Tropentag, September 16-18, 2026, hybrid conference

"Towards multi-functional agro-ecosystems
promoting climate resilient futures"

Certification, climate risk, and farmer vulnerability: Evidence from coffee systems in Rwanda

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Abstract

Agricultural certification schemes are widely promoted as tools to enhance sustainability and improve farmers' ability to cope with climate-related risks. However, evidence on whether certification reduces farmers' vulnerability to shocks remains limited. This study examines the relationship between certification, climatic conditions, farm practices, and shock outcomes among coffee farmers in Rwanda. Using detailed household survey data combined with historical weather indicators, we analyse the pathways linking exogenous climate conditions, certification, farm practices, and shock outcomes. We first show that certification is not systematically correlated with climatic risk, supporting its treatment as conditionally exogenous. We then estimate a sequence of models capturing shock occurrence, severity, coping and mitigation responses. Across all specifications, higher temperatures are consistently associated with greater shock incidence, intensity, severity, and adaptive responses, highlighting the central role of climatic stress. Importantly, these outcomes are self-reported by farmers, yet their strong alignment with objective temperature data provides external validation of perceived climate impacts. In contrast, certification status does not significantly affect any dimension of vulnerability or response behaviour. While certified farmers are more likely to adopt certain agronomic practices, these do not translate into measurable reductions in shock or severity. The role of farm practices is more nuanced. Resistant coffee varieties do not show a statistically significant association with shock outcomes in this specification, suggesting that their protective effect may be limited once other factors are controlled for. Some other practices, such as pruning, are more strongly associated with mitigation responses, suggesting reactive rather than preventive adaptation. Overall, the findings suggest that while certification may influence farmer behaviour, it does not safeguard farmers against climatic risks. This points to a gap between promoted practices and effective risk-reduction under real-world conditions.

Keywords: Climate change, coffee, Rwanda, voluntary sustainability standard (VSS)

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