The gravity models for trade research

ARTNeT Capacity Building Workshop on

"the Use of Gravity Modelling"

19-22 March 2013 ESCAP Bangkok, Thailand

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Outline

- The intuitive gravity model and its problems
- Theoretical Gravity models
- Estimating theoretical gravity models
 - FE approach
 - Baier-Bergstrand approach
- Often-made mistakes

The intuitive gravity model

What is the gravity model?

- Gravity model is a very popular econometric model in international trade
- The name came from its utilizing the gravitational force concept as an analogy to explain the volume of bilateral trade flows
 - Proposed by Tinbergen (1962)
- Initially, it was not based on theoretical model, but just intuition only
- Later on, a range of rigorous theoretical foundation has been given.
 - The most well-known benchmark so far is Anderson and van Wincoop (2003).

Gravity Analogy

Gravity force equation

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^2}$$

Gravity force between two objects depends on their masses and inversely proportional to the square of distance between them. Intuitive gravity for trade

$$X_{ij} = C \frac{Y_i Y_j}{t_{ij}}$$

 $X_{ij} = \text{exports}(\text{or trade}) \text{from i to } j$,

C = contstant,

 $Y = \text{economicmass}(\approx \text{GDP}),$

t = tradecosts between two countries

≈ distance, adjacency,., "policyfactors".

Export (or trade) between two countries depends on their economic masses and negatively related to trade costs between them.

Intuitive gravity model of trade: $X_{ij} = C \frac{Y_i Y_j}{t_{ij}}$

- Larger countries trade more than smaller ones
- Trade costs between two trade partners reduce trade between them.

Empirical equation for basic gravity model:

$$\ln X_{ij} = b_0 + b_1 \ln(Y_i) + b_2 \ln(Y_j) + b_3 \ln(t_{ij}) + e_{ij}$$
$$b_1, b_2 > 0; \ b_3 < 0$$

A 1% change in Y_i is associated with a b_1 % chage in X_{ij} .

Proxies for trade costs

- Distance
- Adjacency
- Common language
- Colonial links
- Common currency
- Island, landlocked
- Institutions, infrastructures, migration flows,...
- Bilateral tariff barriers

'hy is it so popular?

[,] appealing

some important stylized facts

use real data to explain trade respect to policy factors.

n using OLS

