UNIVERSITA' DEGLI STUDI DI MILANO
Dipartimento di Economia, Management e Metodi Quantitativi

Food Security, Health and Trade Liberalization

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3rd AIEAA Conference "Feeding the Planet and Greening Agriculture: Challenges and opportunities for the bio-economy", Alghero (SS) June 25-27, 2014

Outline

- **Introduction & motivation**
- Previous evidence
- Empirical strategy and data
- Main results
- Conclusions

Introduction and motivation

- Past half-century marked improvement in food security and health conditions…
- However, still vast difference across and within countries
- Food security/health determinants studied mainly at micro-level and with country case-study
- Less attention to macro determinants:
  - Macro-economic shocks
  - Political and institutional reforms
  - **Trade policy reforms**

Introduction and motivation

- **Key research question**:
  - *Do trade liberalization improve food security/health outcomes ?*
  - This is a complex research question, because
    - No clear prediction from trade theory
    - Results often country or regional specific
    - Problems in the definition of both the outcome and the treated variable (trade reforms)

Introduction and motivation

- **Prediction from trade theory**
  - Trade is important for food security
    - Trade balance domestic food demand and supply
    - Trade increase the efficiency allocation of resources
    - Creates new opportunities for innovation and productivity growth
  - Trade could be detrimental for food security
    - Creates winner and loser, increasing inequality
    - Negative effect on the income of consumers and/or of producers of import-competing crops
    - Increase risk through imported price volatility

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Previous evidence

- Food security & trade literature
  - Meta-analysis
    - Mc Corriston et al. (2013) out of 34 studies: in 13 (**+**), 10 (**-**) and the remaining 11 (**mixed**)
  - Cross-country studies
    - Arcand and Hombres (2004), openness **weak** + effect;
    - Bezuneh and Yiheyis (2009), openness short-run (**-**), long-run (weakly **+**)
- Health & trade literature
  - Cornia et al. (2008), Blouin et al. (2009): globalization **not good** for health, due to dietary problems
  - Anukriti and Kumler (2012), infant mortality **declined relatively slowly** in India's districts more exposed to tariff reform (DiD)

Previous evidence

- **Our contribution**
  - Broad coverage, **40 reform** episodes (1970-2010) in Asia, Africa, Latina America and Middle East
    - We use the extended Wacziarg and Welch (2008) index of trade liberalization (Sachs-Warner)
  - We use the **Synthetic control method** a long the line of Billmeier and Nannicini (2013)
    - It represents a bridge between country case-study and cross-country econometric

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Empirical strategy

- **Synthetic control method (Abadie & Gardeazabal 2003; Abadie et al. 2013)**
  - It is a quasi-experimental tool for comparative case studies, closed in spirit to matching
    - Objective: to build the "best" counterfactual (synthetic control) to compare the treated unit (reforming country)
  - Has been developed for case-study, namely situation where we have few treaded units

Empirical strategy

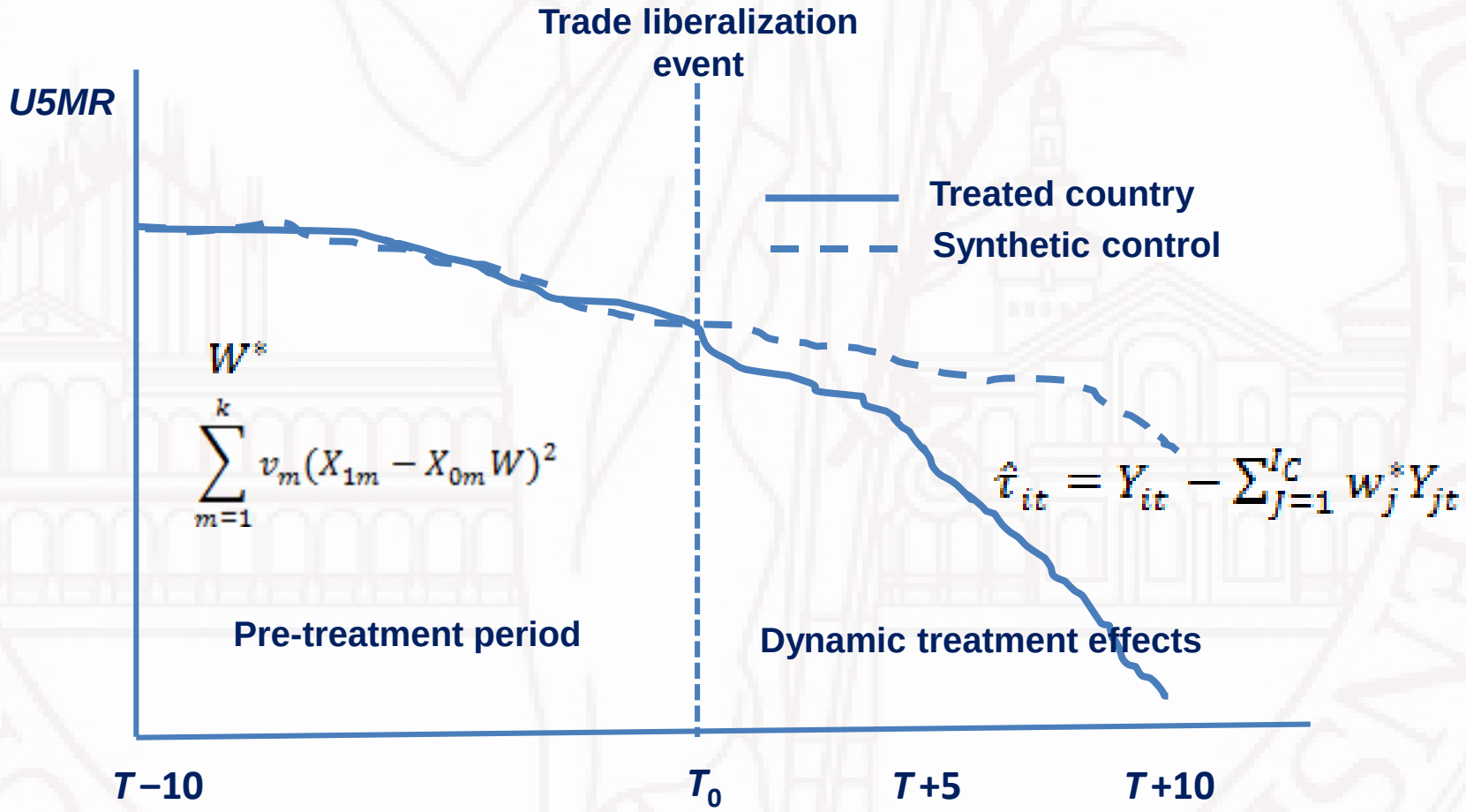
- **Synthetic counterfactual analysis**
  - Let X_1 be a (K X 1) vector of pre-treatment values of K predictors of food security
  - Let X_0 be a (K X J) matrix which contains the values of the same variables for the J possible control countries
  - Let V be a diagonal matrix with nonnegative components
    - The values of the diagonal elements of V reflect the relevant importance of the food security predictors
  - The vector of weights W is chosen to minimize:
    - $(X_1 - X_0W)'V\,(X_1 - X_0W)$ subject to $w_j \geq 0$ (j = 1, 2,…,j) and $w_1 + \ldots + w_J = 1$

Empirical strategy

- **SCM in practice**
  - To study the trade reform effect on food security/health outcomes
  - We build a **counterfactual** (synthetic control) as a **weighted average** of "all" untreated countries
    - Based on pre-treatment values of **FS predictors *X*** (including values of the outcome)
    - Minimizes the sum of square differences in the predictors between treated and untreated units
  - The **treatment effect** is evaluated by comparing the trajectory **of post-reform** outcomes of treated countries with that of the synthetic control

Empirical strategy

- **SCM in practice**



Empirical strategy

- **Synthetic control method**
  - Advantages over DiD
    - **Transparent** (and better) counterfactual
    - Control for unobserved **time-variant** heterogeneity
    - **Dynamic** treatment effect (short- & long-run effects)
  - Disadvantages:
    - Only **overall effect**, impossible to disentangle direct and indirect effects
    - Given the few number of observations, statistical **inference is problematic**
      - Normally overcome by **placebo tests** (fake experiments)

Data

- **Sample:** 80 developing countries with data (1960-2010) of which 40 treated
- **Treatment variable:** trade liberalization index based on Wacziarg and Welch (2008)
- A country is **closed** to international trade when:
  - overall average tariffs exceed 40 percent
  - non-tariff barriers cover more than 40 percent of its imports
  - it has a socialist economic system
  - the black market premium on the exchange rate exceeds 20 percent
  - much of its exports are controlled by a state monopoly

Data

- **Outcome variable**: under-five mortality rate (U5MR) from UN
  - It is a **health** indicators,… key advantages are disposability (from ‘60) and yearly variation,…
- **Controls *X***:
  - Log *per-capita* GDP (Penn World Table)
  - Share of Rural population (FAO)
  - Population growth (Penn World Table)
  - Female primary years of schooling (Barro&Lee)
  - Frequency of wars and conflicts (Kudamatsu)
  - Pre-treatment values of U5MR at T–10, T–5 and T_0

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Main results

- Negative relation: trade reforms **reduced** U5MR
  - **20 Countries** (out of 40)
    - 4 Asian (out of 6); 5 African (out of 18); 7 Latin American (out of 12); 4 Middle-East & North-Africa (out of 4)
- No impact: trade reform **no effect** on U5MR
  - **19 Countries**
- Positive relation: trade reform **increased** U5MR
  - **1 Country**
    - South Africa (1991), largely due to the post-treatment HIV/AIDS diffusion

Results

Covariates and average effects for two Asian Countries

	Indonesia 1970	Synthetic Control	Bangladesh 1996	Synthetic Control
War	0.10	0.08	0.00	0.03
Log GDP per-capita	6.52	6.82	6.58	6.61
Rurale population	0.84	0.79	0.87	0.89
Population growth	0.03	0.03	0.02	0.02
Primary school	8.85	6.82	9.49	3.61
U5MR T_0	165.20	165.23	108.10	109.43
U5MR T+5	139.89	148.30	83.59	82.95
U5MR T+10	120.00	135.02	63.40	59.66
RMSPE		0.23		1.28

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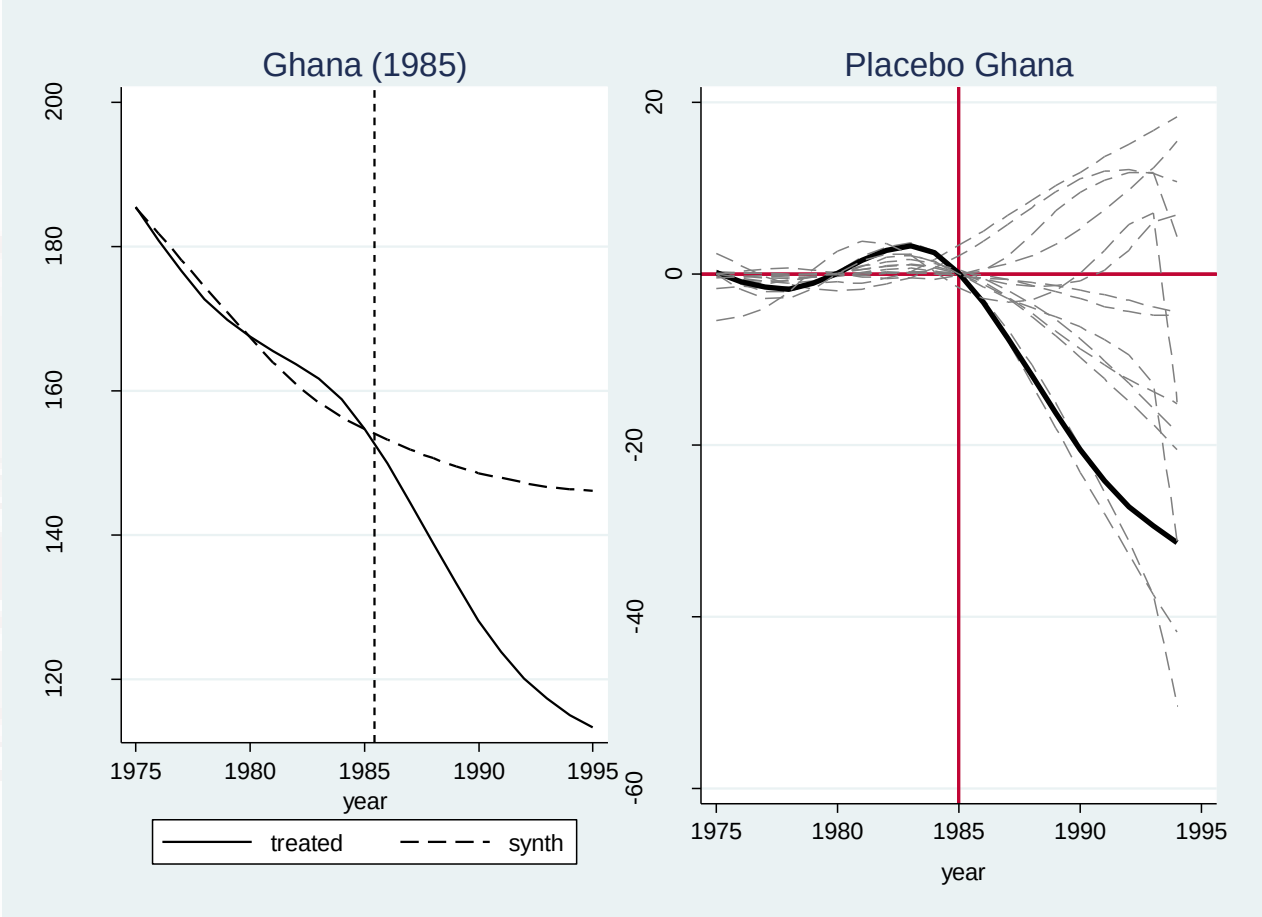
Results

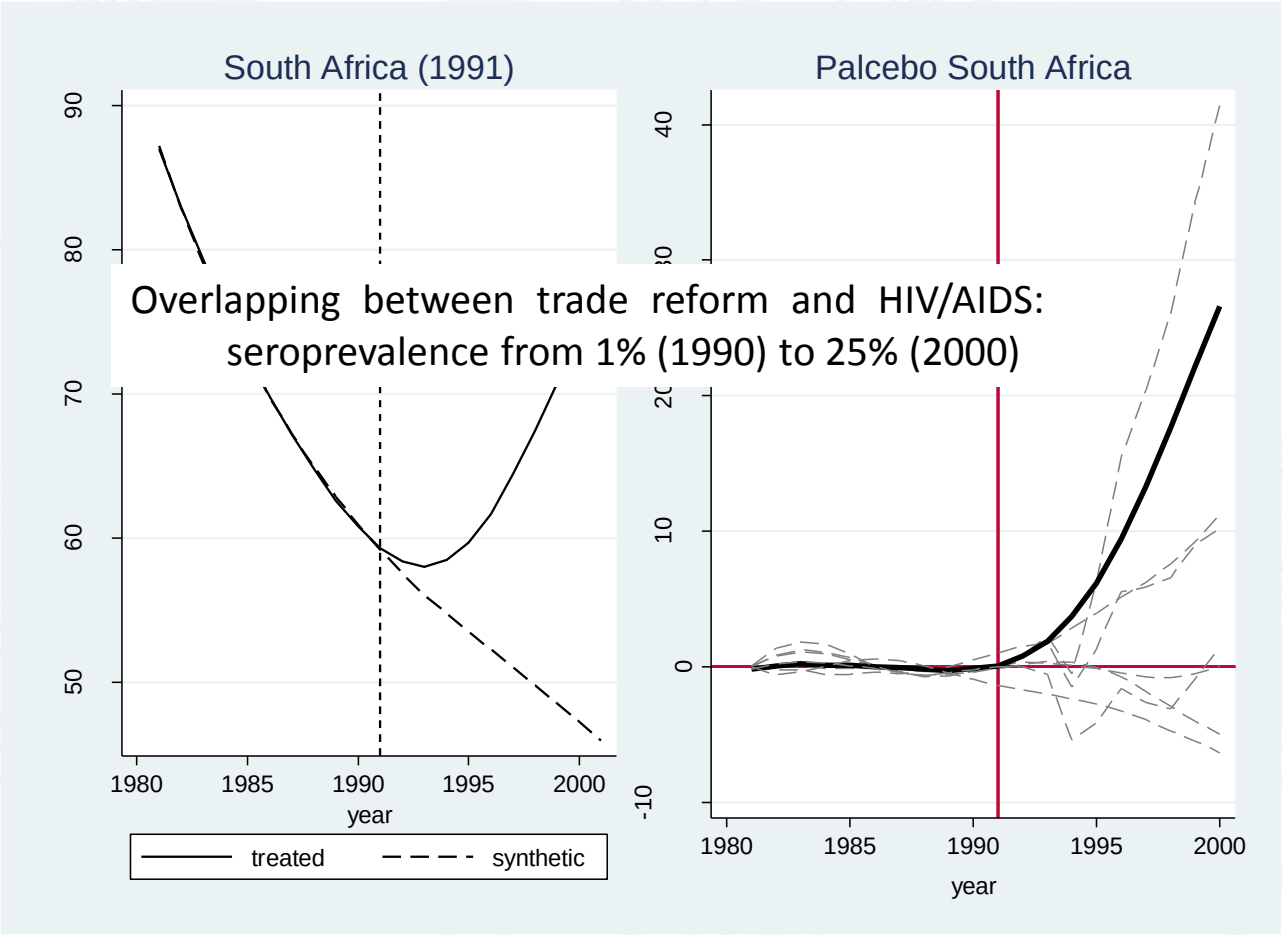
Ghana SCM and Placebo test



Synthetic Ghana: Centrafrica Rep. (0.212); Congo Dem. Rep. (0.341); Malawi (0.079); Panama (0.033); Papua New Guinea (0.145); Sierra Leone (0.172); Siria (0.017).

Results

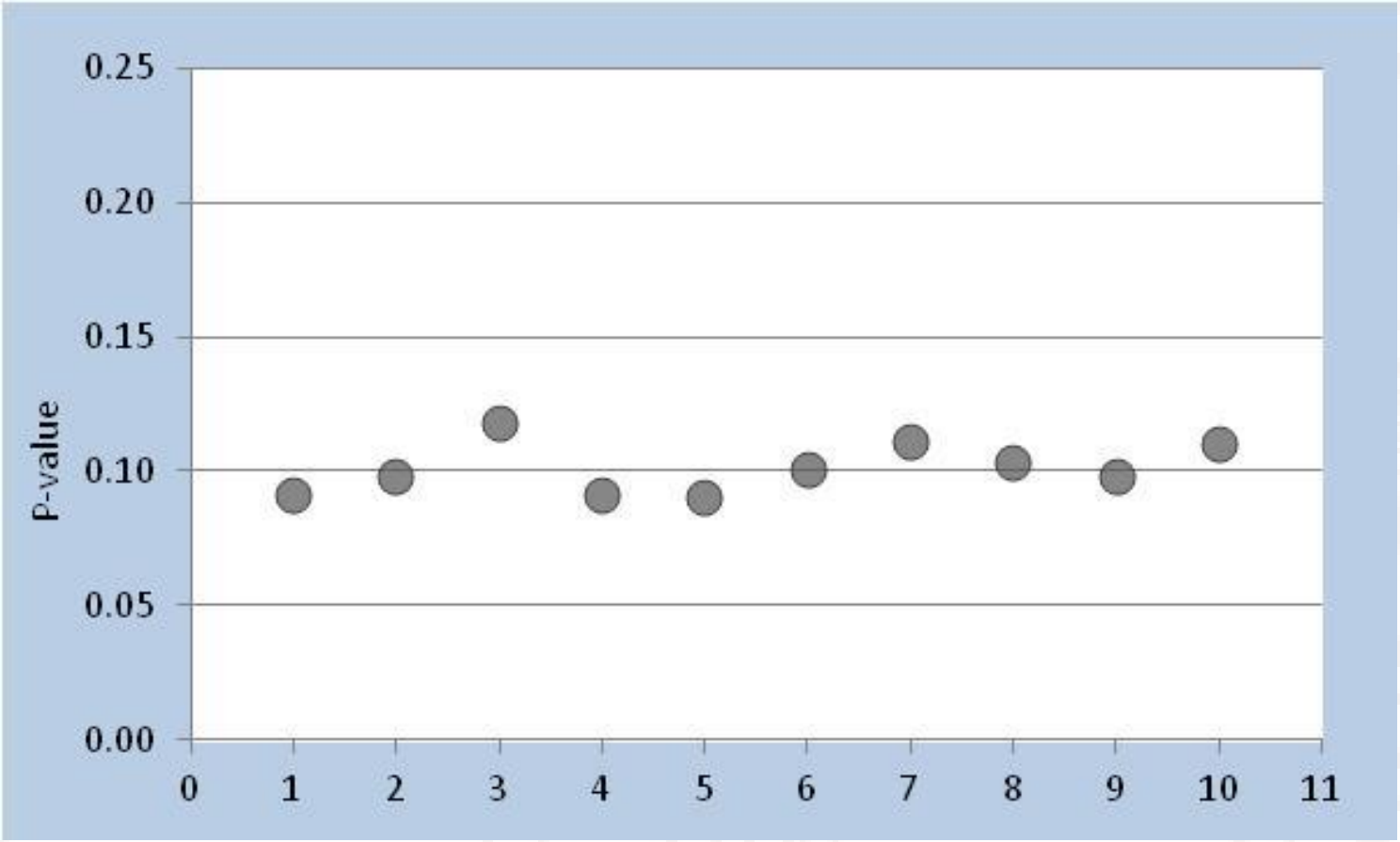
South Africa SCM and Placebo test



Synthetic South Africa: Centrafrican Rep. (0.095); China (0.017); Congo Rep (0.07); Iran (0.318); Siria (0.50)

Robustness checks

P-values for the experiments with “positive” trade effect



Given the few observations involved a level of significance of 10% means that the results are fairly robust !

Robustness checks

- We check for the consistency using:
  - **Food security indicators** (IFPRI: proportion of undernourishment, prevalence of children underweight)
  - **Agricultural trade policy** patters in the post-reform years (FAO case studies, Anderson & Nelgen 2013)
- Strong **qualitative** consistency between our results and the patterns of these indicators

Conclusion

- Impact of trade reforms on child mortality
  - **Negative** and significant for half of the sample (20 countries out of 40)
  - For all other case studies, but one, the effect is **zero**
  - Trade reform effects on child mortality are corroborated by the **changes of other indicators** of food security
  - and by **changes in agr trade policy** (lower taxation, lower protection, elimination of STEs,…)
- The main conclusion is that trade liberalization is not inimical of food security/health outcomes

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Conclusion

- What next ?
  - We are studying if the **timing** of reforms matters:
    - Is it better to anticipate trade or political reforms ?
    - Preliminary findings seem to show that reforming trade **before** a political reform is better for food security

Thank you for your attention

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Results

- Negative relation: trade reforms **reduced** U5MR
  - **20 Countries**, **Asia (4 out of 6)**: Indonesia (1970), Thailand (1970), Sri Lanka (1977), Philippines (1988); **Africa**: **(5 out of 18)**: Ghana (1985), Gambia (1985), Guinea (1986), Guinea-Biss (1987), Tanzania (1995); **Latin America (7 out of 12)**: Chile (1976), Mexico (1986), Guatemala (1988), Guyana (1988), Brazil (1991), Nicaragua (1991), Perù (1991); **Middle-East & North-Africa (4 out of 4)**: Morocco (1984), Tunisia (1989), Turkey (1989), Egypt (1995).
- No impact: trade reform **no effect** on U5MR
  - **19 Countries**, **Asia (2 out of 6)**: Bangladesh (1996), Pakistan (2001); **Africa (11 out of 18**): Botswana (1979), Uganda (1988), Benin (1990), Cape Verde (1991), Cameroon (1993), Cote d'Ivory (1994), Mauritania (1995), Mozambique (1995), Ethiopia (1996), Madagascar (1996), Burkina Faso (1998); **Latin America (5 out of 12):** Colombia (1970), Paraguay (1989), Honduras (1991), Dominican Rep. (1992), Panama (1996).
- Positive relation: trade reform **increased** U5MR
  - **1 Country**, South Africa (1991): largely due to the post-treatment HIV/AIDS diffusion

Introduction and motivation

- Food insecurity/health problems are emerging as increasingly relevant issues at international level
- A vast research on food security and malnutrition determinants has been carried out at micro-level
- Less attention to macro determinants, like institutional and trade reforms
  - The link between trade and food security has become crucial after the recent commodity price spikes
  - WTO has raised the issue of predicting the implications of further trade liberalization on food security in a more uncertain world.