Agricultural Trade Policy Distortions and Food Security: Is there a Causal Relationship?

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Outline of the presentation

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2: What are the FNS consequences of trade policies (i.e., freer trade is the solution or… the problem)?

Equilibrium models: PE and CGE models (micro-macro)

Conceptual framework

- **Trade policies:**
- Tariffs
- NTMs
- …

Econometric (e.g. gravity) models

- **Trade outcomes**:
- prices (level, volatility)
- quantities (nutritional contents)
- intensive margin vs. extensive margin

- **FNS indicators**:
- 3 types (outcomes, drivers&risks, interventions
- 4 dimensions (availability, accessibility, utilization, stability)

(Generalized) propensity score estimator: non-parametric matching techniques addressing treatment selection bias by comparing units similar in their characteristics

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2: Conceptual framework for food security-trade linkages
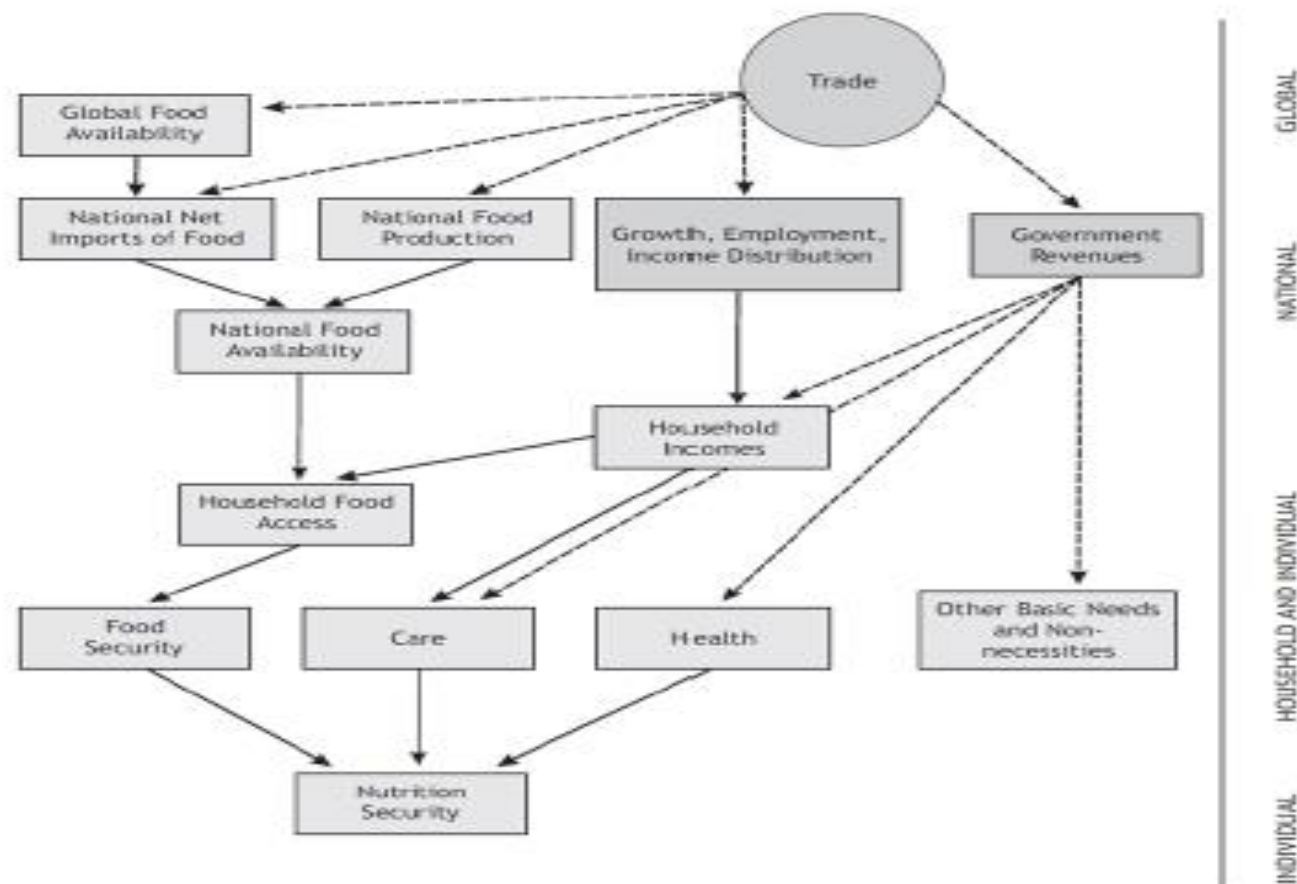
Source: Diaz-Bonilla et al. (2002), adapted from Smith (1998)

1: Aims and value added

Aim

The aim of the paper is to estimate the causal relationship between trade policy distortions (TPD) on food security.

Added Values

- adapting a non-parametric matching technique to estimate the dose-response function between TPD and food security;

- addressing the likely presence of self-selection bias despite the use of a continuous treatment (nominal rate of assistance, NRA);

- controlling for treatment heterogeneity (general NRA and commodity-specific NRA) as well as for outcome heterogeneity (different dimensions of food security)

The outcomes of our estimates show:

- Agricultural trade distortions are significantly correlated with the various dimensions of food security but on the opposite direction hoped-for by policymakers

- Countries less prone to adopt trade distortion policies tend to be better off in terms of food availability, access, utilisation, but worse off in terms of food stability

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The most recent empirical works find that:

- The actual poverty-reducing impact of trade insulation is much less than expected by policy-makers and ineffective if many countries respond in the same way (Anderson et al.2013);

- TPDs are likely to be inefficient: while the poor can in principle benefit on the expenditure side, they can be harmed on the earnings side if they are net sellers of food or suppliers of unskilled labour (Anderson and Nelgen 2012);

- TPs are also inequitable since they affect all food consumers and/or producers in the country and not only the target groups (Anderson et al.2013);

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3: The GPS estimator (Hirano and Imbens, 2004; Imai and van Dyk, 2004)

What is it?

- It is a generalisation of the binary treatment propensity score. It does not need control groups (impact evaluation within the treatment group)

How it works?

- For each unit i in the sample, we observe a $p \times 1$ vector of pre-treatment covariates, X_i; the treatment received, T_i; and the value of the outcome variable associated with this treatment, Y_i;

- we define with $r(t,x)$ the conditional density of the treatment given the covariates while R=r(T,X) is called "Score";

- our purpose is to estimate the function $\mu(t) = E\{Y_i(t)\}_{t \in T}$;

3: Steps

1. The GPS is estimated and its balancing property checked: if balancing holds, countries within GPS strata can be considered as identical in terms of their observable characteristics, independently of their actual level of treatment.
2. Estimation of the conditional expectation of the outcome as a function of two scalar, the treatment level and the GPS score.
3. Compute the average dose-response function (DRF) of the outcome (i.e., the different dimensions of food security) averaging the conditional expectation over the GPS at any different level of NRA,

4: Data

Treatment: trade distorsions

| Variable	Source
Aggregate Nominal Rate of Assistance	WB dataset (Anderson and Nelgen, 2012)
Commodity Nominal Rates of Assistance	WB dataset (Anderson and Nelgen, 2012)

NRA definition

- NRA is defined as the % by which **government** policies directly raises (or lower) the gross return to producers of a product above what it would be without the intervention.

- More specifically, NRA is computed as the unit value of production at the distorted price less its value at the undistorted free market price

$$NRA = [E.P(1+d) - E.P]/E.P$$

where E is the exchange rate, d is a distorsion, P is the foreign price of an identical product in the int.l market

4: Treatment
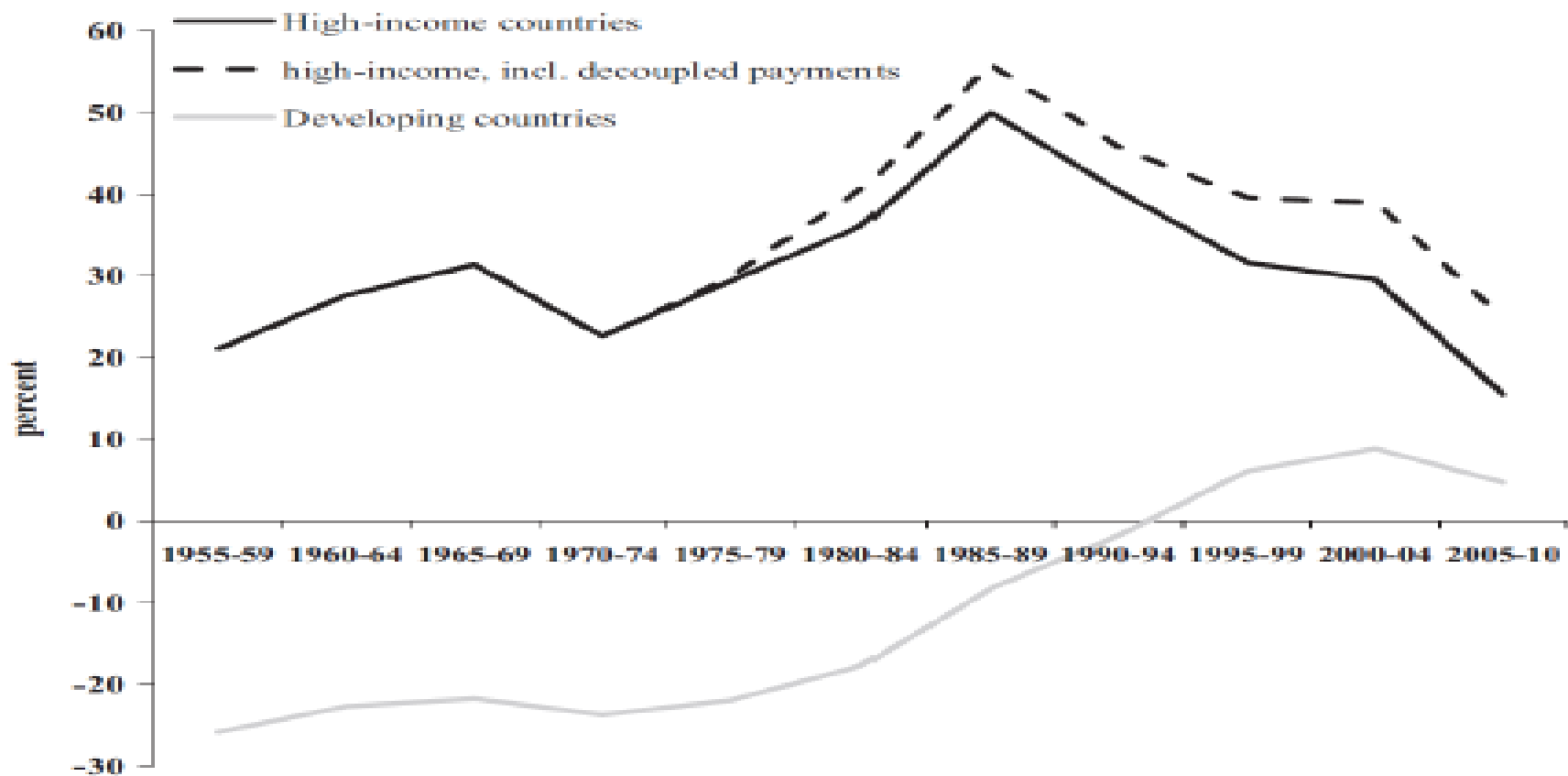
Source: Anderson and Nelgen (2012)

Three facts on trade and agricultural protection (Swinnen, 2010)

- Positive correlation between agricultural protection (import/export tax) and average income (Development pattern)

- The bias in mainly in favor of the import-competing products (Anti-trade pattern)

- Protection increases when farm incomes fall relative to the rest of the economy (Relative income pattern)

# 4: Covariates

Observable Characteristics X

Variable	Source
Per capita GDP (2005 USD)	Penn World Table 7.1
Arable land hect per person	World Bank – WDI
Deviation int.l food prices from trend (pos/neg)	FAO – GIEWS
International food prices volatility	FAO – GIEWS
Food Production Index	World Bank – WDI
Food Import/Total Export	World Bank – WDI
Dummy for Net Exporter (=1 if Yes)	WB dataset (Anderson and Nelgen, 2012)
Dummy for Food Crisis (=1 if Year=2006-2008) and Regional dummies	

Outcomes: Food Security Indicators

Pillar	Indicator	Source
Food Availability	Food Supply in kcal/capita/day	FAOSTAT
Food Access	Depth of Food Deficit	World Bank – WDI
Food Utilization	Infant Mortality	World Bank – WDI
Food Variability	Food Supply Variability	FAOSTAT

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4: The country coverage

Legend:
- Included
- Included but Dropped
- No data
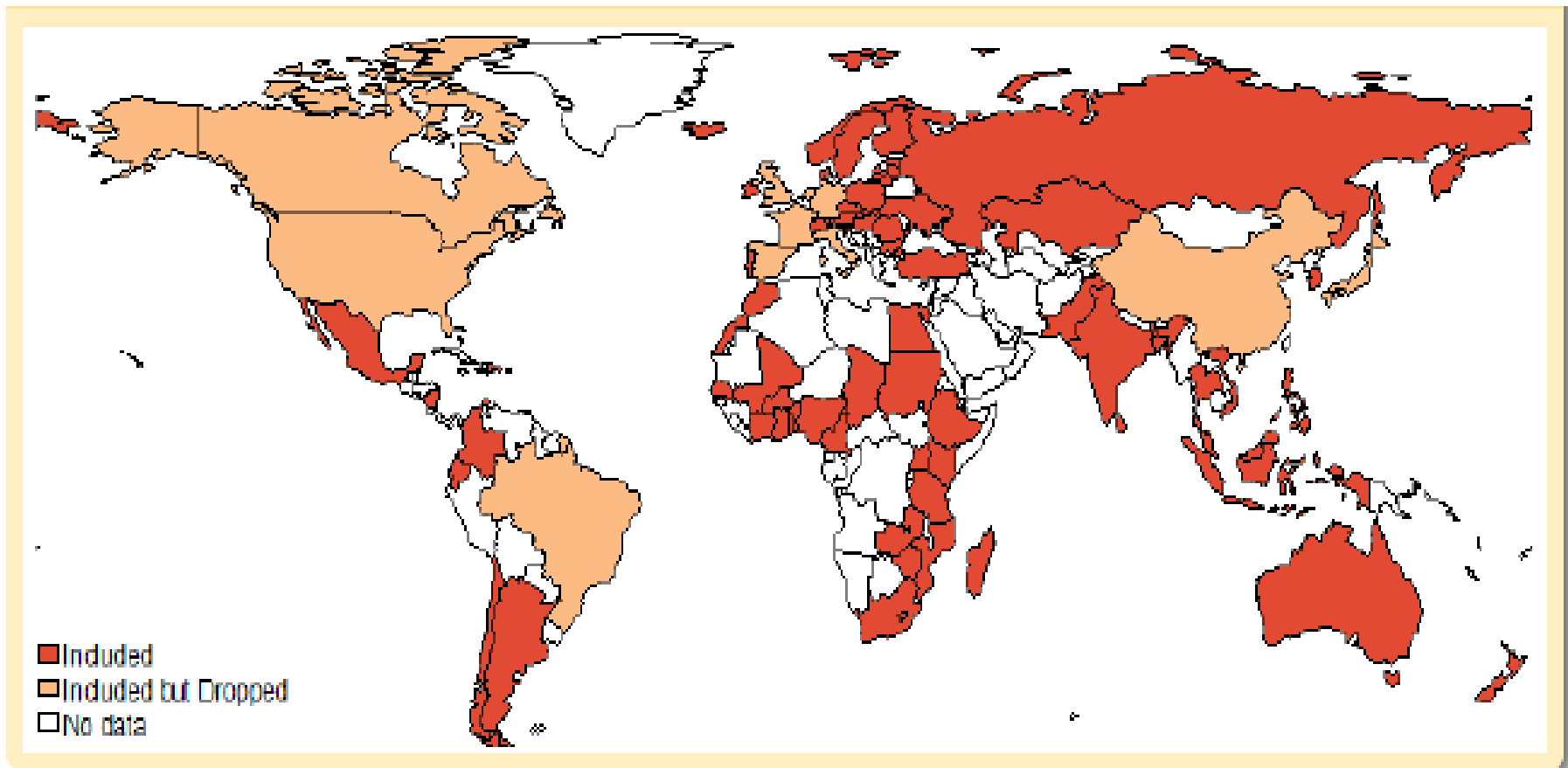
5: Regression results

- We first apply a regression type analysis to control for the possibility of reverse causality between food security and trade policy distortions (i.e., the possibility that trade policy can be influenced by the level of food availability).
- We apply a panel model with instrumental variables. As a valid instrument we use the average level of NRA in the previous decade which is supposed to be correlated with the current level of NRA but uncorrelated with any other determinants of food availability.
- Determinants of the food availability selected according to the literature.
- NAC coefficients in the OLS and IV models are both significant too, pointing to the consistency of both estimates.
- The Hausman test does not reject the null hypothesis of the consistency of the parameters in the two models, confirming that the relationship between trade policy and food availability does not suffer from reverse causality.

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5: First stage outcomes (aggregate results)

- NACs tend to be higher the higher a country's per capita income (even if at a decreasing rate): this is consistent with the well-known "development pattern" that richer countries tend to maintain higher protection for domestic producers, while developing countries as well as more populous countries, tend to keep lower levels of NAC.

- Countries characterised by high dependence from food imports with respect to their total exports tend to maintain lower levels of NAC as well since they tend to reduce the domestic prices of importables.

- The "anti-trade pattern" is also confirmed since countries with a comparative advantage in agriculture (proxied by the percentage of arable land) as well as net food exporter tend to protect less.

- To be noted the asymmetry in the impacts of positive and negative deviations of international food prices from their trend. NACs are negatively correlated with positive international food price deviations from their trend, since food import restrictions tend to be eased during price spikes and export tax raised. Consistently, NACs are negatively correlated with negative international food price deviations from their trend, since overall food import restrictions tend to be stressed during price drops, while net exporter countries undertake a pro-trade behaviour. Such an anticyclical behaviour is confirmed by the negative sign of the international food price volatility estimated coefficient.

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# 5: Testing the balancing properties

- Following Hirano and Imbens (2004) we compare obvd characteristics of units within 10 GPS strata across 3 groups determined on the basis of the actual treatment intensity

- The difference between the three groups conditional on GPS is not significant (according to a standard two-sided t-test **the balancing property is satisfied at 5 percent level**)

- The validity of the balancing property as well as the use of an homogeneous measure of trade distortion prevent any likely relationship across the outcomes of various treatment intensities, i.e., no SUTVA (Stable Unit Treatment Value Assumption) violation.
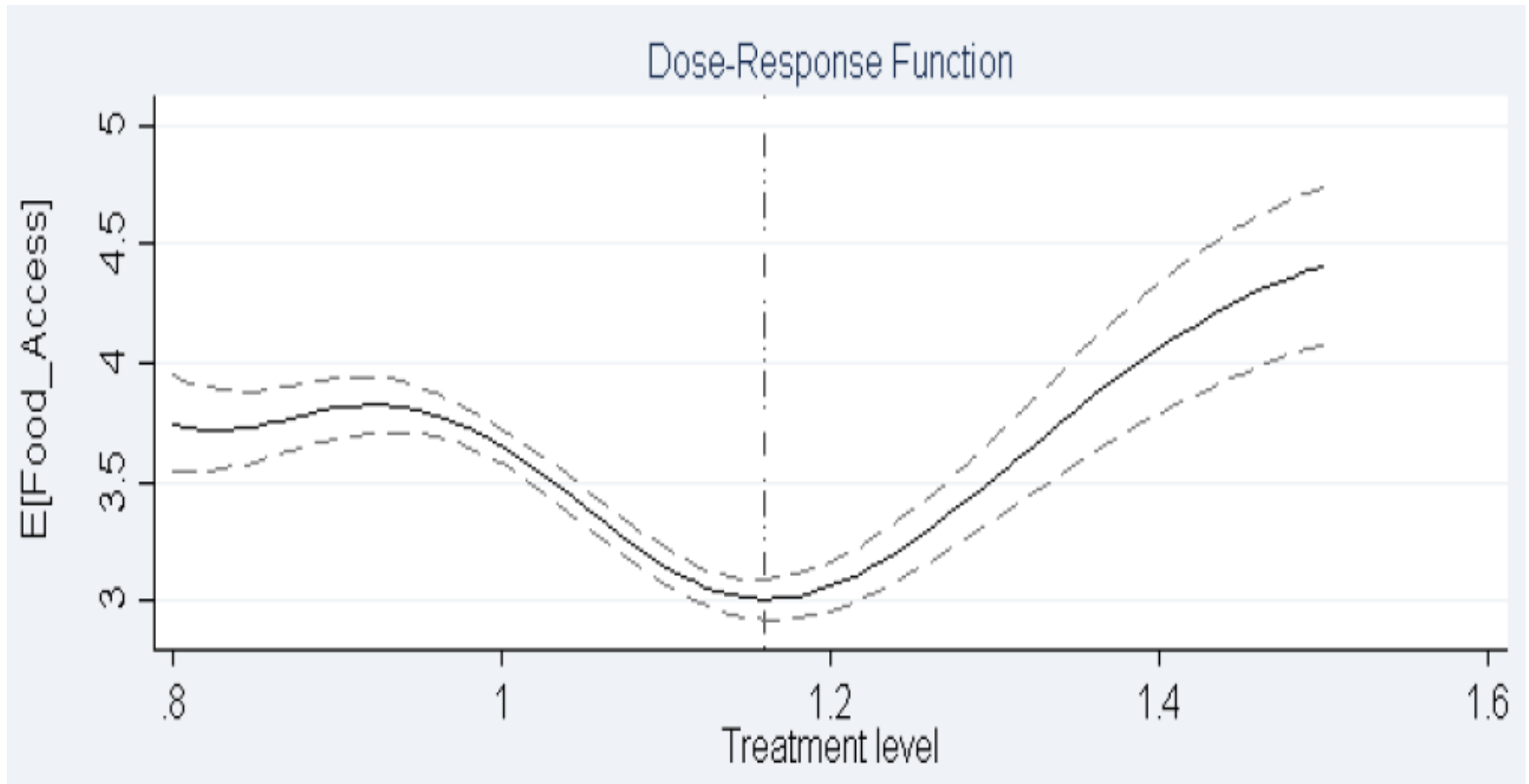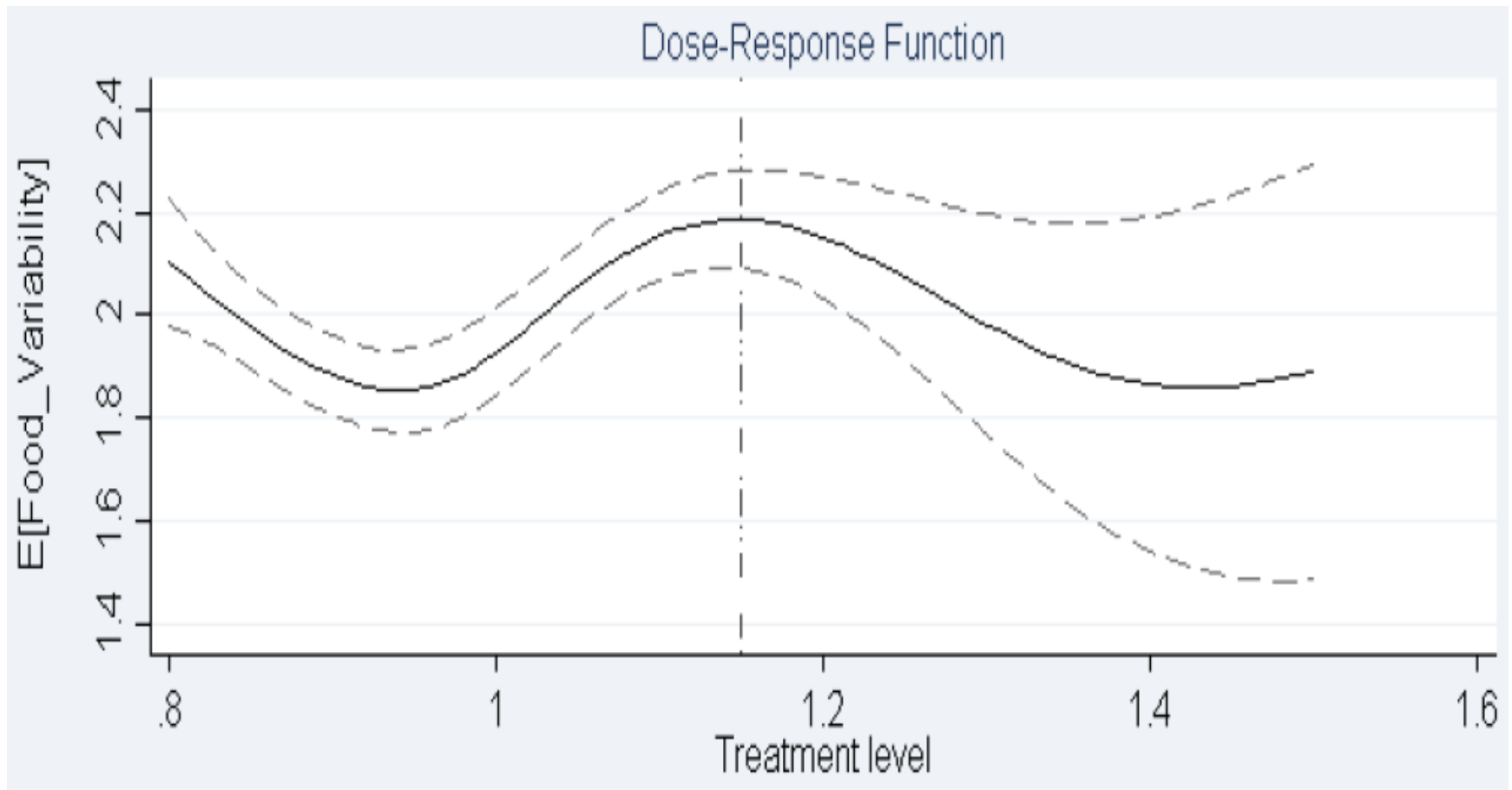
5: Food availability (aggregate results)
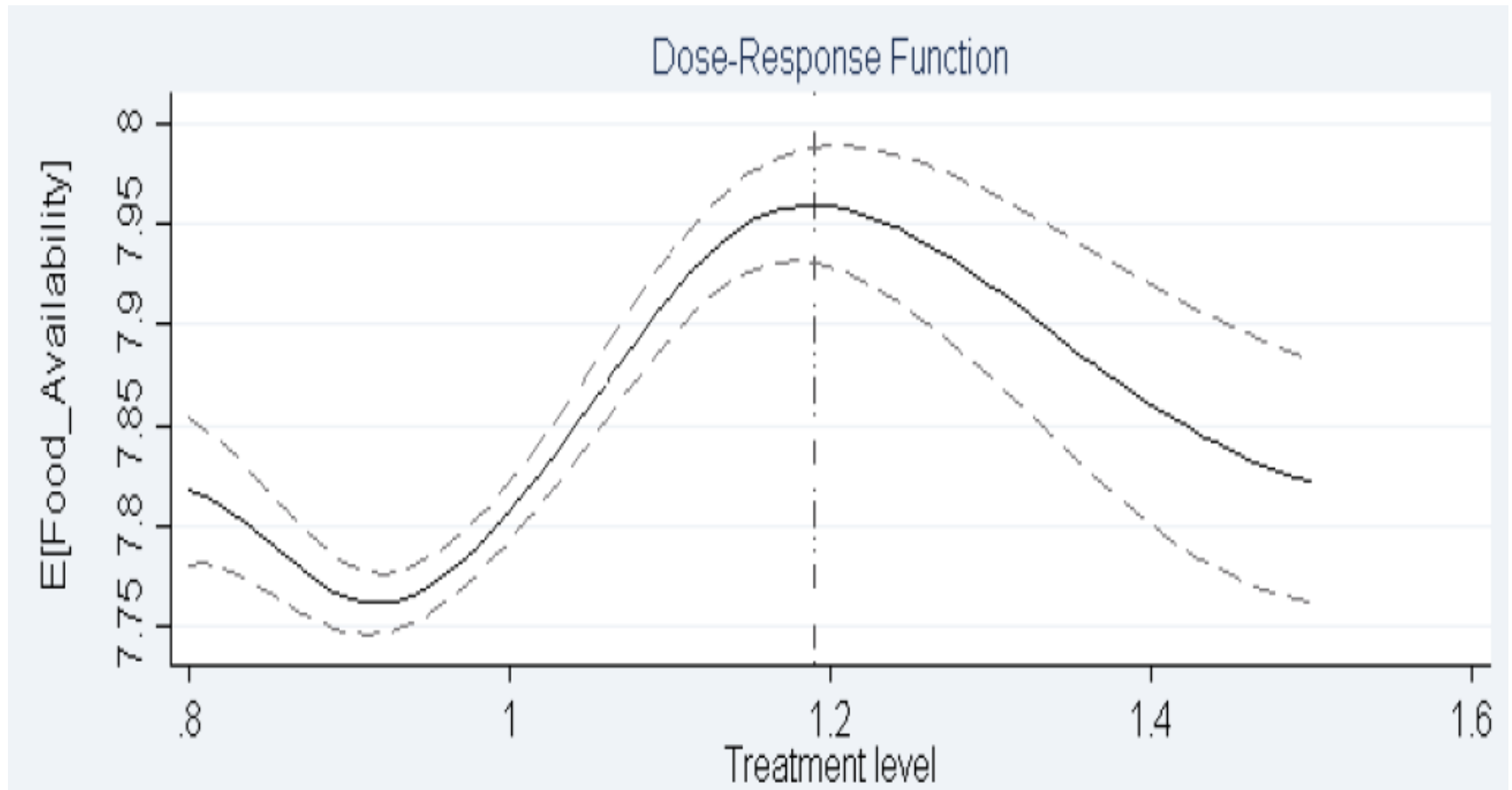
5: Food utilization (aggregate results)

Dose-Response Function
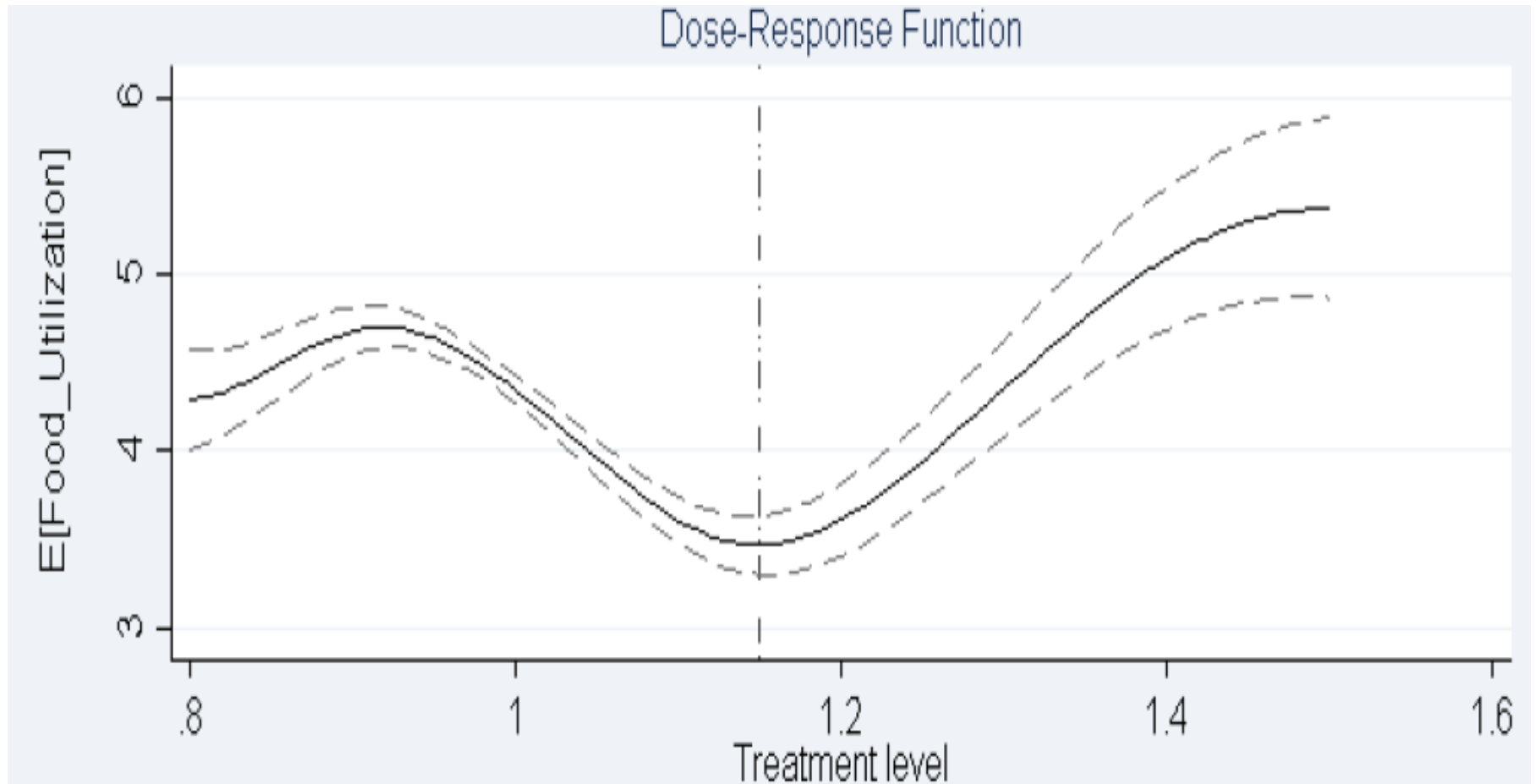
5: Food access (aggregate results)

Dose-Response Function

5: Food variability (aggregate results)

6: Conclusions

MAIN RESULT: agricultural policies are effective
OPEN QUESTIONS:

- Which policies?
- Are thesepolicies efficient?

Thanks!

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