Informal Economy and Trade in the Agricultural Sector

Structural gravity evidence and GE counterfactuals for the EU–India FTA

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Roadmap

1. Introduction and motivation
2. Background: informality and EU–India
3. Theoretical framework
4. Empirical framework and data
5. Results and conclusions

Core message

Accounting for informal agricultural activity does not materially change the estimated direct FTA coefficients, but it changes the general-equilibrium welfare calculation by making domestic trade larger and the economy less open.

Research question

Question

How does incorporating the informal economy change the estimated welfare gains from international trade liberalization?

The paper answers this question in a setting where the issue is empirically important:

- **Sector:** agriculture, where informal activity is large and often undermeasured.
- **Policy shock:** the EU–India Free Trade Agreement.
- **Method:** structural gravity estimation plus general-equilibrium counterfactual simulations.

Takeaway

If informal production is omitted, trade openness can be overstated and welfare gains from FTAs can be exaggerated.

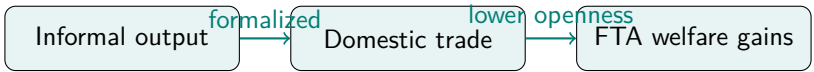
Why agriculture and informality?

Agriculture is a natural testing ground

- High relevance for developing economies.
- Large share of employment outside formal contracts and taxation.
- Domestic production is often imperfectly measured.

Trade policy evaluation may be biased

- Gravity models require domestic trade flows.
- Undermeasured domestic activity inflates measured openness.
- Welfare formulas are sensitive to domestic expenditure shares.



Contribution

1. Estimate FTA effects in agricultural trade while explicitly incorporating informal-sector domestic production.
2. Translate partial-equilibrium FTA estimates into GE welfare effects.
3. Quantify how formalizing informal agricultural activity changes the welfare implications of the EU–India FTA.

Preview of results

- Adding informal activity barely changes the estimated FTA coefficients.
- In GE simulations, welfare gains for India are smaller once informal agricultural activity is included.
- The reduction in welfare gains reaches about 1.3% in the robustness specifications reported in the paper.

Background: trade liberalization and informality

The relationship between trade and informality is theoretically ambiguous.

Why trade may reduce informality

- Exporting can raise productivity and earnings.
- Integration into formal value chains may increase compliance.
- Better market access can improve formal-sector opportunities.

Why trade may increase informality

- Competition can increase pressure to cut production costs.
- Firms may use informal labor or suppliers to remain competitive.
- Adjustment costs may fall on vulnerable workers.

Source: Bacchetta, Ernst and Bustamante (2009); Fugazza and Fiess (2010); Artuc et al. (2019); Ernst and Leung (2023); Dix-Carneiro et al. (2026).

Background: the EU–India FTA

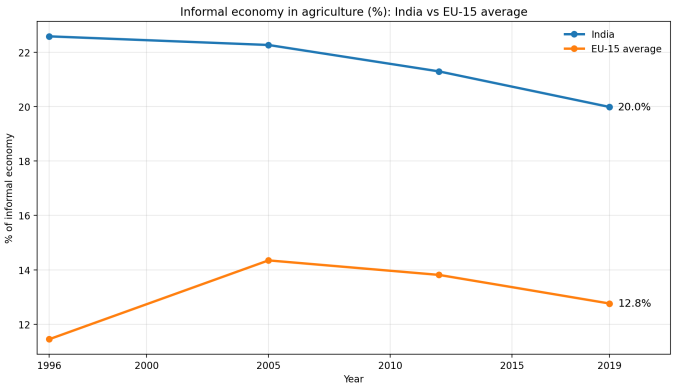
- Negotiations began in 2007, were suspended in 2013, relaunched in 2022, and concluded in January 2026.
- The agreement covers about two billion people and around 25% of world GDP.
- The Commission reports that the deal eliminates or reduces 90% of tariffs and saves EU exporters about EUR 4 billion per year in duties.
- It includes chapters on customs, SPS, TBT, services, digital trade, intellectual property, competition, SMEs, good regulatory practices, sustainable food systems and dispute settlement.

Source: European Commission, EU–India trade agreement and published draft texts

Status and agriculture

- The text is not yet binding: entry into force requires legal revision, signature and internal approval procedures.
- Sensitive EU agricultural products retain protection or limited access.
- Safeguards and food-safety controls are part of the agreement.

Background: informal economy in India and the EU–15



- India's informal agricultural economy is much larger than the EU–15 average in every common year.
- The gap is especially relevant for GE simulations because it changes India's domestic-trade baseline much more strongly.

Source: India: MIMIC estimates of informal output (% of official GDP). EU–15: simple average of country estimates of informal agricultural economy relative to official agricultural GVA, for 1996, 2005, 2012 and 2019.

Why the EU–India case is useful

Policy relevance

- Large agreement between a major developed bloc and a major developing economy.
- Deep provisions resemble modern EU trade agreements.
- Agriculture remains central to employment and distributional concerns.

Measurement relevance

- India's agricultural informality is large.
- EU informal agriculture is smaller but non-negligible.
- Counterfactuals can compare formal-only versus formal-plus-informal domestic trade.

Takeaway

The agreement is not only a market-access shock; it is also a test of whether standard trade models mismeasure welfare when domestic informal production is large.

Theoretical mechanism

In an Armington-type structural gravity model, welfare gains from trade can be summarized by the domestic expenditure share.

$$\hat{W}_i = \hat{\lambda}_{ii}^{-1/\varepsilon}$$

- $\hat{W}_i$: change in real income or real wage.
- λ_{ii}: domestic expenditure share.
- ε: trade elasticity.

Informality adjustment

If informal agricultural activity is integrated into domestic production, domestic trade becomes larger:

$$\lambda_{ii}^{S} = S_i \lambda_{ii}, \qquad S_i > 1.$$

Implication for welfare gains

Combining the standard welfare formula with the informal-sector adjustment gives:

$$\hat{W}_i^S = S_i^{-1/\varepsilon} \hat{W}_i.$$

Interpretation

- Formalization raises measured domestic absorption.
- The country is less open for a given level of international trade.
- A given FTA shock generates smaller welfare gains.

Numerical intuition

- If informal activity adds 25% to domestic production, then $S_i = 1.25$.
- With $\varepsilon = 4$, the welfare gain is scaled by $1.25^{-1/4}$.
- This lowers the gain by roughly 5% relative to formal-only data.

Data

Informal economy data

- EU-15 agricultural informal economy, 1996–2019.
- India agricultural informal-sector estimates from national-accounts-based sources.
- Informal activity is added to domestic agricultural trade flows.

Trade and policy data

- ITPD-E Release 3: agriculture, 1996–2019, 265 countries.
- USITC Dynamic Gravity Dataset: FTAs, WTO and EU membership.
- ITPD-S for GE simulations; ADB71 MRIO as robustness.

Estimation sample

Almost 750,000 dyadic exporter-importer-year observations in the main gravity estimation.

Source: Schneider (2023); Kolli (2007); Dutta, Kar and Guha; Larch et al. (2025); Gurevich and Herman (2018); Borchert et al. (2024).

Structural gravity specification

The first-stage empirical model is estimated by PPML:

$$X_{ij,t} = \exp\{\alpha_1 FTA_{ij,t}^{EU\to S} + \alpha_2 FTA_{ij,t}^{S\to EU} + \alpha_3 FTA_{ij,t}^{EU\to N} + \alpha_4 FTA_{ij,t}^{N\to EU} + \beta Z_{ij,t} + \gamma BRDR_{ij} \times t + \lambda_{it} + \lambda_{jt} + \lambda_{ij}\}\epsilon_{ij,t}.$$

- $X_{ij,t}$: bilateral agricultural exports.
- $Z_{ij,t}$: FTA controls, WTO membership, EU-15 membership.
- Fixed effects: exporter-year, importer-year and country-pair.
- $BRDR_{ij} \times t$: trend in cross-border relative to domestic trade.

Policy variables and counterfactual design

EU–India-type FTAs

- Identified using the depth/classification approach in Timini and Viani (2022).
- Directional effects distinguish exports from and to the EU.
- Partner heterogeneity: South = non-OECD developing economies; North = OECD economies.

Counterfactual scenarios

1. EU–India FTA using formal domestic trade only.
2. Same FTA after adding informal agricultural activity to domestic trade.

What changes between scenarios?

Both the first-stage coefficients and the GE baseline can change. In practice, the main difference comes from the GE baseline, not from the estimated coefficients.

Partial-equilibrium results: baseline estimates

Full table

	Formal data	Formal + informal data
$FTA^{EU \to S}$	0.097	0.094
$FTA^{S \to EU}$	0.200*	0.200*
$FTA^{EU \to N}$	0.320**	0.320**
$FTA^{N \to EU}$	0.282***	0.283***
Observations	744,441	744,441

- South-to-EU agricultural exports respond positively to EU–India-type FTAs: $\exp(0.20) - 1 \approx 22\%$.
- EU-to-South effect is small and statistically insignificant in the preferred specification.
- Adding informal domestic production barely moves the coefficients.

GE simulation results for India

Economy	Δ Exp	Δ Imp	Δ Real Wages	Δ Nom. Wages	Δ Prices
ITPD-E estimates, preferred					
Formal only	1.0040	2.0298	0.0134	0.3390	0.3255
Formal + informal	1.0003	2.0224	0.0115	0.3348	0.3233
Rel. Change (%)	-0.004	-0.004	-0.142	-0.012	-0.007
ITPD-E estimates, all EU FTAs					
Formal only	1.0055	2.0329	0.0153	0.1136	0.0982
Formal + informal	-0.0054	-0.0044	0.0001	-0.0087	-0.0089
Rel. Change (%)	-1.005	-1.002	-0.991	-1.077	-1.091
ADB71 estimates					
Formal only	0.8986	3.2570	0.0035	0.8359	0.8324
Formal + informal	-0.1529	-0.1192	-0.0010	-0.0135	-0.0125
Rel. Change (%)	-1.170	-1.037	-1.290	-1.016	-1.015

Source: Relative change is computed as $(\text{formal} + \text{informal}/\text{formal}) - 1$, in percent. For negative baselines, a positive relative change means a larger loss.

GE simulation results for EU-15 average

Economy	Δ Exp	Δ Imp	Δ Real Wages	Δ Nom. Wages	Δ Prices
ITPD-E estimates, preferred					
Formal only	-0.0329	-0.0184	0.0154	-0.0985	-0.1139
Formal + informal	-0.0358	-0.0201	0.0146	-0.1034	-0.1180
Rel. change (%)	8.68	9.10	-5.41	5.00	3.59
ITPD-E estimates, all EU FTAs					
Formal only	0.0655	0.0452	0.0165	-0.0233	-0.0397
Formal + informal	0.0670	0.0463	0.0155	-0.0252	-0.0407
Rel. change (%)	2.34	2.42	-5.84	8.49	2.55
ADB71 estimates					
Formal only	-0.1644	-0.1407	0.0118	-0.2411	-0.2529
Formal + informal	-0.1715	-0.1463	0.0110	-0.2480	-0.2590
Rel. change (%)	4.33	4.00	-7.19	2.87	2.40

Source: Simple unweighted average across AUT, BEL, DNK, FIN, FRA, DEU, GRC, IRL, ITA, LUX, NLD, PRT, ESP, SWE and GBR. Relative change is computed as $(\text{formal} + \text{informal}/\text{formal}) - 1$, in percent. For negative baselines, a positive relative change means a larger loss.

Interpreting the results

What does not change much?

- The estimated FTA coefficients are stable when informal activity is added.
- This suggests the direct trade effect is not the main channel.

What changes?

- The GE baseline changes because domestic trade is larger.
- India becomes less open relative to formal-only data.
- A given FTA shock maps into smaller welfare gains.

Main economic interpretation

Ignoring informal agriculture tends to overstate short-run gains from trade liberalization, because it understates domestic economic activity and overstates exposure to international trade.

Robustness and limitations

Robustness checks

- Alternative FTA definition: all EU FTAs, not only EU–India-type agreements.
- Alternative data source: ADB71 MRIO.
- Main conclusion persists: informal domestic trade lowers GE gains.

Limitations

- Informal-sector measurement is uncertain.
- GE does not model firm-level formalization or productivity reallocation explicitly.
- Results should be interpreted as short-run measurement-adjusted GE effects.

Conclusions

1. Informal activity matters for trade-policy evaluation, especially in agriculture and developing economies.
2. In this paper, adding informal agricultural output does not substantially affect the estimated FTA coefficients.
3. It does reduce simulated GE welfare gains because domestic trade is larger and measured openness is lower.
4. Standard structural gravity models may overstate short-run FTA gains when informal domestic production is omitted.

Policy implication

Trade agreements with economies characterized by large informal sectors should be evaluated jointly with measurement, formalization and domestic-institution channels.

Discussion points

- How should informal output be integrated into national accounts and domestic trade flows for trade-policy simulations?
- How does informality affect trade flows?
- Are the welfare effects heterogeneous across workers, farms and firm sizes?
- Can richer models of informality overturn or amplify the short-run GE result?
- How does informality affect capital flows?

Thank you

Backup: full first-stage estimates, selected controls

Back

	ITPD-E		ITPD-E		ADB71	
	Formal	+ informal	Formal	+ informal	Formal	+ informal
$FTA^{EU \to S}$	0.097	0.094			-0.299	-0.303
$Any\ FTA^{EU \to S}$			0.376*	0.373*		
$FTA^{S \to EU}$	0.200*	0.200*			0.241	0.237
$Any\ FTA^{S \to EU}$			0.128	0.126		
$FTA^{EU \to N}$	0.320**	0.320**			-0.120	-0.121
$Any\ FTA^{EU \to N}$			1.016***	1.020***		
$FTA^{N \to EU}$	0.282***	0.283***			0.162	0.162
FTA^{ROW}	0.221***	0.222***	0.128**	0.127**	0.241**	0.240**
WTO	0.472***	0.470***	0.473***	0.472***	-0.027	-0.031
EU15	0.978***	0.978***	1.247***	1.246***	0.196	0.196
Observations	744,441	744,441	744,441	744,441	13,236	13,236

Source: Robust standard errors clustered by country pair in the paper.