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Agricultural Subsidies: Resurging Interest in a Perennial Debate*

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I

INTRODUCTION

Subsidies have a long history of use – and abuse. Food security has historically been a high priority for policy makers, providing the core justification for agricultural subsidies. Interest in agricultural subsidies has resurged in recent years driven by two factors: (i) the global food price spikes of 2007, with sustained high prices in subsequent years, have renewed concerns about food security, and (ii) the frustration with slow progress in agricultural growth in several parts of the world, including several countries of Africa and Asia where food security remains a major concern, has increased calls for input subsidies, especially for fertilisers to stimulate productivity growth.

Faced with the slow pace of structural transformation, persistent rural poverty, and a widening gap between the incomes of rural and urban populations, political and social imperatives compel policy makers to find ways to boost the incomes of a large share of the population engaged in agriculture, and subsidies are often seen as a convenient way of doing so. Past subsidies resulted mostly from trade policies and output price supports. Most current subsidies in developing countries are direct input subsidies, at times complemented by price supports (backed by public procurement) and trade policies.

Despite their widespread use, or perhaps because of it, subsidies continue to be vigorously debated amongst policy analysts and researchers, often taking seemingly political and ideological overtones. Subsidies (and the specific forms they take) have their justifications but also some serious drawbacks. The costs relative to the benefits associated with different subsidies are at the heart of this debate. The conceptual arguments in favour of subsidies have appeal (see Bardhan and Moorkherjee, 2011; World Bank, 2007), but a poor track record of implementation and the historical legacy of subsidies, particularly the high opportunity costs of scarce budgetary

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resources tied up in unproductive or marginally productive uses, are the basis for many analysts' and economic advisers' opposition to subsidies. Empirical evidence on the effectiveness of subsidies is limited, and what is available shows very mixed results.

This paper briefly reviews the main arguments for and against subsidies, and pulls together compelling empirical findings, in specific circumstances, to highlight some significant implicit costs with potentially serious consequences. The next section provides a brief historical review of the evolution of agricultural policy and the role of subsidies. The third section reviews the rationale for the use of subsidies – noting both the conceptual basis and the political economy of subsidies. The fourth section summarises the main critiques emerging from the global experience with subsidies. The fifth section highlights the hidden costs of subsidies in a few selected cases. The penultimate section summarises the current thinking on input subsidies, and the final section gives some concluding thoughts.

II

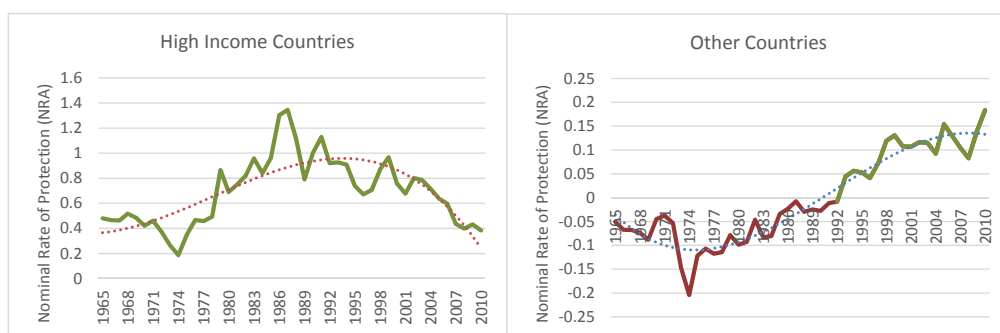
A BRIEF HISTORICAL PERSPECTIVE

Governments have long intervened in agricultural markets, including in the current developed countries when they were not so developed, ostensibly to promote food security. The early interventions sought to ensure affordable food for fast rising urban population (in the now developed countries), and in recent times to promote agricultural productivity (in the current developing countries). Various forms of interventions have been used to alter producer incentives – both directly through pricing policies and/or alternative mechanisms to deliver inputs or procure outputs and indirectly through trade and macro-policies such as tariffs, quantitative restrictions, foreign exchange valuation, and the manipulation of internal terms of trade. Public interventions ultimately manifest themselves as subsidies – which, by choice or inadvertently, either favour consumers (implying net negative subsidies or taxation of agriculture) or producers (as net positive subsidies). Such interventions are a global phenomenon, making agriculture the most distorted sector of the world economy (Panagariya, 2005).

The historical record of agricultural policies reveals two distinct patterns of policy intervention in agriculture, which Lindert (1991) refers to as the developmental pattern and the anti-trade pattern. The former pattern shows a switch from taxation of agriculture in the early stages of development to subsidising agriculture as the economy develops. The latter shows a general tendency of governments to tax exportables and subsidise importables – using varying measures to restrict trade to differing degrees. One or both of these patterns have endured the test of time and are observed consistently across the spectrum of economic development (Krueger *et al.*, 1991; Anderson, 2009).¹

In the post-World War period, the high-income countries have heavily subsidised agriculture, initially to stimulate production but over time to maintain farm incomes. These policies have significantly affected world agricultural markets (Sumner, 2007). The high levels of OECD subsidies have moderated over the past two decades, as shown in Figure 1, but remain high. This is despite the commitment by OECD countries to improve the functioning of world agricultural markets through reduced distortions (Legg, 2003).

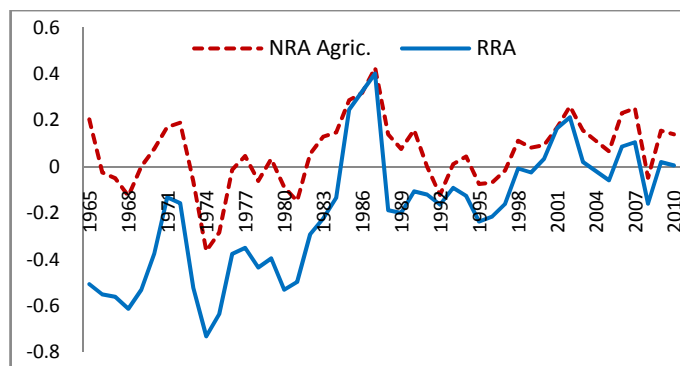
But agricultural protection and barriers to agricultural trade are not just a developed-country phenomenon, nor are they the only source of problems for developing countries' agricultural development. Various subsidies for inputs, price supports, and trade interventions have been an integral part of the economic policy landscape of developing countries themselves at least since the 1960s, and these policies have been equally distortionary and harmful to the developing countries' own interests (Panagariya, 2005). These trends are evident in Figure 1, which shows that on average, developing countries have followed a pattern remarkably similar to Lindert's historical developmental pattern observed in the developed countries. Individual countries and regions are at different stages on the stylised evolutionary path, depending on their level of agricultural development.²



Source: Author using data from Anderson and Nelgen, 2012.

Figure 1. Nominal Rates of Protection in High Income and Other Countries, 1965-2010.

The case of India is somewhat of an exception in this regard, in that it has not followed the standard trade protection pattern (at least since the mid-1960s, the period for which data are available). As shown in Figure 2, India's support for agriculture relative to external markets, reflected in the Nominal Rates of Assistance (NRA), has fluctuated year to year but has on average remained broadly neutral over time – with notable periods of exception in mid-1980s and 2000s, with positive net subsidies for agriculture.



Source: Author using data from Anderson and Nelgen, (2012).

Figure 2. Nominal and Relative Rates of Protection for Agriculture in India: 1965-10.

The Relative Rate of Assistance (RRA), which reflects the domestic level of protection received by agriculture relative to non-agriculture sectors, however, does follow the usual developmental pattern of heavy taxation of agriculture in the 1960s and 1970s and then shifts gradually toward a more neutral policy stance in the 2000s.

The discussion above is based mostly on indirect subsidies. Direct subsidies for agriculture have a relatively shorter, but still quite a long history. The documented modern agricultural subsidy programmes date back to 1933 with the Agricultural Adjustment Act of in the United States, enacted in the wake of the Great Depression (Sumner, 2007). US farm programmes since have included commodity price supports, stock acquisition, import barriers, production controls, marketing orders and crop insurance (Edwards, 2009; Sumner, 2007). And even though distortionary input subsidies have not been part of the farm programmes in the US, price supports for specific commodities have proved to be also highly distortionary by encouraging over production of the targeted commodities. In efforts to reduce the distortionary effects of the farm subsidy programmes, in recent decades support has tended to shift towards farm income support programmes, but the overall negative impact nevertheless remains significant, their benefits regressive and the programmes overall have led to a heavy drain on the public budget (Edwards, 2009).

III

WHY AGRICULTURAL SUBSIDIES?

The current developing countries indirectly taxed agriculture in the past, but they also relied heavily on input subsidies, a trend that is now fast growing. Yet the efficacy of input subsidies in achieving desirable development objectives is vigorously debated (e.g., Wiggins and Brooks, 2010; Chirwa and Dorward, 2013; World Bank, 2008; Morris *et al.*, 2007; Jayne and Rashid, 2013). The conceptual

underpinnings of the debate stem from the standard economists benchmark of perfect and complete markets, which is useful to evaluate the impact of policy interventions such as subsidies. Under perfectly competitive markets, no case can be made for a subsidy. Yet economic theory also recognises market failures, i.e., incomplete, imperfectly functioning, or missing markets, which are a reality in many settings. It has long been understood that in the presence of externalities, a judicious mix of taxes and subsidies could be applied to correct for negative and positive externalities, respectively (Pigou, 1920).

Conceptual Foundations for Input Subsidies

Most developing settings suffer from multiple market failures, providing an important entry point for subsidies to address the constraints faced by economic agents, especially poor farmers (World Bank, 2008; Morris *et al.*, 2007; OECD, 2006). Specific circumstances also exist, including in more developed economy and non-agricultural settings, in which subsidies can be justified; for example, when there are potential economies of scale, strong learning-by-doing effects, potential for innovations with large transformative impacts, strategic trade intervention opportunities, or environmental benefits, as well as for social equity considerations.

Welfare economics has long recognised the potential usefulness of subsidies in situations where social benefits of individual actions exceed purely private benefits (due to market failures or externalities). This is indeed often the case in many countries where agriculture faces a number of market failures/constraints and where subsidies can be justified:

- Lack of awareness of technology: prevents adoption of productivity-enhancing innovations
- Insufficient knowledge: constrains the effective use of inputs or technology
- Learning-by-doing: efficiency and productivity improves with experience
- Risk: producers reduce input use in response to weather/market risks to limit financial exposure, especially for inputs that increase both rewards and risks
- Non-affordability: credit/liquidity constraints limit input use or critical investments
- Accessibility: logistical barriers/poor infrastructure raise costs of inputs
- Market “thickening”: low demand constrains the viability of investment in input marketing, while low volumes prevent exploiting economies of scale to lower input supply costs

These constraints often bind farmers in a low-level productivity trap, keeping them from fully participating in the growth process. Relieving these constraints cannot only help the affected farmers but also potentially unleash strong dynamic general equilibrium impacts – boosting agricultural productivity, nutrition, and

incomes; lowering food prices; raising real wages, employment and broader economic growth through forward and backward linkages; promoting structural transformation; and strongly contributing to poverty reduction (World Bank, 2007, 2008). The dynamic gains associated with subsidies could potentially far outweigh the short term costs, as is often associated with the green revolution in Asia (Chirwa and Dorward, 2013; Hazell and Rosegrant, 2000).

That said, it is important to reiterate that even from such a socially sub-optimal setting, social gains may accrue only under certain circumstances. Several pitfalls in the application of subsidies are often overlooked and could undermine their potential benefits and/or contribute to an overall net social loss:

- (a) For most agricultural situations, the gains (in excess of the associated costs, say due to deadweight losses or administrative and implementation costs) depend on market conditions, and specifically the magnitudes of supply and demand elasticities (Dorward, 2009). Inelastic demand tend to generate consumer gains, while supply shifts (outward or downwards) tend to favour the producers/suppliers. It thus follows that in many developing settings subsidies may be useful for food staples in countries/regions with large import-export parity price differentials.
- (b) Many developing situations are beset by a multiple market failures. In such circumstances, a specific input subsidy may address a particular constraint, but its effectiveness and impact may crucially depend on making complementary investments to address the other binding constraints.
- (c) Long-term development and efficiency also require that care be taken to ensure that subsidised inputs do not substitute for market demand for those inputs: infra-marginal transfers are essentially a waste from a budgetary resource efficiency point of view (the inputs would have been purchased and used in any case, so subsidies are a pure income transfer). More importantly, they may have large associated economic and developmental costs as they disrupt and impede market development and crowd out the private sector – a clearly negative long-term outcome, especially in economies with nascent markets and a fragile private sector.
- (d) Finally, important choices need to be made between input and output subsidies, and whether to subsidise a single or multiple inputs. In general, output subsidies are relatively less distortionary as they do not alter producer incentives in the use of inputs, but there is no guarantee that they are less costly in terms of budgetary resources. And output subsidies can hugely distort the patterns of production, often resulting in overproduction of targeted commodities. Further, output price and income support subsidies often manifest as rents for fixed factors, which means they disproportionately benefit factor owners, such as landowners, and not the renters. The impact of indirect subsidies with output price and income supports on land values has been rigorously shown for the U.S. (Goodwin *et al.*,

2011). The choice of subsidies for single or multiple inputs will depend on their impacts on budgetary outcomes as well as the degree of input substitutability – which need to be carefully analysed to determine the final impact on production, the ultimate objective (Parish and McLaren, 1982). Under certain, but not all, circumstances single input subsidies may be more cost-effective and efficient.

Political Economy Considerations

As noted earlier, inclusive growth and poverty reduction objectives keep agriculture high on policy makers' agendas. Rising rural-urban income inequality makes it politically necessary for policy makers to devise mechanisms to support incomes of a large agricultural constituency. The rekindling of food security concerns in the post-2007 period has provided a new impetus to these efforts.

These aspects shape the political economy of decision-making in most settings, with government 'support' often translating into budgetary allocations – a clear signal of the government's commitments (Jayne and Rashid, 2013). Input subsidies are very visible in demonstrating tangible and direct support to the rural population, and are thus popular among policy makers and politicians. The incidence of subsidies is often regressive, resulting in less developmental and distributional than political and patronage gains. But such programmes persist, as the political science literature highlights, because a vocal and politically aligned minority can often influence policy decisions to emerge as winners, while losers are very often too dispersed or otherwise much less visible.

The second important aspect of political economy is the timing of benefits accruing from public expenditures: here subsidies provide instant (or almost) gratification to the beneficiaries, while most public capital investments (e.g., expenditures on public goods such as roads and research and development) only yield results over the longer term, are often widely diffused, and are not clearly attributable to the original decisions or decision makers. The myopic financial benefit thus often overshadows the clearly demonstrated and large benefits from investments in public goods.

Clearly, the timing of benefits from long-term investments does not fit well with the logic of politics, with its much shorter time horizon, typically tied to the electoral cycle in functioning democracies. The result is that political economy more often than not trumps economic or technical considerations.

IV

MAIN CRITICISMS OF INPUT SUBSIDIES

Despite the appeal of subsidies in overcoming multiple and complex development challenges, and their widespread use, a consensus on the effectiveness of subsidies has remained elusive. The common perception among policy analysts and the general

reaction of economists to subsidies is not positive. This reaction is often characterised as ideological, but that is not necessarily the case – it is often borne out of long experience in the use of subsidies across numerous settings and circumstances. Even when eminently justifiable, the track record of implementation of subsidies has been very mixed (Jayne and Rashid, 2013; Chirwa and Dorward, 2014; Rashid *et al.*, 2013; Sharma, 2013; Huang *et al.*, 2011; Smith and Urey, 2002; Gulati and Narayanan, 2003; Chand and Kumar, 2004; Chand and Pandey, 2008; Fan *et al.*, 2008). It is important thus to assess each circumstance, review the implementation experience, and clearly analyse the benefits and costs to base decisions on whether, what, and how to subsidise.

Much of the recent academic and empirical literature is focused on fertiliser subsidies given their recent scaling up in the context of African agriculture. In South Asia, the debate is longer and broader, involving most notably irrigation and power subsidies, largely because of the significant detrimental environmental impacts associated with such subsidies. Using fertilisers as an illustrative case, the common perception of critics is summarised by Morris *et al.*, (2007) as “fertilisers are good, subsidies are bad.” This simplification reflects an extreme view, with reality somewhere in between: the latter could be argued to be true beyond a certain point (unless the subsidies are totally ill-conceived) and the former true up to a point (as overuse has clear detrimental impacts – on productivity and the environment).

The criticisms of subsidies reflect real and serious implementation problems as well as design shortcomings – issues that are observed with a remarkable degree of consistency across countries and settings. On implementation, the problems have been extensively analysed and documented, including issues related to targeting, political patronage, leakages, elite capture, distorted incentives (through prices) encouraging overuse or imbalanced use of inputs, crowding out the private sector, opportunity costs in terms of foregone investments on essential public goods (such as infrastructure), and often the sheer size of programme costs (Jayne and Rashid, 2013; Wiggins and Brooks, 2010; Chirwa and Dorward, 2013). The experience shows that subsidy programmes are difficult to implement in the best of circumstances.

Some more fundamental concerns arise with respect to the design of programmes which reduce their effectiveness and exacerbate implementation challenges:

- (a) Many programmes espouse multiple and often ill-defined objectives. While subsidies may be appealing as a means to tackle multiple constraints, they should not be seen as a simple fix or a panacea for multiple and difficult development problems. In general, a single instrument cannot address multiple objectives. Multiple objectives can create confusion, may work at cross purposes, and often end up being ineffective.
- (b) A common problem is insufficient analysis or a misdiagnosis of the underlying constraint or market failure. Specific subsidies can help overcome specific problems but they cannot alleviate complementary, often more fundamental, constraints.

Ignoring complementary investments is akin to treating a symptom but ignoring its cause. For example, in the case of fertiliser subsidies:

- Subsidies can engender learning-by-doing, but they cannot overcome extension (and broader technology) or information access problems that may be more critical than the provision of subsidised fertiliser.
 - The correct solution to the high cost of fertilisers may be infrastructure investments to reduce transport costs rather than resources tied up in subsidies.
 - “Thickening of markets” may in addition require investments in the capacities of traders, efficient supply chains, better business services, access to credit, and removal of regulatory barriers to market efficiency.
- (c) A persistent problem with subsidy programmes, given their complex political economy, is ‘exit’ from the programme. In most circumstances, it is very difficult if not impossible to end a subsidy programme. Almost invariably, programmes proliferate, living well beyond their useful lives, and have an innate tendency to grow – with rapidly rising costs and fiscal consequences. This problem is seen in all development settings and across a range of countries.

V

LONGER-TERM CONSEQUENCES – TRADE-OFFS AND SUSTAINABILITY

What are the long-term consequences of input subsidies? Despite their long use (since the 1960s) and growing popularity, rigorous assessments of subsidy programmes are limited, in large part due to a lack of suitable data. Jayne and Rashid (2013) survey the findings from recently available micro-data, mostly in the context of Africa, and find very mixed evidence.³ For South Asia, mostly for India, recent analyses shed light on some serious issues emerging from long-standing input subsidies. They highlight the hidden and unintended but significant long-term costs and now appear to be compromising the very objectives that the subsidies seek to achieve. The following discussion highlights a few selected issues on which evidence is available.

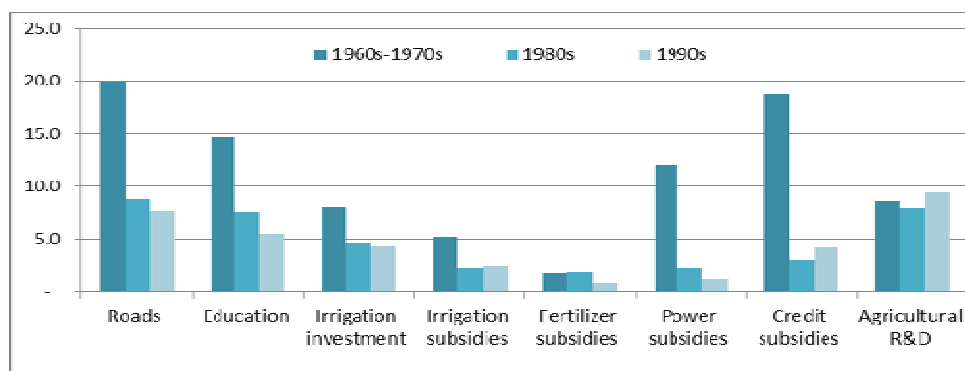
Issue 1: Opportunity Cost: Returns to Public Expenditures

The first issue relates to the efficacy of public spending on subsidies in terms of their impact on agricultural growth, both directly and relative to other forms of public expenditures. A study of Latin American countries found that in countries where a high share of public spending went to subsidise private goods (i.e., inputs), the impact on agricultural growth was negative as it tended to crowd out spending on R&D and

irrigation, both of which have strong positive long-term growth impacts (Lopez and Galinato, 2007).

For India, Fan *et al.*, 2008 estimated the impacts of different expenditures on agricultural GDP, as shown in Figure 3.⁴ The findings show that investments in core public goods (roads, R&D, irrigation, and education) have consistently yielded higher returns than subsidies. Among subsidies, power and credit had substantial returns at the start of the Green Revolution, but their effects have tapered off significantly since then. Credit and power subsidies likely helped smallholders expand minor irrigation, a major driver of the green revolution-led productivity growth since the early 1970s (World Bank, 2014).

A telling comparison is between irrigation investments and irrigation subsidies, which suggests that returns to irrigation infrastructure had a higher payoff than subsidies even in the early years of the Green Revolution. The sharp fall in the impact of almost all subsidies, even as their costs have grown rapidly over the decades, seriously raises the question of the efficacy of continued spending on these expenditures.



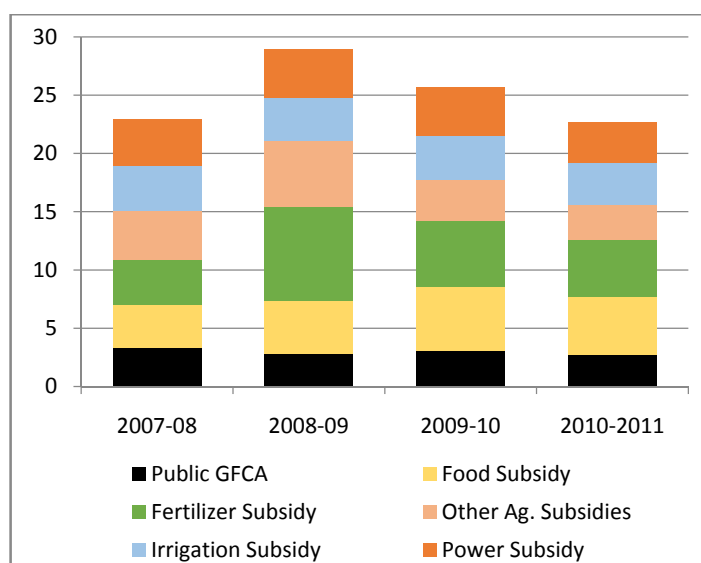
Sources: Fan *et al.*, 2008; Bathla *et al.*, 2014 have confirmed the long-term trend using data to 2011.

Figure 3. Returns in Agricultural GDP (Rupees Per Rupee of Spending).

Finally, fertilisers are often believed to have been one of the main drivers of the green revolution. However, the estimates of Fan *et al.*, (2008) show consistently low impacts of fertiliser subsidies throughout the study period, including the early Green Revolution decades of the 1960s and 1970s. These findings are consistent with other studies by Smith and Urey (2002, on India) and Rashid *et al.*, (2013, on four Asian countries including India, Bangladesh, Pakistan, and Indonesia). Both studies conclude that fertiliser subsidies were not significant in farmers' adoption of the green revolution technology. They identify instead technology, irrigation expansion, and other investments such as roads as the main drivers of technology adoption. Rashid *et al.* (2013) provide evidence that at the height of the green revolution, farmers in three of the four countries studied (the exception being Bangladesh) were

net-taxed for fertiliser (that is, domestic prices for fertilisers were higher than the world market price), indicating that it was profitability and not subsidies that drove technology adoption during the green revolution.

The findings clearly show very high opportunity costs of expenditures on subsidies. Yet India's public expenditures on subsidies dwarf productivity-enhancing public investments (or GFCA, gross fixed capital formation in agriculture) almost 10:1, as shown in Figure 4. Importantly, the expenditures on critical R&D activities, which provide the highest returns to income growth, are equivalent to less than half of one percent of agricultural gross domestic product (GDP) compared to the 20 per cent for subsidies.



Source: World Bank, 2014.

Figure 4. Expenditures as Share of Agricultural GDP

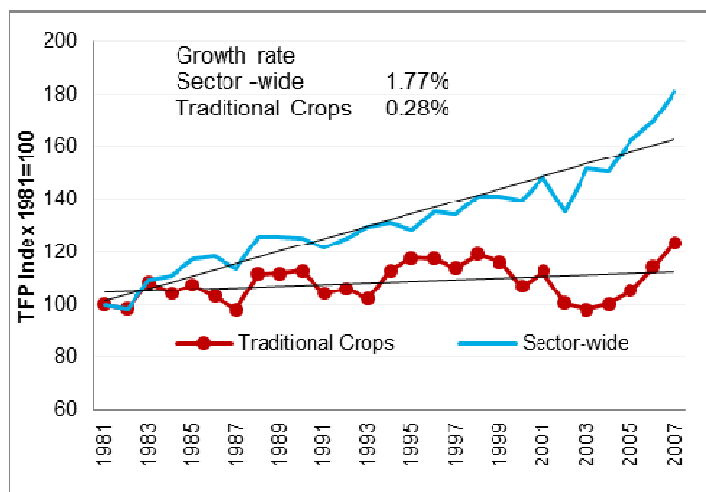
Issue 2: "Tonnage" Focus: Compromising Productivity Growth

The second issue is concerned about the effectiveness of subsidies in promoting productivity, the main objective of agricultural subsidies. Recent evidence on India provides a useful comparison of the growth in sector-wide total factor productivity (TFP), which covers all crop and livestock outputs, with that for "traditional crops," which are dominated by the main cereals, rice and wheat, but also include other major crops. Notably, the traditional crops exclude high-value agriculture, namely horticultural crops and livestock products.

This distinction is useful because agricultural policy in India has historically been driven by an output target-oriented focus on cereals, and in particular rice and wheat.

This ‘tonnage’ focus has in turn driven agricultural policy and institutional priorities, with a major emphasis on input subsidies and output price support to raise cereal yields. The focus of policy has expanded over time to include selected other crops, but the main crops remain rice and wheat. An important consequence of the policy-driven incentives facing farmers has been the very sluggish diversification of crop area out of cereals despite better income prospects for higher-value crops (World Bank, 2014).

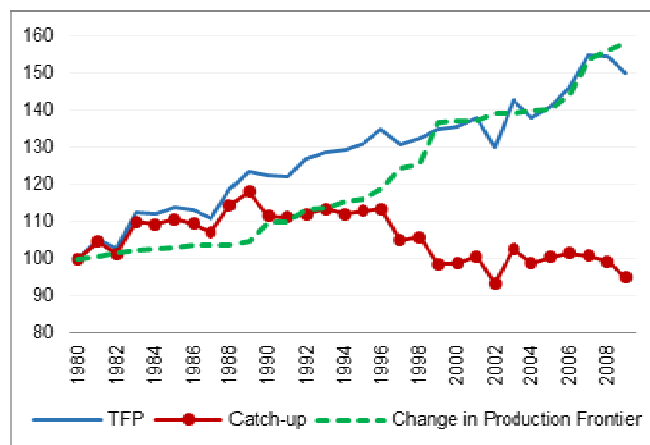
The stark contrast between the sector-wide TFP growth and the TFP growth of the policy-favoured traditional crops, shown in Figure 5, clearly reveals the trade-offs implicit in public policy and expenditure choices. The divergence shows that even the limited diversification that has taken place in Indian agriculture has had a huge impact on making production factors more productive.



Source: World Bank 2014.

Figure 5. Total Factor Productivity Trends: Sector-Wide and Traditional Crops

Another important outcome of the subsidised input strategy is shown in Figure 6. A decomposition of the sector-wide TFP shows that almost all of TFP growth is accounted for by technical change, while efficiency in production has declined. Technical change reflects a major impact of agricultural research. Efficiency reflects the joint outcome of the policy environment and the inadequate delivery of extension services. The policy environment, including subsidies, provides the incentives for increased but seemingly inefficient input use, resulting in compromised TFP growth. The same subsidy expenditures also crowd out the needed productivity-enhancing public goods such as research and extension, including by tying up extension agents' time in administering subsidy programmes instead of delivering the needed advisory services.



Source: World Bank, 2014.

Figure 6. Decomposing Sector-Wide TFP: Technical Change vs Technical Efficiency.

Issue 3: Waste: Overuse and Incidence of Subsidised inputs

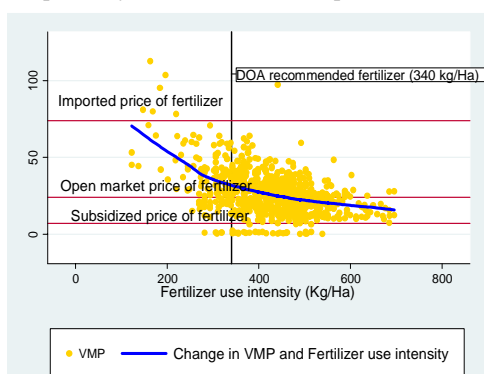
A third major concern is the waste often associated with subsidies. The waste considered here is not due to leakages, corruption, or misuse of the subsidies themselves – these are well known and widely recognised, but often difficult to quantify. Instead, the discussion highlights two other forms of waste. The first is the waste associated with over-use and ineffective use of the subsidised input, drawing on an analysis of paddy cultivators in Sri Lanka. The second form of waste is associated with the regressive incidence of subsidies, using data from India.

The findings from a recent analysis of Sri Lankan paddy cultivators reveal the induced overuse of fertilisers (Gautam and Kar, 2014). Fertiliser is heavily subsidised (compared to the import price of Rs. 87, the subsidised price that a paddy farmer pays is as low as Rs. 7). The analysis of paddy production shows the farmers behave optimally, as predicted by micro theory, using fertiliser to maximise returns (price equated to value of marginal product) – as shown in Figure 7 (left panel). The reasons behind this result are relatively straightforward: farmers are aware of the available technology including fertilisers and have long used them; they recognise the benefits, are rational decision makers, and are responsive to price incentives.

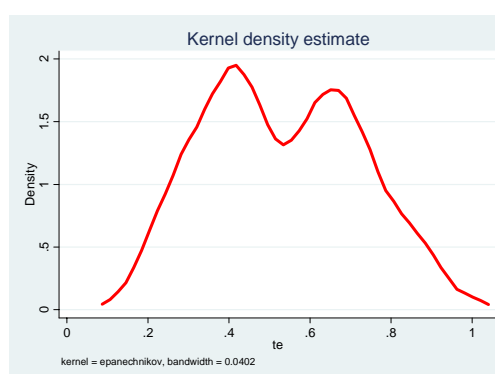
The important finding from the analysis is that given the exceptionally low subsidised price of fertiliser, economically rational farmers end up significantly overusing fertiliser – at levels nearly twice the technical research recommendations. At the same time, the technical efficiency of the average farmer is very low, which seems to be the main reason for the low aggregate paddy productivity. This finding underscores the point made earlier about identifying the underlying constraint to ensure that subsidies are targeted correctly. In this case, the rationale for a subsidy to

promote adoption is no longer valid as fertiliser use is widespread. However, awareness is not proficiency. Achieving higher proficiency (i.e., technical efficiency) calls for access to extension advice to help farmers use fertiliser more effectively. Yet investment in R&D and extension is crowded out by the massive budget outlays for fertiliser subsidies.

Optimality of farmer decisions: $p = \text{VMP}$



Technical Efficiency in paddy cultivation



Source: Gautam and Kar, 2014.

Figure 7. Rationality of Farmers' Input use Decisions and Technical Efficiency in Paddy Cultivation among Sri Lankan Paddy Farmers.

The main implications of the study are that: (a) the fertiliser price is subsidised to too low a level; (b) a higher price would induce farmers to reduce use to more optimal levels; and (c) the savings from subsidies can be much more effectively used to provide much needed extension services to the farmers.

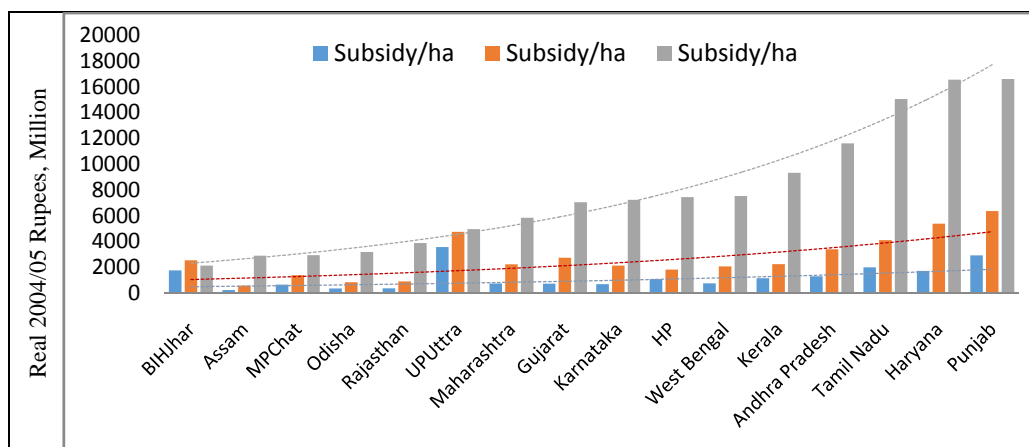
Subsidising overuse of fertiliser with low marginal returns, while ignoring potential productivity gains from higher efficiency through spending on extension services, amounts to a substantial waste of limited public expenditures. But Sri Lanka is not unique in such a misalignment of subsidies. The Chinese farmers tend to use fertiliser significantly more than U.S. wheat and maize farmers, but their yields are significantly lower, suggesting waste. In India, partial productivity of fertiliser has declined consistently since the 1970s, also suggesting ineffective or over-use of fertilisers.

Another form of economic waste arises from poor targeting of subsidies: global experience has repeatedly shown that the incidence of subsidies tends to be regressive (i.e., the bulk of subsidies' benefits accrue to larger and wealthier farmers instead of the intended beneficiaries, the poorer small- and medium-size farmers). Farmers in the more advanced agricultural states of India, for example, would use fertiliser in any case, so a fertiliser subsidy to farmers in these states is essentially infra-marginal and amounts to a pure income transfer.

This form of waste is normally associated with "universal" subsidies, which are bestowed on a per unit basis – so farmers using more of the subsidised input receive a

larger share of the subsidy. South Asia, and India, has long relied on universal subsidies, recognising the complexity and cost of administering and delivering targeted subsidies. For India, the results show mixed evidence. Sharma (2009, 2012) finds a reasonably progressive trend in the incidence of subsidies, based on the intensity of fertiliser use by farm size using input surveys. Yet using public expenditure data, the same study finds the incidence of subsidies to be significantly higher in wealthier relative to poorer states.

The incidence of broader agricultural subsidies across the major states in India, on a per hectare basis, as shown in Figure 8, is consistent with Sharma's finding on the fertiliser subsidy expenditures across states. Using data from Bathla *et al.* (2014), the figure shows the per hectare total subsidies for fertiliser, power, irrigation, and credit in real 2004-05 millions of Rupees. The pervasiveness of subsidies can be gauged by their sheer size, measured relative to states' net agricultural domestic product: this ratio shows a similar trend across states and is estimated at an astonishing 30-35 per cent for the states of Punjab and Haryana in recent years.



Source: Based on data from Bathla *et al.*, 2014.

Figure 8. Subsidy Per Ha Across States in India.

Issue 4: Beyond Fiscal Impacts: Hidden Heavy Costs

The debate on the fiscal dimensions of subsidies is a well-trodden one, and while it is worth reiterating the arguments with new evidence, the issues are widely understood - and continue to be ignored.⁵ But leaving the fiscal cost considerations aside, an issue that does deserve serious and urgent attention has to do with the hidden but very heavy long-term costs associated with the behaviours promoted by subsidies. The emerging evidence from India highlights the seriousness of such heavy hidden costs, which are neither fully appreciated nor sufficiently taken into account in

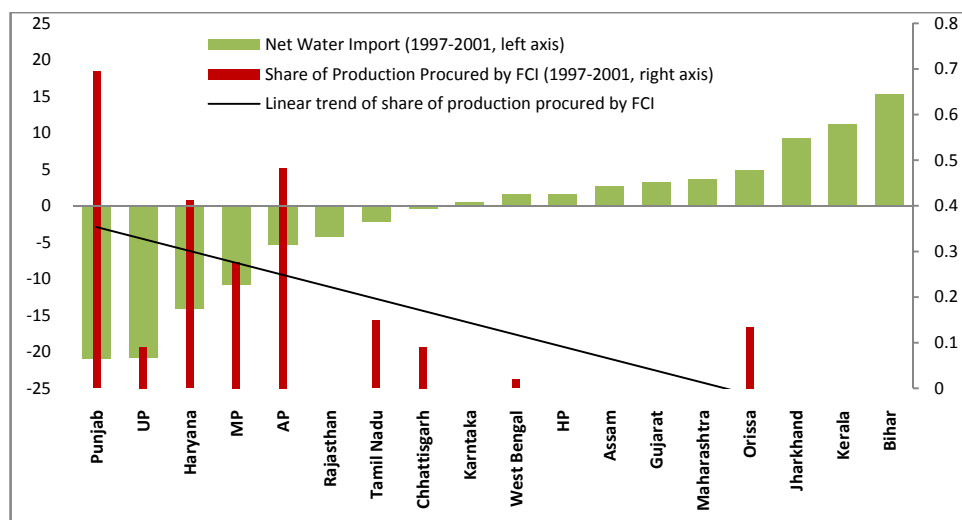
public policy decision-making. These findings from the analysis in World Bank (2014) are summarised briefly here:

- Analysis on India shows a staggering cost in terms of foregone income of the farmers who appear to be responding to the policy-driven incentives they face in making their output and input choices. On an average, a huge 68 per cent of profits are estimated to be foregone by farmers due to their current production choices. This gap is driven equally by technical inefficiency (indicating a lack of extension services) and allocative inefficiency (indicating crop choice favouring lower-value crops, an outcome of distorted incentives). Rebalancing public expenditures to prioritise technology services while addressing the overall policy framework to remove price distortions and encourage economically optimal choices by farmers for more rapid income growth need to be at the top the policy agenda.
- Perhaps even more important are the findings on the hidden negative costs of subsidies in terms of jeopardising sustainability; that is, reducing future prospects for productivity, resilience, and growth – an outcome quite the opposite of their intent. Two subsidies linked to this prospect are the electricity/power subsidies and differential pricing of different types of fertilisers. Subsidised electricity (which is used to power groundwater pumps and results in the overuse of such water) and the relative price-driven nutrient imbalance in fertiliser use are both statistically linked to negative impacts on TFP. Each is discussed briefly below.

(a) *Electricity and Water Do Not Mix*

Figure 9 highlights the water-energy-productivity nexus with the ironic trend in net virtual water exports – from the water-deficit northwest to the water abundant east (and other areas). Public procurement of rice is correlated with excessive groundwater use powered by subsidised electricity in the water-scarce states, especially in the northwest of India. This leads to the second irony: public procurement, ostensibly for food security, may itself be compromising long-term food security by contributing to rapid decline in groundwater tables in the traditional breadbaskets of the country.

These findings are corroborated by recent rigorous estimates of a significant negative impact of electricity subsidies on groundwater, with the elasticity of groundwater level to electricity subsidies estimated at a substantial -0.67. Electric subsidies are also shown to be driving the expansion of water-intensive crops, primarily rice (Badiani and Jessoe, 2011). At the same time, another study finds that a fall in groundwater level by 1 meter reduces foodgrain production by 8 per cent, water-intensive crops by 9 per cent, and cash crops by 5 per cent (Sekhri, 2013).



Source: World Bank, 2014, using Kampman, 2007 and Ministry of Agriculture data.

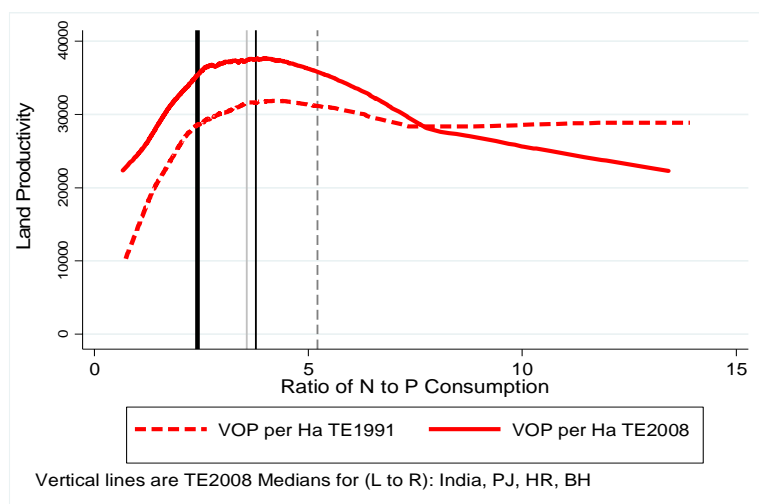
Figure 9. Virtual Water Imports and Public Procurement of Rice in India.

(b) Rebalancing Nutrients for Productivity Growth

Another consequence of subsidies is due to the change in relative prices of plant nutrients. The heavily subsidised price of urea has driven excessive use of nitrogen (relative to phosphorous and potassium based fertilisers, and important micro-nutrients). Analysts and scientists have long warned about the consequences of this imbalance in nutrient use, but the magnitude of the impact of imbalanced nutrient use on agricultural productivity has not been fully appreciated. Using district-level data on nutrient use and land productivity, Figure 10 shows how productivity changes with nutrient imbalance (i.e., captured simply as the ratio of nitrogen to phosphorous – a crude but still relevant indicator). The evidence clearly shows a significant negative impact of nitrogen overuse on land productivity. Most farmers in Punjab and Haryana, and even the poor smallholders of Bihar appear to operate on the declining returns portion of the curve, compromising their land productivity to almost 25 per cent below the optimum level.

Then there are the additional hidden costs associated with fertiliser overuse, especially nitrogen – environmental pollution, greenhouse gas emissions, ground water contamination, surface water run-off, and soil degradation are other pernicious impacts with huge potential negative long-term consequences. For example, evidence from China shows that overuse of fertiliser has caused air and water pollution problems: excess nitrogen is often lost to agriculture through emissions or leaching into groundwater or runoff into surface water (Li *et al.*, 2013). Another study provides evidence, also from China, that the excessive nitrogen use decreases grain

yield (Wang *et al.*, 2011). Similarly, in parts of Punjab and Haryana, chemicals have leached into the soil and started polluting the groundwater, affecting water quality, and are reportedly creating health and other problems.



Source: World Bank, 2014.

Figure 10. Impact of Nutrient Imbalance on Land Productivity.

VI

CURRENT THINKING ON INPUT SUBSIDIES

The renewed interest in agricultural and, especially input subsidies in recent years reflects frustration and a growing impatience with the slow progress of agricultural development and poverty reduction, the persistence of food insecurity, and rising income divide between rural and urban areas. Market failures have endured (for multiple reasons, including insufficient focus on tackling the more fundamental constraints) compelling a search for more sustainable solutions, including the use of subsidies in ways that maximise their benefits while reducing their negative and unintended consequences.

This search has resulted in the articulation of a set of core principles of “market-smart” subsidies (World Bank, 2008; Morris *et al.*, 2007), which seek to identify a well-defined input subsidy design so that subsidies address market failures rather than ignore them or have other negative consequences on existing or potential markets. These principles require that subsidies be:

- Focused: to encourage incremental input use by farmers not currently using them (due to specific market failures).

- Market supporting: to effectively promote market and supply chain development by private sector and not be counter-productive by displacing existing commercial sales.
- Temporary: to ensure there is a clear “exit” strategy to encourage sustainable growth and limit fiscal costs.
- Part of a broader strategy: to be effective by avoiding substituting for or crowding out essential complementary public investments (e.g., R&D, roads) that are critical for long-term sustainable growth.

But usual caveats continue to apply: programme design issues will remain critical to ensure that excessive costs and high opportunity costs are avoided and there are no policy inconsistencies. A very high risk of political/elite capture will remain as will the substantial risk that once subsidies are introduced, they may be virtually impossible to reverse.

VII

CONCLUDING THOUGHTS: DRAWING FROM EXPERIENCE

This paper provides a quick “birds-eye” review of the experience and debates on agricultural subsidies, with a focus on input subsidies. Subsidies have long been used to provide benefits to specific sections of the population, with the historical pattern showing a distinct shift from taxing agriculture in the early stages of development to eventually subsidising it. There are circumstances in which subsidies can be beneficially used. And evidence indeed points to a few occasions where subsidies have had a sizeable positive impact. But there are also significant problems with subsidy programmes, and analysts have identified several instances from past experiences which have not been positive.

While sound conceptual arguments can be made for the use of subsidies in specific circumstances, there are substantial risks and costs associated with them, at least as they have usually been applied in the past. Emerging evidence demonstrates potentially enormous hidden costs associated with prolonged use of subsidies. Improper analysis of the underlying problem to be addressed, a generic use of subsidies to address difficult development challenges, and the political economy of scaling back subsidies even when they may be compromising the very objectives they were originally designed to achieve, seem to be some common drawbacks associated with subsidies.

A key lesson that emerges from past experience is ask a few seemingly naïve, but still apparently pertinent questions when contemplating subsidies or when reviewing existing programmes: what is the real problem that needs to be addressed? What would be the most cost-effective way to sustainably do so? And how would a specific intervention, especially a subsidy, address the identified underlying market failure or constraint? There will be circumstances where a temporary or a “bridging” subsidy

may be needed as the basic market failure is being addressed (for example, infrastructure projects typically take a long time to complete and it may not be politically or socially acceptable to “do nothing” until the infrastructure is built and functioning). In such situations, the biggest challenges are to keep the subsidy focused, for a specified period of time, with a clear exit strategy, and ensure complementary investments to address the market failure are undertaken.

In designing a subsidy programme, three overarching issues need special attention:

- Targeting: how to best reach those who *need* the subsidy, as opposed to those who *want* the subsidy (likely all).
- Effectiveness: how to ensure positive impact, reduce wastage, and maximise efficiency (fully accounting for all benefit and costs, as well as detrimental impacts).
- Sustainability: how best to reduce the environmental footprint, ensure sustained productivity growth, and promote robust market development.

Detailed programme design would need to consider additional complex issues such as the choice of instruments (vouchers, cash transfers, physical deliveries, etc., that may be least distortionary depending on circumstances), approach to be used (universal but costly or targeted but administratively complex, where feasible using modern ICT based innovative platforms and mechanisms), and the additionality of the intervention (to ensure that the programme reaches the previous non-users and complements rather than substitute for existing commercial sales/markets).

The question of whether or not to use subsidies is often a very complex one. Enthusiastic supporters often tend to ignore the design and implementation challenges, especially the opportunity costs of subsidy expenditures. Critics often tend to discount the potential benefits or fail to appreciate the political imperatives to address long-standing food security and poverty problems. Given the political economy dimensions of subsidies, their popularity as policy instruments is likely to remain for some time. It is important thus to identify best-practice designs and implementation mechanisms. That said, while the problems with past and current subsidy programmes have been well analysed and identified (as discussed above), there are as yet no robust solutions to these problems. The current state of knowledge on what works or how to make subsidies ‘market-smart’ remains weak, and the limited evidence available so far is not encouraging. Going forward, a high priority for policy analysts and researchers is to undertake careful evaluations of the ongoing subsidy programmes – to assess their effectiveness and consequences, both intended and unintended; identify best practice examples; and contribute to resolving this long-standing debate.

NOTES

1. The taxation to subsidy pattern was observed in medieval European times to ensure low food prices for the fast rising urban populations and to extract surplus from agriculture for investment in other parts of the economy. The notable exception to this pattern were England's Corn Laws (in effect from 1660 to 1846) which raised domestic grain prices in favour of the dominant landed aristocracy, until they were repealed as the political landscape changed in favour of industrial interests (Lindert, 1991).
2. African countries, with generally lower level of agricultural development, continued to heavily tax agriculture till the recent food price spikes in 2007/2008, and have since exhibited generally neutral policy stance. Asian countries (excluding Japan and Korea) moved from taxing to favouring agriculture around the 1990s.
3. The mixed outcomes are often the result of the implementation modalities used, such as for targeting, input delivery that displaces commercial sales, inappropriate use such as promoting fertiliser use in an environment where fertilisers may be technically or economically non-viable, or where returns to alternative investments may be higher (Jayne and Rashid, 2013).
4. India adopted a comprehensive strategy with a wide array of instruments and policies to usher in the green revolution starting in the late-1960s. These included investments in agricultural research, extension, irrigation, rural markets, trade policy, price support for staples backed by public procurement and storage, public distribution of foodgrains, and crop insurance. The strategy also included a number of subsidies to promote productivity and food security – for seeds, fertilisers, water, credit, energy, and output support prices (through Minimum Support Prices or MSP).
5. A typical response to criticisms highlighting the fiscal costs of subsidies is that they are a small share of the economy, measured as a share of total GDP, and hence affordability is not a concern – certainly not to the politicians. However, this is not the appropriate metric to assess the cost of subsidies, as it does not consider the opportunity costs of public funds. A more relevant measure is the share of public expenditures or perhaps even more pertinently, as the share of the fiscal deficit. And typically, subsidies account for a very large share of public expenditures: In India, agricultural subsidies (fertiliser, irrigation, credit, and power) are now equivalent to 13 per cent of total government expenditures (on average 2008-12) but 226 per cent of the agricultural (non-subsidy) budget. To put these numbers in perspective, agricultural research and education gets a mere 0.34 per cent of total and 6.4 per cent of agricultural expenditures. Finally, it is important to note that most estimates of subsidies ignore the substantial associated overheads, such as the cost of staff in delivering and monitoring subsidies.

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