EPPs and Shocks

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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.

2 1. Introduction

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…

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

3 2. Data Sources and Preprocessing

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)

3.2 2.2. Cleaning & Harmonization

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

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

5.1 Describe data

5.2 Next step?

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)

6 3. Exploratory Analysis

6.1 3.1. Global Trends

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

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).

7 4. Modelling Approaches

7.1 4.1. Binary Probit/Logit Models

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

8 Modelling

Model Performance Metrics

	Value
RMSE	0.6
R2	-0.26

Regression Coefficients

Variable	Coef.	Std.Err.	p-value
Intercept	-0.923	0.129	0
C(Continent)[T.America]	-0.679	0.18	0
C(Continent)[T.Asia]	-0.731	0.151	0
C(Continent)[T.Europe]	-0.674	0.141	0
C(Continent)[T.Oceania]	-1.293	0.263	0
ECONOMIC_lag5	0.225	0.073	0.002
TECHNOLOGICAL_lag2	-0.034	0.014	0.015