# How Does Coffee Price Volatility Affect the Net Income of Mexican Producers?

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**This research was conducted as part of a bachelor's thesis**

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## Relevance

Nearly 80% of coffee producers in Mexico earn less than €300 net per month (TEEB, 2025)

In Mexico, over **500,000 families** depend on coffee production (SADER, 2025), yet face persistent economic uncertainty due to price instability. This volatility constrains financial planning, investment, and long-term sustainability across the value chain. This research examines the effect of coffee price volatility on the net income of Mexican producers, a gap insufficiently addressed in the existing literature.

This research covers the four main coffee-producing states in Mexico (Chiapas, Oaxaca, Veracruz and Puebla)

## Overview

**Research Question:** How does coffee price volatility affect the net income of Mexican producers?

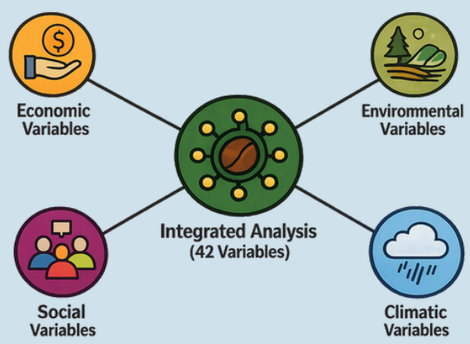
**Objectives**

- Examine the relationship between net income and price volatility.
- Identify periods of highest volatility.
- Analyze regional differences across producing states.
- Determine economic, natural, social, and climatic drivers of prices and income.

**Hypothesis:** Price volatility negatively affects net income, even during periods of rising international prices.

## Methodology

This study follows a quantitative and descriptive research design, combining primary and secondary data sources. Primary data were collected through interviews with 192 coffee producers as part of the TEEB AgriFood Mexico project.



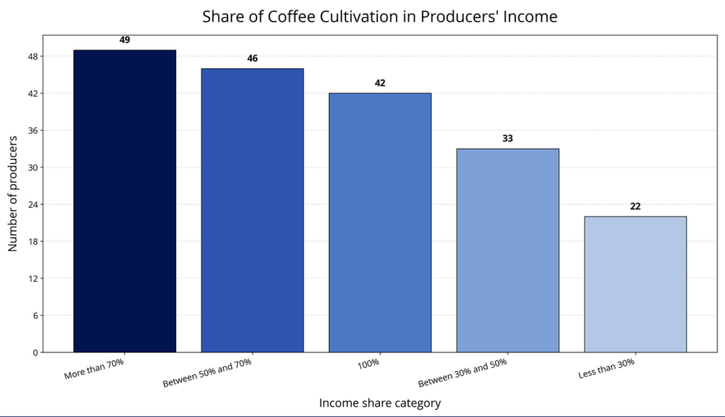

Secondary data were obtained from the International Coffee Organization and Agri-Food and Fisheries Information Service of Mexico.

These sources were used to analyze the historical behavior of coffee prices and their volatility **over the period 1990–2024**.
The methodological approach includes exploratory data analysis, descriptive statistics, time series analysis, and regression techniques.

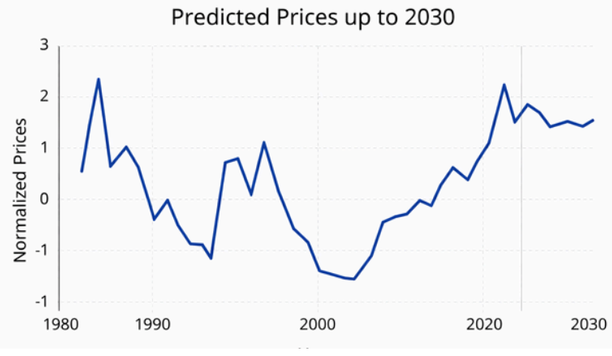

Variables were standardized using Z-scores to ensure comparability across scales. Price volatility was analyzed at both the national and international levels. Non-linear models more effectively captured interactions among productive, climatic, and market factors.

## Results

Coffee price volatility directly affects producers' net income, driven by shifts in global supply, climate conditions, and market fluctuations.








| Model | MAE | RMSE | $R^2$ | MAPE (%) |
|---|---|---|---|---|
| Multiple Linear Regression | 78,400.00 | 102,900.00 | 0.17 | 45.6 |
| Random Forest Regressor | 51,300.00 | 72,000.00 | 0.54 | 29.3 |
| Gradient Boosting Regressor | 41,800.00 | 63,400.00 | 0.61 | 24.7 |
| XGBoost Regressor | 25,400.00 | 49,700.00 | 0.75 | 14.1 |

## Conclusion

This study demonstrates that the **net income of Mexican coffee producers is closely associated with coffee price volatility**. It contributes new evidence for the Mexican context, particularly regarding regional income patterns and the applicability of machine learning models for projecting future income scenarios.

From a practical standpoint, these findings can support producers and policymakers in designing more effective commercialization strategies, risk mitigation mechanisms, and sectoral support policies.

## Next Steps

- Expand the producer sample
- Improve data collection in remote areas
- Translate findings into policy instruments
- Develop decision-support tools for producers as a next step

## Sources

**Related literature**

- TEEB AgriFood Mexico. (2025). Socioeconomic information, organization, production, and costs. Aggregated database: general information. *http://teebafcafe.geolab.mx/*
- International Coffee Organization. (2024). New historical data. *https://www.ico.org/es/new-historical-c.asp*
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The Economics of Ecosystems & Biodiversity