

# Advanced Economic Integration

March 27, 2025

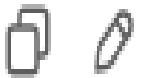
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I. Presentation by the students, and Discussion and Comments

An example:

## Show modelling for cointegration with real data



Sure! Let's walk through **cointegration modeling with real data** using Python. Cointegration is a statistical property of a collection of time series variables where a linear combination of them is stationary, even if the individual series are non-stationary.

We'll use real-world financial data — for example, **stock prices of two companies** that are potentially cointegrated, like **Coca-Cola (KO)** and **PepsiCo (PEP)** — to model cointegration.



# Step-by-Step Cointegration Modeling in Python

## 1. Import Libraries

python

📄 복사

✎ 편집

```
import yfinance as yf
import pandas as pd
import statsmodels.api as sm
from statsmodels.tsa.stattools import coint, adfuller
import matplotlib.pyplot as plt
```

## 2. Download Historical Data

python

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✎ 편집

```
start_date = '2020-01-01'
end_date = '2024-12-31'

ko = yf.download('KO', start=start_date, end=end_date)['Adj Close']
pep = yf.download('PEP', start=start_date, end=end_date)['Adj Close']

df = pd.DataFrame({'KO': ko, 'PEP': pep}).dropna()
```

### 3. Visualize the Price Series

python

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편집

```
df.plot(title='KO vs PEP Prices')  
plt.show()
```

### 4. Test for Stationarity (ADF Test)

python

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편집

```
print("ADF Test KO:", adfuller(df['KO'])[1])  
print("ADF Test PEP:", adfuller(df['PEP'])[1])
```

*If p-value > 0.05, the series is non-stationary.*

### 5. Cointegration Test

python

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편집

```
score, pvalue, _ = coint(df['KO'], df['PEP'])  
print(f"Cointegration test p-value: {pvalue}")
```

*If p-value < 0.05, the series are cointegrated.*

## 6. Estimate Cointegrating Relationship (OLS Regression)

python

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✎ 편집

```
X = sm.add_constant(df['PEP'])
model = sm.OLS(df['KO'], X).fit()
print(model.summary())
```

## 7. Get Residuals and Test for Stationarity

python

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✎ 편집

```
residuals = df['KO'] - model.predict(X)
adf_pvalue = adfuller(residuals)[1]
print(f"ADF test on residuals p-value: {adf_pvalue}")
```

## 8. Plot the Residuals

python

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✎ 편집

```
residuals.plot(title='Residuals from Cointegration Regression')
plt.axhline(residuals.mean(), color='r')
plt.show()
```



## ✓ Interpretation

- If the residuals are stationary (ADF p-value  $< 0.05$ ), KO and PEP are **cointegrated**.
  - You can now model a **pairs trading strategy** based on mean-reversion of residuals.
- 

Would you like me to run this with real data and display the results? Or would you like to try with other asset pairs (e.g., currency pairs, ETFs, etc.)?

Make a summary for this paper to the level master degree students can understand

Absolutely! Here's a **clear and concise summary** of the paper "*Global Financial Market Integration: A Literature Survey*" by Sama Haddad (2023) — tailored for **master's-level students in finance, economics, or related fields**.

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## **Summary: Global Financial Market Integration – A Literature Survey**

**Author:** Sama Haddad

**Published in:** *Journal of Risk and Financial Management* (2023)

**Objective:**

To review and analyze over **380 academic studies** on **global financial market integration** from the 1980s to 2024 — combining both qualitative and quantitative insights.

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## Key Concepts

### 1. Market Integration

Refers to the **degree to which financial markets across different countries are interconnected**, allowing capital to move freely across borders. When markets are integrated:

- Investors can diversify internationally.
- Capital costs tend to equalize.
- Financial crises may spread more quickly.

### 2. Types of Integration

The paper distinguishes three major types:

- **Equity Market Integration** (stock markets)
- **Economic Market Integration** (GDP, trade, etc.)
- **Financial Market Integration & Volatility** (linkages and spillovers)

## Structure of the Literature

The paper categorizes the vast research into **six major groups**:

Group	Focus
1. Market Segmentation	When countries' markets are isolated due to restrictions or structural differences
2. Portfolio Diversification	International investment reduces risk
3. Developed vs Emerging Markets	Comparative studies on integration levels
4. Spillovers & Linkages	How financial events in one market affect others
5. Economic Integration	Impact of trade, GDP, and policy coordination
6. Financial Integration & Volatility	Measured through co-movements and time-varying risk



# Methodologies Reviewed

## 1. Cointegration Analysis

Used to test if non-stationary time series (like stock indices or GDP) move together over the long term. Key models:

- **Engle-Granger (1987)** – two-step method
- **Johansen Test (1991)** – multivariate, VAR-based

## 2. Time-Varying Correlation Models

Analyze how relationships between markets **change over time**, especially during crises:

- **DCC-GARCH / ADCC-GARCH** models (Cappiello et al., 2006)
  - **Wavelet Analysis, Copula Models, Markov Switching**
-

## Practical Applications

- **During crises** (e.g., 1997 Asian crisis, 2008 GFC, COVID-19), correlations spike, making diversification harder.
  - **Emerging markets** (like BRICS) show increasing but still incomplete integration with developed markets.
  - Integration affects **policy decisions**, **investment strategies**, and **risk management** globally.
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## Sample Findings from Past Studies

- **Bekaert & Harvey (1995, 2003)**: Developed models of time-varying integration.
  - **Johansen cointegration tests** found long-term relationships between GDP and stock returns in multiple countries.
  - **DCC-GARCH studies** revealed stronger linkages during crisis periods and weaker ones in calm times.
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## Contributions of the Paper

- Organizes **40+ years** of research into a usable framework.
  - Highlights **seminal papers, models, and gaps** in the literature.
  - Suggests **future directions**, like studying **frontier markets, climate risk, and regional policy impacts**.
- 

## For Master's Students: Why This Matters

- Helps understand how to **measure and interpret market linkages**.
  - Offers a roadmap for **research topics or thesis ideas** (e.g., cointegration between oil prices and emerging markets).
  - Equips students with **statistical tools** like Johansen tests, VECM, GARCH models.
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Would you like me to create a visual summary slide or suggest some cointegration modeling exercises using actual data (for class or thesis work)?