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India's July 2023 Rice Export Ban and Common Commodity Shocks in Public Trade and Price Series

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Abstract

India's July 2023 restriction on non-basmati white rice exports is treated in the literature as a supply shock whose global price consequences can be simulated, and in policy commentary as one whose causal chain is known. This article asks a narrower and prior question: in the public series that any analyst can actually obtain, **can the restriction's effect be separated from the commodity, energy, fertiliser and weather shocks that happened at the same time?** The price and annual trade series show distinct changes. Between June and September 2023 the world rice benchmark (Thai 5%, nominal USD) rose **+20.62%** while the cereals competing with rice for the same inputs fell — United States HRW wheat **−8.92%**, maize **−16.14%** — and energy and fertiliser inputs rose (Brent **+25.52%**, urea **+32.17%**). A common-input-cost shock therefore does not fit a simple one-for-one common-cost account; it does not exclude common-cost shocks with heterogeneous pass-through. Regressing one-month log changes of the rice benchmark on contemporaneous log changes of Brent, urea, wheat and maize over the pre-restriction sample (2015M01–2023M06, **n = 102**, **R^2 = 0.0631**, residual sd **0.04565**) leaves an August 2023 residual of **+0.17819 log points, z = +3.90** against the pre-sample residual distribution, from a fit whose four covariates are jointly indistinguishable from zero. The residual can reflect policy and other rice-specific movements, including weather, freight costs and monthly exchange rates. The bilateral trade interface used here provides **annual** frequency — a monthly request is refused with the error string For annual frequency, all periods must be in YYYY format. — so an annual 2023 value mixes seven months without the restriction with five months with it, and the physical-supply timing effect is **unidentifiable** in these series. What can be measured at annual resolution is reported under its own limitation: India's HS1006 exports moved from 22,236,585 tonnes and 484.2 USD/t in 2022 to 17,864,981 tonnes and 585.1 USD/t in 2023, a decomposition of **−19.7% quantity, +20.8% unit value, −2.9% value**. The article also reports a measurement result that any user of that interface needs: in five of six audited responses a naive sum of the response's rows returns **2.00× to 4.00×** the reported total, because the row carrying the total is accompanied by its own component rows; the total-bearing row is the one with motCode=0 and customsCode=C00 and partner2Code=0. Two contemporaneous shocks — freight rates and monthly exchange rates — could not be controlled at all, because no series for either was obtained, and weather is not separable from the policy because the policy was itself a response to weather expectations. The result is an unusually large rice-price movement alongside a fall in annual export quantity and a rise in unit value; the design does not isolate the ban's causal contribution.

Keywords: food export restrictions; India; rice; price transmission; UN Comtrade; commodity-price shocks; policy attribution

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1. Introduction

On 20 July 2023 India's Directorate General of Foreign Trade issued Notification No. 20/2023, changing ITC(HS) 10063090, non-basmati white rice, from Free to Prohibited with immediate effect (Directorate General of Foreign Trade, 2023). The notification preserved specified transitions for consignments already loading, berthed or handed to Customs before the notification, and allowed exports approved by the Government of India for another country's food-security needs. The policy question that followed is familiar. A large exporter withdraws a staple from the world market; the world price rises; importing countries that depend on that exporter face higher food prices; and the welfare loss is estimated, simulated or deplored.

Every link in that chain after the first is a quantity that models can compute. The first link — that the observed price movement belongs to this restriction rather than to the shocks that arrived with it — is an empirical claim about separability, and it is rarely tested on observed series. The simulation literature this article examines below does not test it at all: it assumes separability by construction, because a computable general equilibrium or partial equilibrium model must be told which shock is active in which scenario (Diwani, 2025) (Fathelrahman et al., 2024). Systematic reviews of what export restrictions do to the restricting country's own economy likewise organise the evidence by instrument rather than by identification (Akter, 2022), and work on why governments restrict exports treats the policy as the outcome to be explained, not the shock to be isolated (He, 2021). The tracker literature documents the wave of measures without attempting to separate any single one of them from its context (Laborde Debucquet & Mamun, 2022).

This article takes the untested link and tests it with what is publicly reachable. It does not estimate welfare and it does not re-simulate the ban. It asks: **in the price and trade series an outside analyst can obtain without a subscription, is the July 2023 restriction separable from the contemporaneous energy, fertiliser, other-cereal, freight, currency and weather shocks?** The answer reported here is *partly, on the price side, and not at all on the quantity side* — and the article is at pains to state which of those two halves licenses which sentence.

The price-side test is a cross-commodity placebo plus a pass-through residual. If a common input cost — energy, fertiliser — drove the August 2023 rice price jump, then the cereals that share those inputs should have moved with rice, not against it. They moved against it, in the same month, by a wide margin. The residual test formalises the same idea: fit the pre-restriction relationship between the rice benchmark and the four common factors, then look at what the relationship does not explain in the treatment months. It leaves a large residual in exactly one month. Two things must be said about that residual immediately, and are said again wherever it is used: it is evidence that common factors do not explain the movement, which is **necessary** for a restriction effect and nowhere near **sufficient** for one; and the residual is bounded below by what this design cannot see.

The quantity-side test fails for a reason that is worth reporting in its own right, because it is a property of the public interface rather than of the question: the interface returns annual data only. A monthly request is rejected outright. The annual 2023 value therefore cannot separate the seven months before the measure from the five months after it, and no arrangement of annual data can. The comparator panel of other exporters that would be needed for a counterfactual is additionally incomplete: one large exporter's series hits the response cap. These two facts are why the article's statement about physical supply is "not identifiable here" rather than either "unchanged" or "reduced".

Between those two halves sits a measurement result that is not about rice at all. Public trade interfaces are widely used for this kind of work, and their responses are widely summed. In the responses audited

here, summing the rows of a single cell over-returns by a factor of **2.00** or **4.00** in five of six cases, and the response contains no field that marks which row is the total. The trap is not exotic: it is what happens when a reporter publishes a total row and its components in the same response.

The article next establishes the literature and legal scope, defines the data and aggregation rule, reports the price and annual quantity results, and then states the identification conditions needed to interpret them.

2. What the neighbouring literature establishes, and what it leaves open

2.1. The theory is settled, and it is not this article's contribution

That export restrictions transmit instability to world markets is a settled theoretical result, not a hypothesis. The canonical statement shows that when exporters insulate their domestic market from world prices, the variance of the international price becomes larger than it would be without insulation — the paper's own abstract puts the factor at four times — and it treats wheat and rice as the staples that have attracted most attention for exactly this reason (Martin & Anderson, 2011). This article therefore claims **no novelty** for the proposition that a rice export restriction can raise the world rice price. That proposition is the premise, not the finding. What is not settled by the theory is the magnitude attributable to a particular episode, and the theory says nothing about whether a given observed movement is attributable to the restriction at all.

The empirical literature on earlier episodes is substantial and consistently finds domestic market effects. The 2007–08 food-crisis work on Russian and Ukrainian wheat restrictions documents domestic price effects in the restricting countries (Götz et al., 2013). The COVID-19 wave is documented comparably: restrictions during the pandemic put food security at risk in low- and middle-income countries (Falkendal et al., 2021), and the food-protectionism episode of 2020 was assessed for its world-market impact (Espitia et al., 2020). This article does not dispute any of it, and it does not re-estimate it. They establish the broader literature context; none of their numerical estimates is reused here.

2.2. The 2023 episode: what has been done, and the gap this article works in

Three strands now bear directly on the July 2023 measure.

Simulations. The closest peer-reviewed study that this article could actually read is a computable general equilibrium assessment of short-term export bans in the Indian, Thai and Vietnamese rice sectors. Its design is explicit about the point that matters here: the export ban and the El Niño productivity shock are entered as **separate scenarios** — scenarios 1 and 2 vary the export restriction, scenarios 3 and 4 vary rice productivity — so separability is a design assumption, not a tested proposition (Diwani, 2025). It also records two facts used here as the minimal factual description of the measure: the ban on non-basmati white rice was imposed on 20 July 2023, and Indian domestic rice prices had risen by more than 30% since October 2022. A second simulation, using a global partial-equilibrium model, reports a negative world net welfare effect of USD 1.7 billion, and its abstract states the population quantities — the banned non-basmati white rice accounted for 25% of India's total rice exports, or 10% of the global rice trade (Fathelrahman et al., 2024). The USD 1.7 billion figure and the 25%/10% shares are reported as that study's estimates, not results of the present analysis.

Official monitoring. The Food and Agriculture Organization's September 2023 market bulletin provides an independent price-side check, not causal identification. It records that the FAO All Rice Price Index averaged 142.4 points in August 2023, up 9.8 percent from July and a 15-year nominal high, and that India's July ban on Indica white rice exports was the context (Food and Agriculture Organization of the United Nations, 2023). In the same paragraph it records a counter-movement: the benchmark United States (US No. 2, Yellow) maize price fell by 12.3 percent in that month, with Argentina Up River down 3.7

percent and Brazil Paranagua down 3.3 percent (Food and Agriculture Organization of the United Nations, 2023). And it offers a mechanism description that is not about physical shortage at all: uncertainty about the ban's duration and the fear that restrictions would extend to other rice types caused supply-chain actors to hold on to stocks, renegotiate contracts or stop making price offers, limiting most trade to small volumes or to previously concluded sales (Food and Agriculture Organization of the United Nations, 2023). Finally, the same bulletin juxtaposes the confounders without resolving them — conflict and insecurity, adverse weather, high prices of agricultural inputs, elevated distribution costs and currency weaknesses (Food and Agriculture Organization of the United Nations, 2023). That sentence is this article's problem statement in the source's own words.

The gap. Nobody in these strands tests whether the observed August 2023 movement is separable from the common shocks in observed public series; the simulations assume it, the official bulletin documents the confounders and stops there. The contribution here is a partial negative: a commonly-used placebo and a pre-sample pass-through fit can exclude the common-cost story for one month, cannot exclude the other stories, and cannot address supply at all at the frequency the public interface supplies.

2.3. Literature basis

The analysis uses the official DGFT notification for legal scope, the FAO bulletin for contemporaneous market observations, and the cited simulation and export-restriction studies only for propositions available in their text or abstracts. It does not rely on results from inaccessible works and makes no claim that the diagnostic used here is unprecedented.

3. Data, vintages, aggregation rule, and verification posture

3.1. Sources, vintages, and the cut-off

The evidence cut-off for this article is **2026-02-20**, and it is applied mechanically: no source created or published later is used. That constraint bites in a specific way, because two of the standard price sources now publish rolling updates. The live World Bank commodity-price page carries a Last-Modified of 2026-09-14 and the live FAO food price index file is named for 2026-09; **both are after the cut-off and neither is used.** The article instead uses archived versions that predate it:

- **World Bank Commodity Price Data (the "Pink Sheet"), monthly**, in-file version line Updated on April 02, 2025, spanning **1960M01–2025M03** — 783 monthly periods and **71 non-empty columns** (World Bank, 2025). The named series used are Rice, Thai 5%; Wheat, US HRW; Maize; Crude oil, Brent; Urea; DAP; and Natural gas, US, all in nominal United States dollars.
- **FAO Food Price Index**, the data file archived before the cut-off, **433 monthly observations** from **1990-01 to 2026-01**, base 2014–2016 = 100, with the Food Price Index and its meat, dairy, cereals, oils and sugar sub-indices (Food and Agriculture Organization of the United Nations, 2026).
- **NOAA Oceanic Niño Index**, seasonal ENSO values, **910 rows**, latest season 2025 SON with an anomaly of **−0.55** (National Oceanic and Atmospheric Administration, 2025). It is reported for availability and is **not** used in a regression; see Section 4.4.
- **UN Comtrade public preview interface**, annual HS responses for a reporter–partner–commodity–year–flow cell (United Nations Statistics Division, 2026). It is a live interface with no vintage field: the responses used here were retrieved on 2026-09-21 and carry the 2024 annual values, which are the latest annual values used in this article.

All monetary values are nominal United States dollars. No deflation is attempted, and none is needed: the comparisons in Section 4 are same-month, same-units ratios.

3.2. The trade channel returns annual data only, and that is the design's binding constraint

The public preview interface refuses monthly periods. A request for period=202307 returns the error For annual frequency, all periods must be in YYYY format. and no data. This is not a rate limit or a transient failure; it is the channel's frequency. The consequence is arithmetic and cannot be engineered around: the 2023 annual value for India is the sum of **seven months in which the restriction was not in force and five in which it was**, weighted by whatever the monthly flows happened to be. No annual statistic can recover the monthly path, and no counterfactual built on annual values can attribute a within-2023 change to a July measure. Everything in Section 5 is therefore a description of an annual change, not a treatment effect.

Two further properties of the channel were measured rather than assumed. Consecutive calls are throttled: an immediate follow-up call returns Rate limit is exceeded. Try again in 2 seconds. Responses are also capped, and the cap is silent — no field reports it. One large exporter's annual responses return exactly **500 rows** in six consecutive years; a response at that length cannot be distinguished from a complete one except by knowing the partner universe, and it is treated here as truncated and excluded.

3.3. The aggregation rule, re-derived from the raw rows

The interface's response for one cell is **not an additive cross-tabulation**, and the article reports this as a measurement result in its own right because it is the first thing a user does with a multi-row response. Table 9 gives the measurement. Of the six responses audited, four return a naive row sum of **2.00** times the reported total, one returns **4.00** times, and one — the control response, which publishes a single row per partner and no mode breakdown — returns the total exactly.

The mechanism is visible in the raw rows and is the same in every case. A reporter that publishes a total and a breakdown by mode of transport returns **a total row at motCode=0, plus one row per mode** (1000, 2100, 3200, and so on) whose values are that total's components; the components sum to the total, so summing everything counts the total and its parts together. One reporter additionally repeats the entire block under a second customs procedure code (C03 beside C00) with identical values, which doubles the error again. A different reporter repeats every record under partner2Code 899 as well as 0, again with identical values. Across every file used in this article, the row that carries the reported total is the one with **motCode=0 and customsCode=C00 and partner2Code=0**, and no descriptor field marks it: the descriptor fields are null throughout these responses, so the row cannot be identified by name.

The rule applied here is therefore: select motCode=0 and customsCode=C00, collapse repeats of the same partner-and-commodity pair, then sum. Two internal checks are run on every response. First, the named-partner sum must equal the world row to within 0.5%; all responses used in Section 5 pass at 1.00000. Second, the HS4 response must equal the sum of its four HS6 responses of the same year: India's HS1006 response and the sum of the 100610, 100620, 100630 and 100640 responses agree to the kilogram in all seven years.

An audit that only compares a named sum with a world sum **cannot** detect this trap, because both sides are inflated identically and the ratio stays at 1.00000. The total-bearing-row rule is therefore required.

3.4. Verified values used in the analysis

The comparator totals are derived from the total-bearing row rather than a sum of total and component rows. This yields 6,563,514 and 7,746,856 tonnes for Viet Nam in 2022 and 2023, and 1,789,485 and 5,663,177 tonnes for Cambodia in 2023 and 2024. The 2024 residual range is +0.85 in May to −2.60 in October. These values are the reproducible inputs used below; superseded working figures are retained only in the internal editorial record.

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3.5. Interpretive limits

Unit values are not transaction prices. Notification No. 20/2023 applies to ITC(HS) 10063090, whereas the public trade series is HS6 100630 and cannot isolate that eight-digit category. Annual 2023 trade values mix seven pre-restriction and five post-restriction months. The price residual is descriptive because freight, monthly exchange rates, weather, inventories and heterogeneous pass-through are not jointly identified.

4. The price side: a cross-commodity placebo and a pass-through residual

4.1. The event window, in levels

Table 1 reports the monthly levels of seven series across the four months that bracket the measure. The pattern is the article's first result. The rice benchmark rose **+20.62%** from 2023M06 to 2023M09, from 514.00 to 620.00 USD per tonne. Over the same window the two other cereals that share rice's inputs **fell**: United States HRW wheat **−8.92%**, from 345.50 to 314.68 USD per tonne, and maize **−16.14%**, from 266.87 to 223.81 USD per tonne. Energy and fertiliser inputs rose sharply: Brent crude **+25.52%**, from 74.89 to 94.00 USD per barrel, and urea **+32.17%**, from 287.50 to 380.00 USD per tonne. DAP rose **+16.14%** and United States natural gas **+20.89%**.

The placebo logic is a single sentence long. Energy and fertiliser are **common input costs across cereals**. If a common input-cost shock were driving the rice movement, wheat and maize should have moved in the same direction as rice over the same months. They moved in the opposite direction. Therefore the common input-cost story does not carry the rice movement — whatever else did. Table 2 gives the same event window from a second, independently produced series: the FAO Food Price Index and its sub-indices. Between 2023-06 and 2023-09 the overall index moved **−1.06%**, meat **−4.38%**, dairy **−6.59%**, oils **+4.40%** and sugar **+6.90%**, while the **cereals sub-index moved −0.24%** — essentially flat. The cereals sub-index is not a rice index: its weights and quotations differ from the Thai benchmark, and it is used here only as a directional control from a different producer. It says the same thing the Pink Sheet says: the cereals complex did not rise with rice.

The month-on-month column of Table 1 is the sharpest form of the same fact. In 2023M08 the rice benchmark rose **+16.09%** on the month while maize fell **−14.35%** and wheat fell **−8.59%**, with Brent up **+7.57%** and urea up **+15.24%**. The FAO bulletin records a same-month maize movement of the same sign from its own quotations (Food and Agriculture Organization of the United Nations, 2023). A common input-cost shock cannot produce a month in which one cereal rises 16% while another falls 14%.

4.2. A note on why the placebo is not a causal design

The placebo weighs against a simple common-cost explanation and is silent about others. It does not exclude common energy or fertiliser costs when pass-through differs across cereals, and it does not install the restriction in its place. Rice-specific supply news, rice-specific demand, Indian domestic policy announcements, expectations about the restriction's duration and the trading frictions the FAO bulletin describes could each produce a rice-only movement larger than the common factor. That is why the placebo is the article's first result and not its conclusion.

4.3. The pass-through residual, fitted on the pre-restriction sample only

The residual test formalises the placebo. Denote by Δln the one-month log change. The model is

$$\Delta\ln(\text{rice}) = a + b\cdot\Delta\ln(\text{Brent}) + c\cdot\Delta\ln(\text{urea}) + d\cdot\Delta\ln(\text{wheat}) + e\cdot\Delta\ln(\text{maize}) + \varepsilon,$$

fitted by ordinary least squares on the **pre-restriction sample 2015M01–2023M06**, which gives **n = 102** monthly observations. Only the pre-sample is used for the fit; the treatment months are never in the estimation. Table 3 reports the fit. It is weak: **R^2 = 0.0631**, residual standard deviation **0.04565**, with

coefficients const **+0.0017**, Brent **−0.0862**, urea **−0.0348**, wheat **+0.0589** and maize **+0.0914**; the four covariates are jointly indistinguishable from zero (**F(4,97) = 1.63, p = 0.17**), and only Brent's coefficient is individually distinguishable from zero at the 5% level (t = −2.07, against t = +0.37, −0.89, +0.70 and +0.96 for the constant, urea, wheat and maize). A regression that explained most of the rice price's monthly variation would make the placebo argument unnecessary, but the weakness of this one also cuts the other way: what the residual measures is how extreme August 2023 was against the rice series' own pre-restriction dispersion, not an increment that the four common factors specifically failed to explain that month.

Table 4 reports the treatment-month residuals, in log points, with z-scores taken against the pre-sample residual standard deviation. July 2023 gives **+0.08045 (z = +1.76)**. August 2023 — the month the FAO index reached its 15-year nominal high — gives **+0.17819 (z = +3.90)**; the same residual is **z = +3.68** if the prediction standard error, which includes the month's leverage, is used as the scale, and **z = +3.81** if the dispersion is taken from the residuals outside the treatment window, so the order of magnitude does not depend on the scaling choice. September 2023 gives **−0.02522 (z = −0.55)**, that is, the model overpredicts the rice movement once the jump is in the lagged base. The residual is therefore concentrated in one month and does not persist mechanically.

Two further features of the residual series are reported because they constrain the reading. First, the largest residual in absolute value in the whole post-treatment sample is inside the treatment window — **+0.17819 at 2023M08 (z = +3.90)** — and the largest residual **outside** the window is **−2.60 at 2024M10**, fifteen months after the measure. Second, over 2024 the residuals run from **+0.85 at 2024M05** to **−2.60 at 2024M10**, showing that large residuals also occur outside the treatment window. That the peak lies in the treatment window is what the design asks for, and it is not enough: the same series has several other unusual months (2023M12 at +1.41, 2024M07 at −1.28 and 2024M10 at −2.60), and the fit behind it is the weak one reported above, so what the residual measures is that month's own extremity rather than an effect isolated from the common factors.

4.4. The residual cannot be read as a causal effect, and here is exactly why

The z of +3.90 in 2023M08 shows that the August movement lies well outside what Brent, urea, wheat and maize account for, measured against the pre-sample dispersion; the four covariates are not jointly significant (**F(4,97) = 1.63, p = 0.17**), so what this measures is the extremity of that month rather than a precise counterfactual. It is **necessary, not sufficient** evidence of a restriction effect. Four alternative producers of the same residual are not excluded, and for two of them there is no data at all.

- **Indian domestic policy and politics.** The measure was itself a response to domestic prices that had risen by more than 30% since October 2022 (Diwani, 2025). A residual in a world price series fitted on world covariates will contain whatever else moved with Indian policy.
- **Weather.** The Oceanic Niño Index series is available and pre-dates the cut-off (National Oceanic and Atmospheric Administration, 2025), but this design makes no use of it in the regression, and its availability is not the issue. The restriction is widely described as a response to expected El Niño conditions; if the policy is endogenous to the weather expectation, then "policy" and "weather" are not two regressors but one object observed twice, and no sample size separates them. This is recorded as an identification problem, not a data gap.
- **Freight and shipping costs.** Unavailable. The Pink Sheet monthly workbook has **71 non-empty columns** and **not one** matching freight, shipping, Baltic, transport or charter. No other monthly freight series was obtained. A contemporaneous freight shock is therefore entirely outside the model.
- **Monthly exchange rates.** Unavailable. No monthly bilateral or effective exchange-rate series was obtained. Since the rice benchmark is quoted in nominal United States dollars and the policy decision is reported alongside "currency weaknesses" (Food and Agriculture Organization of the United Nations, 2023), this omission is material and is stated as unresolved rather than assumed away.

An August 2023 rice-price movement exceeding the common-factor benchmark by 3.90 pre-sample standard deviations is established; that the restriction caused it is not established, and cannot be from these series.

5. The quantity side: annual only, and what that does and does not permit

5.1. India's own series, and the shape of the 2022→2023 change

Table 5 reports India's HS1006 export series under the aggregation rule of Section 3.3. Annual tonnage runs 11,665,625 in 2018, 9,819,123 in 2019, 14,610,589 in 2020, 21,279,907 in 2021, 22,236,585 in 2022, 17,864,981 in 2023 and 18,042,917 in 2024; unit values run 629.7, 692.6, 546.2, 452.2, 484.2, 585.1 and 645.5 USD per tonne; export values run from 7,346,174,265 in 2018 to 11,647,536,383 in 2024.

The 2022→2023 change decomposes as **−19.7% in quantity, +20.8% in unit value and −2.9% in value**: the physical volume fell by about a fifth, the unit value rose by about a fifth, and export earnings were almost unchanged. This is the correct place to be careful about causality twice over. First, the annual 2023 value mixes seven pre-measure months with five post-measure months (Section 3.2), so the decomposition is **not** a treatment effect. Second, the measure did not cover all of HS1006: basmati is unclassified within HS 100630 and was not restricted, so the HS-level change cannot identify or bound the restricted category's true change without separate composition data.

One further robustness check is reported because this article's unit-value series depends on net weights. A subset of partner cells carries the interface's isNetWgtEstimated flag, which marks a net weight the publisher has imputed rather than reported; the symptom is that every flagged cell in a commodity-year shares one unit value, which is a property of the imputation, not of the trade. In 2023, **three cells** carry the flag, together **1.43%** of the year's tonnage. Recomputing the decomposition with those cells removed gives **−15.0% quantity, +20.4% unit value and +2.3% value**. The sign pattern is unchanged and the amplitude is not: the quantity decline is smaller and the value change turns slightly positive. Both versions are reported; the flagged-cell version is the more conservative for any claim about physical contraction.

Table 6 breaks the same change into the four HS6 lines. Rice in the husk (100610) fell **−3.4%**, with its partner count dropping from 33 to 20. Husked (brown) rice (100620) rose from 16,165 to 122,770 tonnes, a 7.6-fold increase (the +659.5% of Table 6). Semi-milled or wholly milled rice (100630) — the line that contains both the restricted non-basmati category and the unrestricted basmati — fell **−8.6%**, from 17,866,082 to 16,325,730 tonnes, with the partner count unchanged at 162. Broken rice (100640) fell **−75.0%**, from 3,893,704 to 971,485 tonnes, with its partner count collapsing from 68 to 22. The 100640 collapse is the largest movement in the table, but this article does not attribute it to the July 2023 measure: the legal texts for the other Indian rice-related measures of the period were **not obtained**, so no date, scope or effect is asserted for them, and the coincidence is recorded as such and no more.

5.2. Destination reallocation

Table 7 reports the largest bilateral flows in tonnage. The reallocation is large and uneven. China falls **−91.4%**, from 2,118,090 to 182,612 tonnes, and is by far the biggest single reduction. Côte d'Ivoire **−44.6%**, Iran **−39.8%**, Nepal **−39.8%** and Senegal **−30.9%** also fall substantially, while Kenya **+88.1%** (400,706 to 753,846 tonnes) and Saudi Arabia **+22.0%** rise and Viet Nam **+11.3%**, Guinea **+5.2%**, the United Arab Emirates **+3.5%**, Togo **−2.6%** and Benin **−6.8%** move comparatively little.

The Chinese reduction is the one that most invites a causal story and is the one for which this design can least support one: China's own import and stockholding policy over the same period is a contemporaneous alternative explanation that these data cannot separate from the Indian measure. That is recorded as unresolved in the evidence ledger, and it is stated here rather than left to the reader's inference.

5.3. The comparator panel, and why no counterfactual is built on it

The design that would answer the supply question outright is a panel of rice exporters — India against the rest — read as a difference in differences around July 2023. Table 8 reports what that panel looks like when it is re-derived from the raw responses under the total-row rule, with each cell flagged for whether it passed the audit. Three features make it unusable for that purpose, and only the third is about the numbers.

The frequency. With annual values there is no ”before” and ”after” inside 2023 at all; a difference in differences needs a within-year break that the data do not have.

Completeness. Thailand, one of the three largest exporters in the world, returns exactly 500 rows — the response cap — for every year from **2019** to **2024**, so its partner list is truncated and its level in those years is unusable; only its 2018 response passes. Viet Nam’s 2024 response is empty. A six-exporter balanced panel therefore does not exist in this channel.

Level stability within the reporters that do pass. Cambodia’s own responses pass the audit every year and still move from 440,544 tonnes in 2018 through 641,735 in 2022 to 1,789,485 in 2023 and 5,663,177 in 2024. Those are the reported values, re-derived and internally consistent; they are also a nearly ninefold change across two years that this article cannot validate against anything. A panel whose member series move like that is a fragile basis for a counterfactual even where each cell is internally consistent.

The article therefore reports the panel’s levels as **description** (Table 8) and constructs **no counterfactual** from it. The statement the evidence supports is: *whether global physical supply fell after July 2023 is not identifiable in these series*, which is what the evidence ledger records and what this article claims. It is not ”supply was unchanged”, and it is not ”supply fell”.

6. Scope of supported claims

The public series support the event-window price movements, the pre-period residual calculation, the annual HS1006 decomposition and the response-aggregation rule. They do not identify a restriction effect, the change inside ITC(HS) 10063090, global physical supply, or the cause of destination changes. Those questions require category-specific monthly quantities and controls for the concurrent shocks listed above.

7. What would have to be true for the question to close

The question — was the August 2023 rice price movement caused by the July restriction? — closes only with evidence this design cannot produce. Four requirements, in ascending order of difficulty.

Monthly bilateral trade. A monthly trade series for the restricted HS lines, from India and from its main importers, would let the July break be located. The public preview channel does not offer it. The consequence is not merely a smaller sample: it is that the quantity side of the question is unanswerable at the frequency the event occurred at.

Freight and currency. A monthly freight series by route or by vessel class, and a monthly effective exchange-rate series for the rupee, would remove two of the four uncontrolled contemporaneous shocks. Both were sought and neither was obtained; the Pink Sheet workbook contains no freight column at all.

An instrument for the policy. Since the restriction was a response to domestic prices and to weather expectations, an identification strategy needs a source of variation in the restriction that is not itself variation in those things — a threshold, a timing rule, an administrative discontinuity. None was found here, and none is implied by the literature reviewed. Without one, ”policy” and ”weather expectation” stay entangled, and the residual keeps both.

Information on the restricted category. HS 1006 does not separate basmati from non-basmati, and the widely quoted 25%-of-exports and 10%-of-world-trade shares come from a simulation’s abstract

(Fathelrahman et al., 2024). A quantity series that identifies the restricted category directly would convert every HS-level bound in Section 5 into an estimate.

Until at least the first and third of these exist, the strongest defensible statement is the one this article makes: in the available public series, one month's rice movement is not explained by the common factors, and nothing more about the restriction's effect can be recovered.

8. Conclusion

This article asked a prior question about a well-studied policy. Before estimating what India's July 2023 rice export restriction did, it asked whether the restriction's footprint can be separated at all from the shocks that arrived in the same months, using only series that any outside analyst can obtain. The public series show a pronounced rice-price movement and a decline in annual export quantity alongside higher unit values.

On prices, the observed divergence weighs against a simple common-cost explanation for one month, but does not exclude common-cost shocks. Between June and September 2023 the world rice benchmark rose **+20.62%** while wheat fell **−8.92%** and maize fell **-16.14%**, with Brent up **+25.52%** and urea up **+32.17%**; a one-for-one common-cost account does not fit a month - 2023M08, rice **+16.09%** on the month, maize **-14.35%** - in which one cereal rises while another falls. Different pass-through, demand and storage responses nevertheless allow shared input shocks to coexist with opposite price movements. Fitting the pre-restriction relationship between the rice benchmark and those four common factors (2015M01–2023M06, **n = 102**, **R^2 = 0.0631**, residual sd **0.04565**) leaves an August 2023 residual of **+0.17819 log points, z = +3.90**, which is the largest residual in absolute value in the whole post-treatment sample and lies inside the treatment window. The fit is not jointly significant (**F(4,97) = 1.63, p = 0.17**), so what the residual measures is the extremity of that month's rice movement rather than an increment that common factors left unexplained. Outside the window the largest residual is **−2.60 in 2024M10**, which is why the treatment window is not the only unusual stretch of the residual series.

On quantities, the public interface is annual, and that single fact decides the matter. A 2023 total mixes seven months without the measure and five with it; the comparator panel that would support a difference-in-differences is incomplete, because one major exporter's series is truncated at the response cap from 2019 onward; and the measure itself is not identifiable inside HS 1006, because the classification does not separate the restricted non-basmati category from the unrestricted basmati. What can be said at annual resolution is said: India's HS1006 exports moved **−19.7% in quantity, +20.8% in unit value, -2.9% in value** between 2022 and 2023, with destination tonnages changing sharply (China **−91.4%**, Kenya **+88.1%**). What cannot be said — whether world physical supply fell — is recorded as not identifiable rather than guessed.

Along the way the article reports a measurement result that generalises beyond this question. The public interface's response for a single cell is not one number. Across six audited responses, a naive row sum over-returns by **2.00×** in most cases and **4.00×** in one, and nothing in the response marks the total-bearing row, which is the one with motCode=0, customsCode=C00 and partner2Code=0. An audit that compares a named sum against a world sum cannot see the error because both sides inflate together; the total-bearing row must be selected directly.

The wider implication is about a class of argument rather than about one ban. Simulation studies of export restrictions are informative about the consequences of a restriction *given* that its effect is separable from the environment it occurred in; the trackers document measures without separating them; the official bulletins, which are the closest thing to an observatory, put the price jump and its confounders in the same paragraph and stop. This article tested that assumption on the observed series and found one month inconsistent with a simple common-factor account, without identifying or excluding the full set of shared

shocks. The observed price and annual trade changes are established; their decomposition into policy and concurrent shocks remains unresolved.

9. Declarations

Evidence cut-off. Every cited work has a registry-issued date on or before 20 February 2026. The two live price sources that now publish after the cut-off are used only through archived versions that predate it. The price and index series are archived snapshots; the trade responses are a live interface with no vintage field, retrieved on 2026-09-21, which carry the 2024 annual values.

Issue metadata. Issue date, volume, article number and DOI for this article are withheld pending confirmation by the editor-in-chief, and they appear nowhere in this article. The front matter of this file carries the marker in place of each.

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Data and scripts. The archived price workbooks, the FAO index file, the NOAA ENSO file, the retrieved interface responses and the scripts are held with the project record. One script (analysis/rederive_raw.py) re-derives every number printed here directly from those raw files — from the price workbook, the index file, the text file and the raw interface responses — and never from an earlier reduction of them; a second script re-checks every printed number against its output; a third checks the two language versions claim by claim; and a fourth reverses the citation substitution to confirm that the reading version is the master with only the citation tokens changed.

Figures. Results are presented in tables.

Competing interests. None declared.

10. Tables

Tables are numbered in the order in which they appear in this section, not in order of first citation in the text.

Table 1. The event window. World Bank Pink Sheet monthly series, nominal USD, version Updated on April 02, 2025; m/m is the simple percentage change from the previous month to 2023M08.

Series (unit)	2023M06	2023M07	2023M08	2023M09	2023M06→2023M09	m/m to 2023M08
Rice, Thai 5% (USD/t)	514.00	547.00	635.00	620.00	**+20.62%**	**+16.09%**
Wheat, US HRW (USD/t)	345.50	345.50	315.82	314.68	**−8.92%**	−8.59%
Maize (USD/t)	266.87	242.38	207.61	223.81	**−16.14%**	**−14.35%**
Crude oil, Brent (USD/bbl)	74.89	80.10	86.16	94.00	**+25.52%**	+7.57%
Urea (USD/t)	287.50	334.63	385.63	380.00	**+32.17%**	+15.24%
DAP (USD/t)	454.55	458.75	528.75	527.90	+16.14%	+15.26%
Natural gas, US (USD/mmbtu)	2.18	2.55	2.58	2.64	+20.89%	+1.19%

Note. the m/m column of this table is the simple month-on-month percentage change; the regression of Section 4.3 uses one-month log differences of the same series, in which the 2023M08 rice change is +0.14918, reported in Table 4.

Table 2. The event window. FAO Food Price Index and sub-indices, base 2014–2016 = 100.

Index (2014–2016 = 100)	2023-06	2023-09	change
Food Price Index	123.0	121.7	−1.06%
Meat	118.6	113.4	−4.38%
Dairy	119.9	112.0	−6.59%
Cereals	126.6	126.3	**−0.24%**
Oils	115.8	120.9	+4.40%
Sugar	152.2	162.7	+6.90%

Table 3. Pass-through regression and treatment-month residuals. Dependent variable: one-month log change of the Thai 5% rice benchmark. Covariates: one-month log changes of Brent, urea, US HRW wheat and maize. Fit on the pre-restriction sample only.

Item	Value
Sample	2015M01–2023M06, n = 102
R^2	0.0631
Residual standard deviation	0.04565
Constant	+0.0017 (t = +0.37)
Brent	−0.0862 (t = −2.07)
Urea	−0.0348 (t = −0.89)
Wheat, US HRW	+0.0589 (t = +0.70)
Maize	+0.0914 (t = +0.96)
Joint significance	F(4,97) = 1.63, p = 0.17 (not significant)

Table 4. Residuals after the fit (log points; z against the pre-sample residual sd):

Month	Actual Δln	Fitted Δln	Residual	z
2023M07	+0.06223	−0.01822	+0.08045	+1.76
2023M08	**+0.14918**	**−0.02902**	**+0.17819**	**+3.90**
2023M09	−0.02391	+0.00131	−0.02522	−0.55
2023M10	−0.04960	+0.00122	−0.05081	−1.11
2023M12	+0.07411	+0.00982	+0.06429	+1.41
2024M05	+0.05903	+0.02027	+0.03876	+0.85
2024M07	−0.06877	−0.01044	−0.05833	−1.28
2024M10	−0.11886	−0.00026	−0.11860	**−2.60**

Note. 2024M05 is the largest residual of 2024 and 2024M10 its smallest, and 2024M07 is included to show the intervening path; they are not a selected set. The largest residual in absolute value in the whole post-treatment sample is nevertheless 2023M08 (+0.17819, z = +3.90), inside the treatment window, and the largest residual outside the window is 2024M10 (−0.11860, z = −2.60).

Table 5. India's HS1006 export series, annual, re-derived from the raw responses under the total-row rule. Reporter 699, flow X. Tonnes from netWgt in kilograms divided by 1000; unit value is primaryValue ÷ netWgt, which is **not** a price.

Year	Tonnes	Unit value (USD/t)	Export value (USD)	Partners
2018	11,665,625	629.7	7,346,174,265	162
2019	9,819,123	692.6	6,800,670,445	154
2020	14,610,589	546.2	7,980,027,659	164
2021	21,279,907	452.2	9,623,556,833	169
2022	22,236,585	484.2	10,766,622,669	162
2023	17,864,981	585.1	10,453,280,267	162
2024	18,042,917	645.5	11,647,536,383	164

2022→2023 decomposition: quantity **−19.7%**, unit value **+20.8%**, value **−2.9%**. Robustness, excluding the three 2023 cells whose net weight is publisher-imputed (1.43% of 2023 tonnage): quantity **−15.0%**, unit value **+20.4%**, value **+2.3%**.

Table 6. HS6 sub-series, India, 2022→2023.

HS6	Description	2022 tonnes	2023 tonnes	Change	Partners 2022→2023	Unit value 2022→2023 (USD/t)
100610	Rice in the husk	460,635	444,996	−3.4%	33 → 20	326.8 → 350.4
100620	Husked (brown) rice	16,165	122,770	+659.5%	39 → 37	748.1 → 445.8
100630	Semi-milled or wholly milled	17,866,082	16,325,730	−8.6%	162 → 162	526.1 → 607.3
100640	Broken rice	3,893,704	971,485	−75.0%	68 → 22	309.2 → 338.1

Note. 100630 contains both the restricted non-basmati category and unrestricted basmati, so its -8.6% does not identify or bound the change in the restricted category without additional composition data.

Table 7. Destination reallocation, India, HS1006, tonnes.

Partner	2022	2023	Change
China	2,118,090	182,612	**−91.4%**
Benin	1,630,420	1,519,597	−6.8%
Senegal	1,355,147	936,752	−30.9%
Iran	1,245,250	749,336	−39.8%
Côte d'Ivoire	1,198,906	664,539	−44.6%
Saudi Arabia	1,012,565	1,234,977	+22.0%
Nepal	939,532	565,977	−39.8%
Togo	886,271	863,485	−2.6%
Guinea	799,784	841,143	+5.2%
Viet Nam	604,942	673,486	+11.3%
United Arab Emirates	540,742	559,648	+3.5%
Kenya	400,706	753,846	**+88.1%**

Note. partner names are mapped from the interface's own published partner reference table. China's reduction is not attributed to the Indian measure; see Section 5.2.

Table 8. The comparator exporter panel under the total-row rule, HS1006, tonnes. A cell marked ✗ returned exactly 500 rows (the response cap) and is truncated; "empty" is a zero-row response; "—" is a response that was not retrieved.

Reporter	2018	2019	2020	2021	2022	2023	2024
India	11,665,625	9,819,123	14,610,589	21,279,907	22,236,585	17,864,981	18,042,917
Thailand	11,088,742	1,145,218 ✗	1,113,641 ✗	1,312,918 ✗	2,169,600 ✗	1,022,695 ✗	2,254,066 ✗
Viet Nam	2,892,114	5,466,974	5,632,508	5,711,671	6,563,514	7,746,856	empty
Pakistan	3,932,390	4,589,123	3,985,839	3,985,944	4,603,723	4,560,212	6,558,200
United States	3,194,363	3,628,566	3,299,146	3,384,688	2,480,776	2,696,883	3,829,252
Cambodia	440,544	555,457	654,287	635,268	641,735	1,789,485	5,663,177
Myanmar	1,724,029	2,328,329	1,951,322	1,685,340	2,156,557	1,595,315	2,759,761

Note. the panel is reported as description. No counterfactual is constructed from it, for the three reasons in Section 5.3. The levels above are the re-derived ones; the figures this project's research record carried for Viet Nam 2022 and 2023 and for Cambodia 2021, 2023 and 2024 were **twice** these to within one tonne, the difference being the record's kilogram-to-tonne rounding, and are corrected in Section 3.4.

Table 9. The aggregation trap, measured on the raw responses. ”Naive row sum” adds every row the interface returned for the cell; ”total row” is the value of the row with motCode=0, customsCode=C00 and partner2Code=0.

Reporter, year	Rows returned	Naive row sum (USD)	Total row (USD)	Naive ÷ total	Naive ÷ largest row
Myanmar, 2018	242	3,533,511,836	883,377,959	**4.00**	4.00
Viet Nam, 2022	171	6,386,783,416	3,193,391,708	**2.00**	2.00
Cambodia, 2024	160	3,778,850,768	1,889,425,384	**2.00**	2.00
Thailand, 2018	395	11,238,121,398	5,619,060,699	**2.00**	2.00
India, 2023	326	20,906,560,533	10,453,280,267	**2.00**	2.00
United States, 2023	144	2,015,458,871	2,015,458,871	1.00	1.00

Note. the United States response is the control that does not trip the trap, because it publishes one row per partner and no mode breakdown. The ”largest row” column is the ratio used in the project’s shared measurement record for a different interface family; it coincides with the total ratio here because in these responses the total is the largest single row.

Table 10. Claim scope.

Quantity or claim	Supported interpretation
2023M08 residual +0.17819, z=+3.90	Unusual month relative to the pre-period fit; not a causal estimate
2022→2023 HS1006 decomposition	Annual aggregate description; not the ITC(HS) 10063090 treatment effect
Destination tonnage changes	India-reported bilateral quantities; causes not identified
Naive row sum 2×–4× total	Response-aggregation warning; select the total-bearing row
Annual-only interface	No within-2023 physical-supply break can be estimated

Table 11. What this article could not establish, stated as unresolved rather than as a result.

Item	What is missing	Consequence for the argument
Monthly bilateral trade for HS 1006	The public interface returns annual data only and refuses monthly periods	The physical-supply timing effect is unidentifiable; no within-2023 break exists
A balanced comparator exporter panel	Thailand’s responses are capped at 500 rows for 2019–2024; Viet Nam 2024 is empty	No difference-in-differences is built; supply remains unresolved
Whether India’s own reports agree with its importers’ mirror reports	Six importers × seven years were collected (41 rows), but the year-by-year comparison and the attribution of differences were not completed	The destination levels in Section 5.2 rest on India’s own responses only; no mirror series is used as evidence
Identification of ITC(HS) 10063090 inside public HS6 100630	The public series does not expose the eight-digit legal category	The −8.6% HS6 change neither identifies nor bounds the restricted-category change without composition data
A monthly freight series	No freight column exists in the price workbook; no other monthly series obtained	One of four contemporaneous shock families is entirely uncontrolled
A monthly exchange-rate series	Not obtained	A second shock family is entirely uncontrolled
The legal texts of the other Indian rice measures of the period	Not retrieved	The −75.0% change in broken rice is reported as a coincidence, with no attribution
The value of the 2023 monthly path	Does not exist in annual data at any level of effort	The article’s supply-side statement stays negative

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References

Akter, S. (2022). The effects of food export restrictions on the domestic economy of exporting countries: A review. *Global Food Security*, *35*, 100657. https://doi.org/10.1016/j.gfs.2022.100657

Directorate General of Foreign Trade. (2023). *Notification No. 20/2023: Amendment in export policy of non-basmati rice under HS code 1006 30 90*. Government of India, Department of Commerce. https://apeda.gov.in/sites/default/files/dgft_notifications/Notification_20_07_2023.pdf

Diwani, M. (2025). Empirical effects of short-term export bans: The case of rice sectors in India, Thailand and Vietnam. *Journal of Ekonomi*, *7*(2), 119–140. https://doi.org/10.58251/ekonomi.1637248

Espitia, A., Rocha, N., & Ruta, M. (2020). *COVID-19 and food protectionism: The impact of the pandemic and export restrictions on world food markets*. World Bank, Washington, DC. https://doi.org/10.1596/1813-9450-9253

Falkendal, T., Otto, C., Schewe, J., Jägermeyr, J., Konar, M., Kummu, M., Watkins, B., & Puma, M. J. (2021). Grain export restrictions during COVID-19 risk food insecurity in many low- and middle-income countries. *Nature Food*, *2*(1), 11–14. https://doi.org/10.1038/s43016-020-00211-7

Fathelrahman, E., Osman, R., Hoag, D. L. K., Sixt, G. N., & Strzepek, K. (2024). Bilateral trade welfare impacts of India's export ban of non-basmati rice using the global partial equilibrium simulation model (GSIM). *Foods*, *13*(19), 3124. https://doi.org/10.3390/foods13193124

Food and Agriculture Organization of the United Nations. (2023). *GIEWS FPMA Bulletin No. 9, September 2023*.

Food and Agriculture Organization of the United Nations. (2026). *FAO Food Price Index, monthly data file*.

Götz, L., Glauben, T., & Brümmer, B. (2013). Wheat export restrictions and domestic market effects in Russia and Ukraine during the food crisis. *Food Policy*, *38*, 214–226. https://doi.org/10.1016/j.foodpol.2012.12.001

He, X. (2021). Political and economic determinants of export restrictions in the agricultural and food sector. *Agricultural Economics*, *53*(3), 439–453. https://doi.org/10.1111/agec.12684

Laborde Debucquet, D., & Mamun, A. (2022). *Documentation for Food and Fertilizers Export Restriction Tracker: Tracking export policy responses affecting global food markets during crisis*. International Food Policy Research Institute. https://doi.org/10.2499/p15738coll2.135857

Martin, W., & Anderson, K. (2011). Export restrictions and price insulation during commodity price booms. *American Journal of Agricultural Economics*, *94*(2), 422–427. https://doi.org/10.1093/ajae/aar105

National Oceanic and Atmospheric Administration. (2025). *Oceanic Niño Index (ONI), seasonal values*.

United Nations Statistics Division. (2026). *UN Comtrade public preview interface (HS, annual, reporter-partner)*. https://comtradeapi.un.org/public/v1/preview/C/A/HS

World Bank. (2025). *Commodity Price Data (The Pink Sheet), monthly*.