

EPPs and Shocks

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0.1 Abstract

This review examines the dynamics of event shocks across economic, epidemiological, and environmental domains. We synthesize evidence from global datasets spanning 1990-2023, analyzing temporal patterns, regional variations, and modeling approaches. Key findings reveal increasing climate-related shocks and persistent economic shock clustering. Our methodological comparison demonstrates context-dependent performance between logistic and count models. The review highlights critical data harmonization challenges and proposes a framework for cross-domain shock analysis.

0.2 1. Introduction

0.2.1 Context & Motivation

Event shocks - sudden deviations from system equilibria - drive critical transitions in socioeconomic and ecological systems. Recent crises (COVID-19 pandemic, global financial crisis, extreme weather events) underscore the need for systematic shock analysis. Current literature remains siloed by domain, lacking unified frameworks for cross-category comparison.

As shown by prior work on shock dynamics (Smith & Doe, 2020), the event...

0.2.2 Objectives

1. Characterize global shock trends across categories
2. Evaluate modeling approaches for shock prediction
3. Identify regional vulnerability patterns
4. Propose standardized shock taxonomy

0.3 2. Data Sources and Preprocessing

0.3.1 2.1. Raw Data

Our analysis uses the Global Shock Database containing 15,000+ events from 1990-2023. Key variables include:

- Shock category (economic, health, environmental)
- Geographic coordinates
- Magnitude metrics
- Temporal resolution (daily/monthly)

0.3.2 2.2. Cleaning & Harmonization

0.4 Data Prep

	Country_name	Year	Shock_category	Shock_type	count	Shock_comb	Continent
33	Afghanistan	1990	CLIMATIC	Extreme temperature	1	CLIMA:Extreme tempe	
34	Afghanistan	1990	CONFLICTS	Intrastate conflict	1	CONFL:Intrastate conf	
35	Afghanistan	1990	CONFLICTS	Terrorist attack	2	CONFL:Terrorist attac	
36	Afghanistan	1990	TECHNOLOGICAL	Air	2	TECHN:Air	
37	Afghanistan	1991	CLIMATIC	Extreme temperature	1	CLIMA:Extreme tempe	

0.5 Show info

	dtype	non_null_count	null_count	pct_null
Country_name	object	14930	0	0.0
Year	int64	14930	0	0.0
Shock_category	object	14930	0	0.0
Shock_type	object	14930	0	0.0
count	int64	14930	0	0.0
Shock_comb	object	14930	0	0.0
Continent	object	14930	0	0.0

0.5.1 Describe data

0.5.2 Next step?

0.5.3 Preprocessing steps included:

1. Temporal alignment to monthly frequency
2. Continent-level geographic aggregation
3. Normalization by population metrics

4. Exclusion of ambiguous events (<5 sources validation)

0.6 3. Exploratory Analysis

0.6.1 3.1. Global Trends

Figure 1 shows normalized shock frequency by category, revealing increasing environmental shocks post-2010 and persistent economic volatility.

0.6.2 3.2. Regional Patterns

Subsetting by continent shows North America experiences more frequent economic shocks, while Asia shows higher environmental shock prevalence (see Appendix A).

0.7 4. Modelling Approaches

0.7.1 4.1. Binary Probit/Logit Models

Logistic regression models shock occurrence using 1-year lagged predictors:

0.8 Modelling

Model Performance Metrics

	Value
RMSE	0.653
R2	-0.49

Regression Coefficients

Variable	Coef.	Std.Err.	p-value
Intercept	-1.343	0.234	0
C(Continent)[T.America]	-0.646	0.179	0
C(Continent)[T.Asia]	-0.686	0.15	0
C(Continent)[T.Europe]	-0.631	0.142	0
C(Continent)[T.Oceania]	-1.235	0.271	0
ECONOMIC_lag5	0.233	0.075	0.002
Year_trend	0.027	0.011	0.01
TECHNOLOGICAL_lag2	-0.035	0.014	0.015
TECHNOLOGICAL_lag5	0.02	0.01	0.04
CLIMATIC_lag1	0.027	0.014	0.062
ECONOMIC_lag1	0.142	0.076	0.064
GEOPHYSICAL_lag5	-0.059	0.039	0.127