

MCP SERVER

NO CODE

CLOUD HOSTED

# Portfolio Volatility Calculator MCP

Quantify risk, prove diversification benefits.

The Portfolio Volatility Calculator finds asset risk metrics by calculating individual volatility, pairwise covariance, and total portfolio risk. It tells you exactly how different investments move together, allowing you to pinpoint diversification benefits or hidden sources of risk in your holdings.

**A+** Quality Score 100/100

volatility

covariance

risk-management

portfolio-analysis

finance-tools



# The connectivity layer between AI and the world's software.



Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

# Your AI Connections Run Through Vinkius Cloud

The world's largest  
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

*The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.*

— Architecture principle

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## Four Pillars of the Vinkius Runtime

### 01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

### 03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

### 02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

### 04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

**AES-256**

Encryption at rest

**Ed25519**

PKI vault signatures

**24h TTL**

Ephemeral session keys

**V8 Isolate**

Sandboxed execution

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## One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

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## Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

**01 — Ed25519 PKI Vault**

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

**02 — V8 Isolate Sandboxing**

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

### 03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

### 05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

### 04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

### 06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

## Emergency Kill Switch

EU AI Act Art. 14(1)  
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

#### 01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

#### 02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

#### 03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

## Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

**Control Plane**

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

**FinOps**

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

**Firewall & DLP**

PII redaction activity, sensitive data protection counters, and security event timeline.

**Agent Activity**

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

**Tool Health**

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

**Incident Log**

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at [cloud.vinkius.com](https://cloud.vinkius.com) — connect your AI agent in under 60 seconds.

# Portfolio Volatility Calculator MCP

3 tools available

Cloud-hosted on Vinkius

Assessing investment risk shouldn't require juggling spreadsheets full of complex formulas. This MCP handles specialized financial analysis by connecting directly to your workflow. You can use it to find the standard deviation for any single asset using `get_asset_volatilities`. It also generates a detailed covariance matrix, showing how every pair of assets relates in movement. Finally, you run `analyze_portfolio_risk` to get one clear number: your total portfolio volatility. This process identifies not only the overall risk level but also which specific holdings are driving that risk and which ones genuinely boost diversification. Vinkius makes connecting these complex financial models simple, letting your agent perform heavy-duty calculations in plain text.

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## Core Capabilities

### 01 — Calculate Standalone Asset Risk

Determine the individual standard deviation (volatility) for any asset you input.

### 02 — Map Pairwise Asset Relationships

Generate a matrix that quantifies how all possible pairs of assets move relative to each other.

### 03 — Determine Aggregate Portfolio Risk

Calculate the overall volatility of an entire portfolio and identify its key risk drivers.

# One Click on Vinkius — From Prompt to Execution

Available at [vinkius.com/mcp/portfolio-volatility-calculator](https://vinkius.com/mcp/portfolio-volatility-calculator) — connect your AI agent in three steps.

- 01 Provide your agent with a dataset containing returns or historical price movements for the assets you want to analyze.
- 02 Run the ``get_covariance_matrix`` tool first. This builds the foundational understanding of how all pairs of assets interact before calculating total risk.
- 03 Pass the data and weights into the ``analyze_portfolio_risk`` tool. Your agent then returns a clear measure of overall portfolio volatility, alongside recommendations on diversification.

The bottom line is that you get actionable risk reports without ever opening Excel or writing a single statistical formula.

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## Built For

Investment analysts and portfolio managers need this. If your job involves assessing the safety and potential return of mixed asset classes, this MCP cuts out the tedious math work. You're done spending hours building complex correlation models; you just ask for the answer.

### Financial Analyst

Using ``get_asset_volatilities``, they quickly check if a newly added asset is disproportionately volatile compared to the existing portfolio. They use this data to justify risk adjustments to senior staff.

### Portfolio Manager

They run the full analysis, using ``analyze_portfolio_risk`` and the covariance matrix, to prove that a specific combination of assets meets their client's mandated risk tolerance levels.

### Investment Research Associate

When comparing two different investment strategies (e.g., tech vs. healthcare), they use this MCP to quantitatively show which strategy offers better risk-adjusted returns based on asset correlation.

## What Changes When You Connect

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- 01 Pinpoint Risk Drivers: `analyze_portfolio_risk` doesn't just give you a number; it tells you *why* the portfolio is risky or safe. This helps you understand which assets need adjusting first.

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  - 02 Measure Asset Relationships: Instead of guessing, use `get_covariance_matrix` to see precisely how two assets move together. This reveals true correlation that spreadsheet models often miss.

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  - 03 Calculate Individual Risk: Quickly determine the standalone volatility for any asset with `get_asset_volatilities`. You can run this check instantly on new investments before committing capital.

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  - 04 Save Time: Skip hours of manual calculations, cross-checking formulas, and formatting risk reports. Your agent handles all the math in real time.

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  - 05 Improve Decisions: By seeing both individual volatility and total portfolio risk side-by-side, you make data-backed arguments to your team that are mathematically sound.
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## Real-World Applications

### Evaluating a new sector allocation

A Portfolio Manager needs to know if adding solar energy stocks to an existing oil and gas portfolio increases risk or stabilizes it. They use the MCP's tools to calculate the covariance between the two sectors, confirming that the pairing actually provides diversification benefits.

### Stress-testing a fund manager's strategy

An Investment Research Associate runs `analyze_portfolio_risk` against several hypothetical market downturn scenarios. The MCP identifies which combination of assets fails to meet minimum volatility standards under stress, allowing for preemptive adjustments.

### Onboarding a new asset class

A Financial Analyst receives data on crypto-assets and needs to integrate them into a traditional portfolio. They use ``get_asset_volatilities`` first to assess the extreme standard deviation of the new assets before running a full risk calculation.

### Comparing two competing investment strategies

A Portfolio Manager wants to compare Strategy A (low correlation) vs. Strategy B (high growth). By generating the covariance matrix for both, they can prove which strategy achieves better overall risk-adjusted returns.

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## Patterns to Avoid

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### Treating volatility as a single metric

#### X AVOID

Only looking at individual asset standard deviations (``get_asset_volatilities``) and assuming the highest number means the riskiest investment. This ignores how assets move together.

#### ✓ INSTEAD

Always use ``get_covariance_matrix`` first to understand pairings, then run ``analyze_portfolio_risk``. The total portfolio risk is never just the sum of individual risks.

### Ignoring asset weights

#### X AVOID

Calculating overall risk using only raw volatility numbers without assigning proper percentage weights (e.g., 60% in Asset A, 40% in Asset B). The result will be inaccurate.

#### ✓ INSTEAD

The ``analyze_portfolio_risk`` tool requires you to input the correct allocation weights alongside the covariance data. Always specify your portfolio's intended structure.

### Over-relying on correlation alone

#### X AVOID

Assuming that because two assets have a low correlation, they automatically reduce overall risk. Correlation doesn't account for magnitude or weight.

#### ✓ INSTEAD

Use the full process: run ``get_covariance_matrix`` to see the relationship, and then use ``analyze_portfolio_risk`` to factor in those weights and calculate the true impact on total portfolio volatility.

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## The Right Fit

Use this MCP if your primary goal is quantifying systemic risk across multiple, weighted assets. You need a rigorous measure of how assets move *together*—not just how volatile they are individually. If you only care about finding the maximum standard deviation for one asset in isolation, then basic statistical tools might suffice. However, when you need to prove diversification benefits or assess total

portfolio volatility based on correlations and weights, this MCP is necessary. Don't use it if you just want a simple average return calculation; that requires different inputs entirely. This tool is built for the complex math of risk modeling.

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## The Headache of Manual Risk Modeling

Today, assessing portfolio safety means pulling up spreadsheets and manually calculating covariance matrices. You spend hours inputting pairs of assets, adjusting weights, and cross-checking the resulting volatility numbers. One small mistake in a formula or an incorrect cell reference can make your entire risk assessment worthless.

With this MCP, you eliminate that manual labor. Give your agent the raw data, specify the asset weights, and it handles the complex statistical modeling instantly. You get back one clear number for total portfolio volatility—a result you can trust and use immediately.

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## Get Portfolio Volatility Calculator with `analyze_portfolio_risk`

First, the arduous process of manually calculating the relationship between every asset pair is gone. You don't need to build out a massive covariance matrix by hand or worry about weighted averages.

Now, you simply ask your agent: 'What is the total risk?' The tool runs `analyze_portfolio_risk` and delivers an immediate, comprehensive answer that pinpoints exactly which asset combination created the risk.

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# Portfolio Volatility Calculator: 3 Tools

Use these tools to calculate individual asset volatilities, understand how assets correlate using a covariance matrix, and determine the overall risk of any investment portfolio.

#	TOOL	DESCRIPTION
01	<code>analyze_portfolio_risk</code>	Calculates the combined risk of a portfolio and points out exactly what is driving that overall risk or how assets help diversify it.
02	<code>get_asset_volatilities</code>	Finds the standard deviation for every single asset you provide in the data set, giving you its standalone level of risk.
03	<code>get_covariance_matrix</code>	Generates a detailed matrix showing the relationship and movement between every possible pair of assets in your portfolio.

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## See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

**U** What is the volatility for Apple and Microsoft based on these returns:  $[[0.01, 0.02], [-0.01, 0.03]]$ ?



The individual volatility for Apple is 0.0141 and for Microsoft is 0.0212.

**U** Calculate the portfolio risk if Apple has a weight of 0.6 and Microsoft has 0.4, using this covariance:  $\{'Apple|Apple': 0.0002, 'Microsoft|Microsoft': 0.0004, 'Apple|Microsoft': 0.0001\}$



The total portfolio volatility is 0.0155. The highest risk adder is Apple and the highest diversifier is Microsoft.

**U** Show me the covariance between these two assets:  $[[0.01, 0.02], [0.01, 0.02]]$  for Asset A and Asset B.



The covariance between Asset A and Asset B is 0.0001.

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## Frequently Asked Questions

### 01 How does Portfolio Volatility Calculator calculate covariance?

The MCP uses the ``get_covariance_matrix`` tool to generate a statistical matrix. This shows how two or more assets' returns fluctuate relative to each other, which is key for understanding diversification.

### 02 Do I need weights to use `analyze_portfolio_risk``?

Yes, absolutely. The ``analyze_portfolio_risk`` tool requires you to specify the weight (percentage allocation) of each asset in your total portfolio. Without weights, the risk calculation is meaningless.

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**03 Can I find the volatility for just one asset?**

You can use `get_asset_volatilities` to calculate the standalone standard deviation for any single asset you provide data for. It's a quick, focused check on individual risk.

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**04 Does Portfolio Volatility Calculator handle non-financial assets?**

This MCP is designed specifically for financial analysis using historical return data. The tools require structured time series data suitable for calculating standard deviation and covariance.

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**05 What inputs does `get_covariance_matrix` need?**

It requires a dataset containing the returns of multiple assets over time. It then processes these returns to generate the comprehensive matrix showing all pairwise correlations.







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# Go Live in 60 Seconds

Get your connection token from [cloud.vinkius.com](https://cloud.vinkius.com), then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
 <b>Claude AI</b>	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 <b>Cursor</b>	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 <b>VS Code</b>	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"portfolio-volatility-calculator": { "url": "..." }</code>
 <b>Windsurf</b>	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 <b>ChatGPT</b>	Settings → Tools & plugins → Add MCP server → Paste endpoint
 <b>Gemini</b>	Extensions → Add MCP Server → Paste endpoint URL

## ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  **Ask ChatGPT** 
-  **Ask Claude** 
-  **Ask Perplexity** 
-  **Ask Gemini** 
-  **Ask Grok** 

READY TO CONNECT

# Portfolio Volatility Calculator is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and  
start building. No SDK. No deployment. Just results.

[Start at cloud.vinkius.com](https://cloud.vinkius.com) →

[vinkius.com](https://vinkius.com) · [support@vinkius.com](mailto:support@vinkius.com)

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### DOCUMENT INFORMATION

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