 Holding Period

The holding period specifies the time horizon for which the risk is measured (in days).

Typical values:

- 1 day for trading portfolios
- 10 days for regulatory purposes (Basel)

5.5 Volatility

You can choose between two modes:

Historical Volatility Automatically calculated from the simulated data

Manual Input Enter your own volatility estimate (e.g. from GARCH models)

6 Results and Interpretation

6.1 VaR Values

The calculator displays VaR values for all three methods:

Method	Interpretation
Variance-Covariance	Analytically calculated VaR under the normal distribution assumption. Fast, but tends to underestimate tail risks.
Historical Simulation	VaR based on actual historical returns. Captures fat tails, but depends on data quality.
Monte Carlo	VaR derived from 10,000 simulated scenarios. Flexible, but computationally intensive and model-dependent.

Table 3: Comparison of VaR Methods

6.2 Expected Shortfall (CVaR)

The Expected Shortfall shows the average loss when the VaR is exceeded. It is always greater than the VaR and provides insight into the severity of extreme losses.

6.3 Statistical Key Figures

Volatility (σ) Annualised standard deviation of returns

Skewness Measure of asymmetry. Negative = more extreme negative returns

Kurtosis Measure of "fat tails". Values > 3 indicate higher tail risks

Min/Max Extreme values of the observed returns

7 Portfolio Functions

7.1 Adding a Position to the Portfolio

1. Select the currency and enter the position size
2. Click "Add to Portfolio"
3. The position appears in the portfolio table
4. Repeat for additional currencies

7.2 Diversification Effect

The calculator displays the diversification effect:

Undiversified VaR Sum of individual VaRs (without considering correlations)

Diversified VaR Portfolio VaR taking correlations into account

Diversification Benefit Risk reduction through diversification (in UZS and percent)

Note

The lower the correlation between currency pairs, the greater the diversification benefit. A negative correlation coefficient leads to the strongest risk reduction.

8 Data Export and Import

8.1 CSV Export

You can export the results and data as a CSV file:

1. Click “Export Data” or “Save as CSV”
2. Choose the save location
3. The file can be opened in Excel or other spreadsheet applications

8.2 Exported Data

The CSV file contains:

- Historical exchange rates
- Calculated returns
- VaR results for all methods
- Statistical key figures
- Portfolio composition (if applicable)

8.3 CSV Import

Your own historical data can be imported. The CSV format must contain two columns:

- Column 1: Date (format: YYYY-MM-DD)
- Column 2: Exchange rate
- First row: column headers

9 Frequently Asked Questions (FAQ)

Why do the VaR values differ between the three methods?

Each method makes different assumptions. The Variance-Covariance method assumes a normal distribution and therefore typically underestimates risk. Historical Simulation captures the actual distribution, and Monte Carlo depends on the chosen model.

Which method should I use?

For regulatory purposes, Historical Simulation is often preferred. For quick estimates, the Variance-Covariance method is suitable. For complex portfolios with options, Monte Carlo is recommended. Ideally, compare all three methods.

How up to date are the exchange rate data?

The calculator uses simulated historical data for demonstration purposes. For productive applications, you should import current market data (see Section 8.3).

What does a negative VaR mean?

A negative VaR is not possible and would indicate a data error. VaR is by definition a positive value representing the maximum expected loss.

Can I use the calculator offline?

Yes, after the one-time download of the HTML file the calculator works fully offline. No data is sent to external servers.

10 Troubleshooting

Problem	Solution
Page is not displayed	Enable JavaScript in the browser. Try a different browser.
Charts are missing	Clear browser cache (Ctrl+F5). Check canvas support.
CSV export does not work	Disable download blocker. Check pop-up blocker.
Calculations take a long time	Normal for Monte Carlo (10,000 simulations). Reduce the number on older devices.
Special characters displayed incorrectly	Re-download the file. Ensure UTF-8 encoding.

Table 4: Common Problems and Solutions

Disclaimer

This calculator is intended exclusively for educational purposes. The results should not be used as the sole basis for investment decisions. VaR models may under- or overestimate risk, particularly in crisis situations.

End of User Manual
