POLICY BRIEF

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# REPURPOSING FERTILIZER SUBSIDIES IN INDIA: AN ECONOMYWIDE MODELING ANALYSIS

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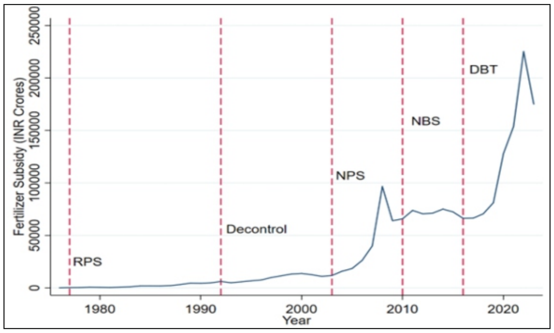
## 1. INTRODUCTION

Between 1980 and 2023—pushed by green revolution technology and fertilizer subsidy policy—fertilizer consumption in India increased from 31.95 kg/ha to 136.05 kg/ha (FAI 2024). The fiscal burden of fertilizer subsidies in India has surged dramatically, increasing from INR 505 crores in 1980/1981 to INR 2,25,220 crores in 2022/2023 (ibid). As of 2022/2023, the budgetary allocation for fertilizer subsidy was 1.02 percent of India's gross value added (GVA). Fertilizer subsidies have led to greater price increases for phosphorus and potassium fertilizers than for urea, making urea the preferred choice among farmers. This consequent overreliance on urea has created significant imbalances in soil nutrient composition, and subsidized urea is also often diverted to other industries undermining its intended benefit for the agricultural sector.

**Figure 1. Trends in fertilizer subsidies (INR crores)**




**Source:** FAI 2024.
**Note:** RPS = Retention Price Scheme; NPS = New Pricing Scheme; NBS = Nutrient Based Subsidy; DBT = Direct Benefit Transfer.

Recognizing these challenges, the government has recently expressed its intent to curtail fertilizer subsidies, with the latest initiative in this direction being the Prime Minister Programme for Restoration, Awareness Generation, Nourishment, and Amelioration of Mother Earth (PM-PRANAM). Without alternative compensation mechanisms, however, reducing fertilizer subsidies will increase the cost of cultivation and reduce farmers' income. Farmers' regular demand will thus contract, which will have spillover effects on the rest of the economy. In this policy brief, we aim to assess the economywide impacts of reducing fertilizer subsidies in India and to explore alternative compensatory mechanisms that might reduce the adverse consequences on farmers' income of reducing fertilizer subsidies.

## 2. DATA AND METHODOLOGY

We have used a national economywide model to conduct a counterfactual analysis of fertilizer policies in India. It is built in the tradition of IFPRI's standard computable general equilibrium (CGE) model, a detailed description of which is available in Löfgren et al. (2002) and Thurlow (2008). This model considers a complex economic system and satisfies key macroeconomic constraints. These constraints cover markets (for factors and commodities) and macroeconomic aggregates (balances for savings–investment, the government, and the current account of the rest of the world) (Löfgren et al. 2002). The price system in the model determines the equilibrium domestic price of commodities

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through market clearance. It is assumed that the world prices of exports and imports are exogenously fixed and that any changes in world prices due to external factors will change the domestic market price of the commodities.

In this case, we have assumed unemployment among low-skilled workers and highly skilled workers is fully employed, but all the workers are freely mobile across activities. The capital supply is assumed to be non-convertible and thus fully employed across activities. We also assume that foreign exchange rates are flexible and government savings fixed, and that if foreign savings fall due to external shocks a depreciation of the real exchange rate will correct the balance of payment of the domestic economy. Fixed government savings ensure that subsidy savings are automatically reallocated to different sectors based on profitability. Finally, we have assumed fixed savings rates for all non-governmental institutions including households, and that the quantity of each commodity in the investment bundle is multiplied by a flexible scalar to ensure that the investment cost equals the value of the savings.

To solve this model, we have used the Social Accounting Matrix (SAM) of India for the year 2019/2020 as the primary data source for calibrating our CGE model. The SAM encompasses 34 primary agricultural activities, 41 industrial activities, and 12 service activities. Households are categorized into rural farm, rural non-farm, and urban groups, with further disaggregation into five income quintiles. Further details about this SAM are available in a document entitled, "2022/23 Social Accounting Matrix for India: A Nexus Project SAM" (IFPRI 2024). Additionally, plot-level cost-of-cultivation data from the Directorate of Economics and Statistics, Government of India, for the period 2017/2018 to 2019/2020 (GOI. 2021), is used to estimate the yield response to fertilizer use for significant crops. Own-price elasticities of fertilizer demand are obtained from Kumar et al. (2010). Based on these estimates, the productivity shocks for crops are determined and incorporated into the model during simulations.

Finally, this model has been solved with two counterfactual scenarios (Table 1).

**Table 1. Description of scenarios**

| Scenario | Anticipated impacts |
|---|---|
| **Scenario 1 (Without transfer):** Reduction in fertilizer subsidy budget by 10% and 50% | Increase in fertilizer prices and consequent fall in agricultural production, leading to declines in farm household incomes and agricultural GVA |
| **Scenario 2 (With transfer):** Scenario 1, but with fiscal savings from subsidy slashing being reallocated to farmers in the form of transfers | Transfers compensate for the lost income of farm households, leading to increased income for these households |

**Source:** Authors' compilation.

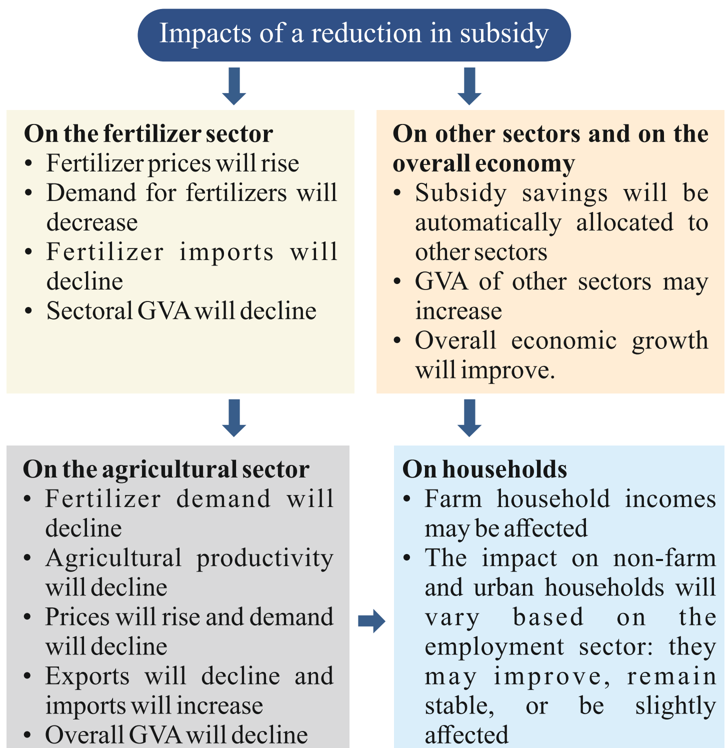
Analysis of the results from these scenarios involves comparing them with the baseline scenario; the latter replicates the structure of the economy as depicted in the SAM for the year 2019/2020 and assumes no change in fertilizer policy.

## 3. RESULTS AND DISCUSSION

Prior to analyzing the empirical results derived from the model, Figure 2 broadly describes the economywide impact pathways of fertilizer subsidy reductions. As it suggests, the immediate impact will be reflected in rising fertilizer prices, a decline in fertilizer demand and imports, and a decline in sectoral GVA, while associated sectors may experience an increased GVA. It is expected that the decline in fertilizer demand within the agricultural sector will ultimately lead to reduced crop yields. For comparison, empirical studies from select Asian countries indicate that subsidy reductions do contribute to higher fertilizer prices and a consequent decline in the yields of specific crops (Wu et al. 2024; Bathla, Kumar, Aggarwal 2021). A decline in agricultural production is likely to have adverse effects on trade dynamics, reducing exports and increasing imports of agricultural commodities; this, in turn, may negatively impact the incomes and consumption patterns of rural farm households.

Sectors reliant on fertilizers may also experience a downturn in production, potentially affecting non-farm and urban households associated with these industries; however, as the model assumes that subsidy savings are reallocated to various sectors based on their profitability, specific sectors

**Figure 2. Pathway of economywide effects of a reduction in subsidy**



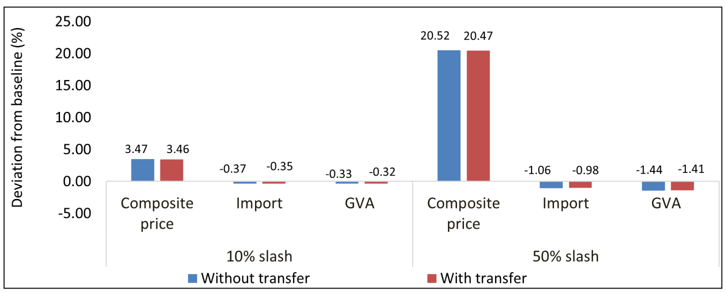

**Source:** Authors' compilation

may witness growth in production and in GVA, contributing to overall economic expansion. This redistribution could benefit non-farm and urban households linked to these expanding sectors. The Figure 2 schematic constitutes the backdrop for an analysis of the empirical results derived from the two scenarios explored in the model.

### 3.1. Impact on the fertilizer sector

As shown in Figure 3, subsidy reduction leads to an increase in composite price in the fertilizer sector, with the extent of the price rise corresponding to the level of the subsidy cut. Sectoral GVA shows a decline of 0.33 percent to 1.44 percent from the baseline due to the reduced demand that follows from increased fertilizer prices. Imports also show a decline from 0.37 to 1.06 percent due to an increase in composite demand prices, which corresponds to a savings of INR 172 to 492 crores in import bills. Although this trend continues in both transfer and non-transfer scenarios, the increase in prices, decline in GVA, and reduction in imports are slightly less pronounced in the scenario that includes transfers.

**Figure 3. Impact on the fertilizer sector of Scenario 1 (without transfer) and Scenario 2 (with transfer)**

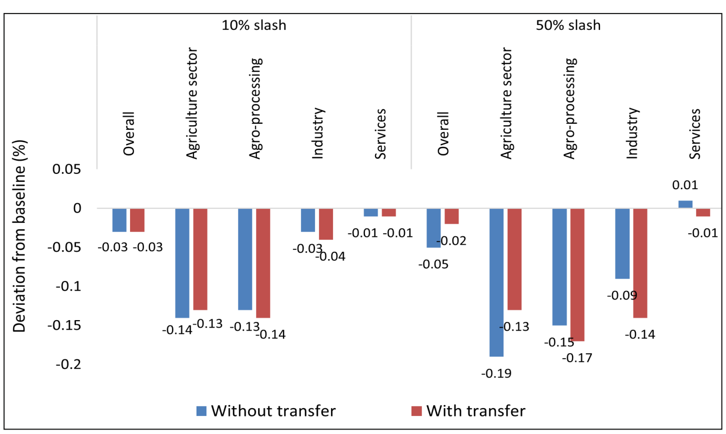



**Source:** Simulation-based results.

### 3.2. Impact on the overall economy

The rise in fertilizer prices lowers fertilizer demand, leading to a decline in agricultural production. This, in turn, drives up agricultural commodity prices, thus reducing their consumption, as reflected in the 0.14 percent to 0.19 percent

**Figure 4. Impact of subsidy reductions on GVA of the overall economy and of major sectors**



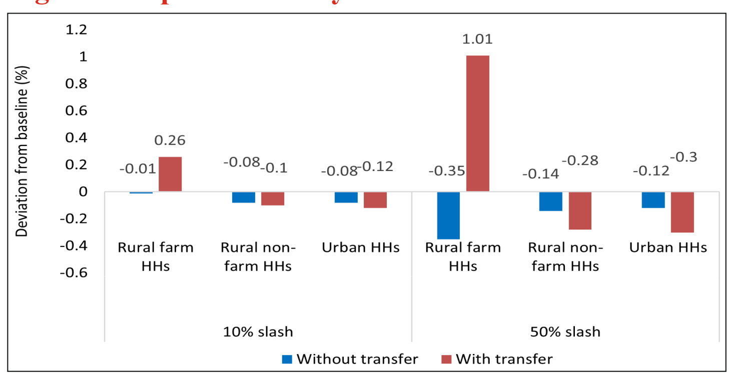

**Source:** Simulation-based results.

decline in the agricultural sector's GVA (Figure 4). The reduction in domestic agricultural production also results in lower exports and higher imports, and the agro-processing sector (which is closely linked to agriculture) experiences a comparable decline in GVA. Industrial output falls by 0.03 percent to 0.09 percent from the baseline, while the impact on the services sector remains minimal. At the macroeconomic level, the GVA at market prices declines by 0.03 to 0.05 percent from the baseline. While subsidy transfers improve agricultural production and overall GVA, they remain below the base level.

### 3.3. Impact on households

As shown in Figure 5, the reduction in subsidies leads to a decrease in the real incomes of all household categories. This decrease is driven by declines in industrial and agricultural output, factor demand, and wages. Rural farm households experience the largest income reduction, pointing to the higher vulnerability to policy shock of farm households. When subsidy savings are transferred to rural farm households their overall real income rises, while real incomes in rural non-farm and urban households do not show any improvement. Consumption also declines due to the drop in income levels.

**Figure 5. Impact of subsidy reductions on households**




**Source:** Simulation-based results.

## 4. CONCLUSIONS AND POLICY IMPLICATIONS

Fertilizer subsidies have long been a cornerstone of India's agricultural policy, ensuring affordable fertilizers for farmers and boosting food production; however, this system has also led to an ever-growing fiscal burden on the government. Instances of diversion of subsidized fertilizers to non-agricultural uses and increasing nutrient imbalances in several parts of the country have also raised concerns about its actual benefits to the farming community. With rising fiscal and sustainability concerns, the government has increasingly signaled its intent to reduce fertilizer subsidies, but the economic consequences of such a shift remain uncertain.

This study uses a computable general equilibrium (CGE) model to explore the broader economic consequences of reducing fertilizer subsidies. Our findings reveal that while cutting subsidies can ease the fiscal burden, the negative impacts of subsidy reductions spill from agriculture to other sectors. The models suggest that GVA declines across all major sectors, even when savings from subsidy reductions are redirected to rural farm households via direct transfers. These transfers help cushion the blow for farmers, mitigating some of the income and consumption losses, while rural non-farm and urban households, in contrast, experience a decline in real income.

Given these findings, a blanket reduction in fertilizer subsidies is not a feasible solution. While fiscal sustainability is essential, any significant policy shift that affects farmers directly must also exhibit the potential of improving economic growth and farmer livelihoods. A well-designed and phased approach to subsidy reforms, combined with investments in sustainable alternatives, precision farming, and farmer education is the way forward for creating a resilient agricultural system that balances economic viability with environmental sustainability.

## ABOUT THE AUTHORS

Asha Devi is scientist; K. V. Praveen is senior scientist; Alka Singh is head and principal scientist; Subrata Barman, K. Ramanjaneya Reddy, and Shreya Hanji are PhD scholars in the Division of Agricultural Economics, ICAR-IARI, New Delhi; Kriti Sharma is research analyst, Barun Deb Pal is research coordinator at the International Food Policy Research Institute, New Delhi; and Ch Srinivasa Rao is the Director & Vice Chancellor of the ICAR-Indian Agricultural Research Institute (ICAR-IARI), New Delhi.

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