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## Cover Page

Title of presentation: **Development and Peace: Cause, Consequence and Effects**

Authors: **Shahriar R Kibriya**

Conflict & Development Center

Assistant Director, Texas A&M University

Shahriar@tamu.edu

**Yu Zhang**

Department of Agricultural Economics

Graduate student, Texas A&M University

zhangyu523@tamu.edu

**David Bessler**

Department of Agricultural Economics

Professor, Texas A&M University

D-bessler@tamu.edu

**Edwin Price**

Department of Agricultural Economics

Professor, Texas A&M University

Ec-price@tamu.edu

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# Development and Peace: Cause, Consequence and Effects

Shahriar R Kibriya  
Conflict & Development Center  
Assistant Director, Texas A&M University  
Shahriar@tamu.edu

Yu Zhang  
Department of Agricultural Economics  
Graduate student, Texas A&M University  
zhangyu523@tamu.edu

David Bessler  
Department of Agricultural Economics  
Professor, Texas A&M University  
D-bessler@tamu.edu

Edwin Price  
Department of Agricultural Economics  
Professor, Texas A&M University  
Ec-price@tamu.edu

## ABSTRACT

Conflicts push back development endeavors of a society by many years. The authors attempt to investigate the dynamic effects of conflicts on development, as well as the causal relationships among conflicts, development and foreign assistance, by using Panel-VAR and directed acyclic graphs (DAG) methods.

## OVERVIEW

- Economic growth is reduced by 2.3% per year on average due to conflicts (Collier, 2007). State fragility and conflict exact terrible tolls on over 600 million people across the world (World Bank, 2010).
- To mitigate conflict and alleviate poverty, OECD countries have allocated \$135 billions of dollars into recipient countries in 2011, U.S. donated \$31 billions (Milner and Tingley, 2012).

## PROBLEM STATEMENT

- The macro-level research addressing the nexus of conflict, poverty and foreign assistance is lacking.
- What are the dynamic and contemporaneous causal relationships among conflict, foreign assistance and development?

## Research Approach and Data

### Theoretical Motivation

- We employ Panel-VAR to study the dynamic relationships of conflict, poverty and foreign assistance through panel data on variables related to conflict, poverty, development and foreign assistance.
- We also use DAG (Directed Acyclic Graph) to discover the contemporaneous causal relationships of conflict, poverty and foreign assistance.

### Empirical Motivation

- We use an inductive causation method to work around the endogeneity problem related with foreign assistance and conflicts.

### Data

- Yearly Data on 93 developing countries from 1995 to 2010.
- Variables include: conflict fatalities, children mortality, GDP, State Fragility Index, Hunger, Foreign Aid.
- Data on international/multi party conflict fatalities were collected from the Uppsala University database.
- Data on foreign aid was collected from OECD Database.
- Data on development indicators was collected from World Bank's various databases and the Penn World Table.
- Data on state fragility indicator was collected from Center for Systemic Peace.

## Theoretical Model Assumptions and Structure

Conflict, development and foreign aid are mutually affected by each other, leading to subsequent responses dynamically.

- Start with a Panel Vector Auto-Regression Model. Employ a time varied system of equations until we reach an optimal point.
- Each variable is tested as explained variable and examine the significant relationships with others.
- Discover how and if variable X responds to a one time shock to variable Y through Impulse response.
- Use Bayesian Networks and Graphical models to discover contemporaneous causal relationships.
- Use Variance decomposition method to predict what percentage variation of Y will be caused by X in future, controlled for country and time.
- Provide policy recommendations.

## Objective

To discover the dynamic and contemporaneous causes, consequences and effects of foreign aid, poverty and conflicts of the developing countries.

## Panel VAR Model

Panel VAR Function

$$Y_{i,t} = \alpha_i + \beta_t + \Gamma(L)Y_{i,t} + e_{i,t}$$

$\Gamma(L) = \Gamma_1 L + \Gamma_2 L^2 + \dots + \Gamma_p L^p$  is a polynomial in the lag operator, where the lag length  $p$  is selected by information criteria.  $\alpha_i$  is a country specific fixed effect,  $\beta_t$  is year specific effect, and  $e_{i,t}$  is a time and country varying error term.

Time demeaned transformation to eliminate the country effects:

$$y_{it} - \bar{y}_i = \beta_1(x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i, t = 1, 2, \dots, T,$$

Forward mean differencing transformation to eliminate the time effects:

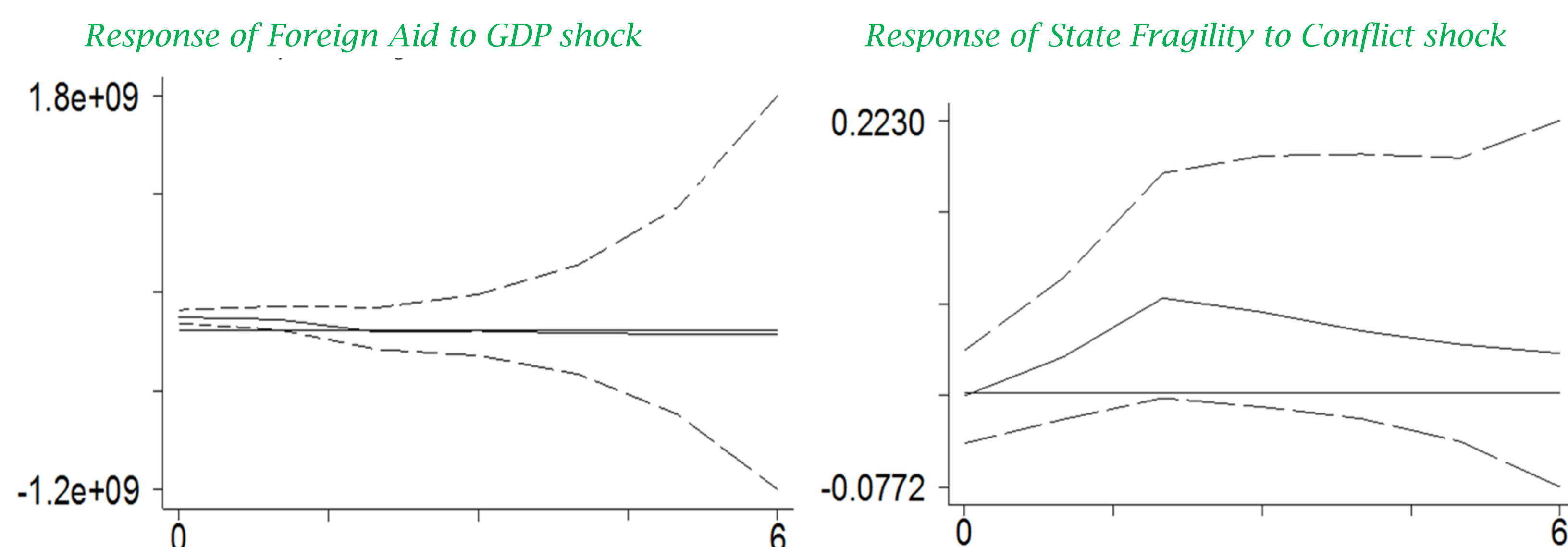
$$Y_{i,t}^* = \delta_{i,t}(Y_{i,t} - \bar{Y}_{i,t}) \text{ Where } \delta_{i,t} = \sqrt{(T_i - t)/(T_i - t + 1)}$$

## Variance Error Decomposition

	Year	conflict	Mortality	GDP	StateFragility	Hunger	ForeignAid
conflict	20	0.70299	0.031997	0.200514	0.01404884	0.049266	0.0011838
Mortality	20	0.001464	0.375899	0.549028	0.02480349	0.048703	0.000102
GDP	20	0.000215	0.075083	0.795149	0.03765836	0.091894	1.33E-06
StateFragi	20	0.010351	0.035718	0.25494	0.66523426	0.031052	0.0027059
Hunger	20	0.000141	0.06052	0.652252	0.06052561	0.226029	0.0005322
ForeignAi	20	0.043873	0.028858	0.037541	0.01194766	0.036987	0.8407927

## Graphical Analysis

Two typical Impulse Response graphs illustrate that how one variable responds to the shock of another variable:



## DAG Methodology

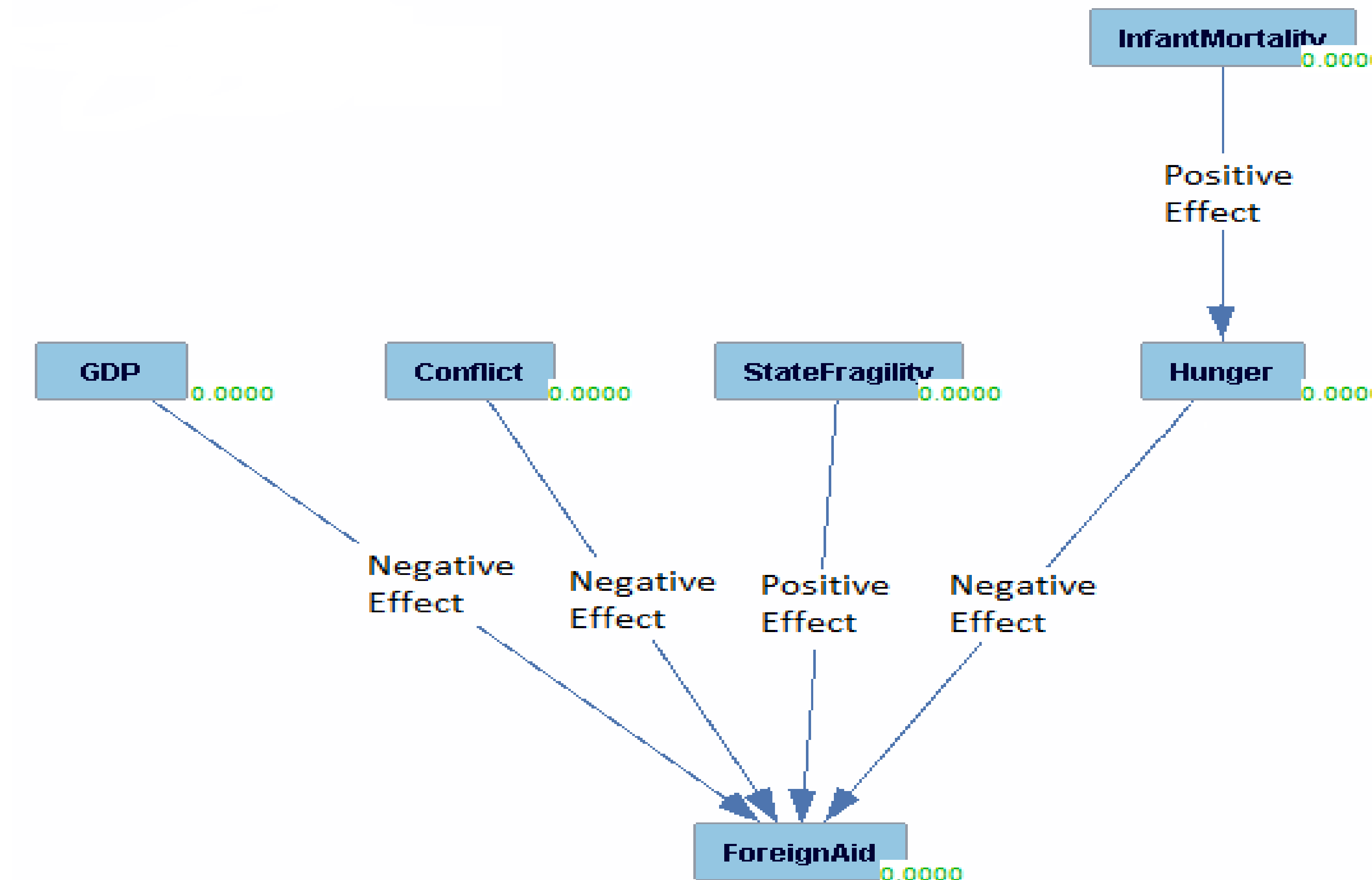
Directed acyclic graph (DAG) shows causal relationships among a set of variables by using arrows and vertices. The algorithm is based in asking for the true of independence relationships of the form:

$$I(X_i, X_j | A), \text{ where } A \text{ is a subset of variables.}$$

A graph is an ordered triple  $\langle V, M, E \rangle$  where  $V$  is a non-empty set of vertices (variables),  $M$  is a non-empty set of marks (symbols attached to the end of undirected edges) and  $E$  is a set of ordered pairs. Each member of  $E$  is called an edge. Vertices connected by an edge are said to be adjacent. Edges are removed if correlations or conditional correlations are equal to zero. The remaining edges illustrate the conditional independence. Conditional independence in DAG is shown as:

$$P(V_1, V_2, \dots, V_n) = \prod_{j=1}^n P(V_j | pa_j)$$

## Contemporaneous Relationships portrayed by DAG Graph



## Conclusions and Suggestions

- ✓ Every variable is significantly affected by its most recent past.
- ✓ Foreign aid is negatively influenced by conflict in the short run; but they are mutually affected in the long run.
- ✓ State fragility plays a significant role in explaining hunger and infant mortality.
- ✓ When looking beyond 20 years, economic growth is the most powerful tool to mitigate poverty and conflicts.