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The Political Economy of Reforming Agricultural Support Policies

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Contents

Abstract

Agricultural support policies cost more than US$800 billion per year in transfers to the farm sector worldwide. Support policies based on subsidies and trade barriers are highly distortive to markets and are also regressive as most support is provided to larger farmers. On balance, the incentives this support creates appear to increase greenhouse gas emissions that contribute to climate change. In addition, some subsidies undermine the production of more nutrient-dense commodities that are otherwise critical for the improvement of dietary outcomes. This paper first highlights that better outcomes could be achieved if even a small portion of agricultural subsidies were repurposed into investments in research and development (R&D) dedicated to productivity-enhancing and emission-reducing technologies. This would create multiple wins — mitigating global climate change, reducing poverty, increasing food security, and improving nutrition. Nonetheless, the political economy challenges to doing so are sizeable. Because current support policies are often politically popular and serve well-organized interests, reform is difficult without committed political leadership and multilateral collaboration. Using several case studies of both successful and failed changes of agricultural support policies in China, India, and the EU and the United States, we highlight lessons learned about the political economy constraints on and possibilities for reform.

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Executive Summary

- Governments provide over $800 billion per year in transfers to agriculture and yet there is enormous concern about the outcomes:
  - Part of this concern arises because the support is inefficient in achieving traditional goals, such as protecting farm incomes and raising agricultural productivity, but also because of the regressive nature of many of the transfers achieved.
  - Another part arises because agricultural support is often ineffective or harmful in achieving newer policy goals such as reducing greenhouse gas emissions from agriculture and improving nutrition.

- Reforming existing support will be challenging partly because the multitude of goals to which agricultural policies are to be directed would require – in accordance with the Tinbergen rule of economic policy – coordination across multiple interventions, as well as assessing trade-offs across the multiple goals. This challenge is further complicated by the fact that achieving critical global goals, such as abatement of GHG emissions to address climate change, require internationally coordinated action.

- Yet, political-economy constraints are likely the most important limits to successful reform. Resistance to successful policy reforms typically originate from three interrelated factors:
  - **Ideas**: preconceived notions of what policies can or should do often shape policies and blur dialogues about reform. Such notions may include views that market functioning should prevail over the state intervention; that food security is essentially about food availability, rather than also about food access or dietary diversity; or that national self-sufficiency should prevail over international trade or multilateral cooperation.
  - **Interests:** the opportunity to secure profits, votes, job security, and prestige, among others, may all shape who favors which policies.
  - **Institutions**: not all interest groups have equivalent influence and power to secure their objectives. More concentrated interest groups, such as farmer organizations or industry associations, may be able to exercise greater influence, while new institutional arrangements (such as multilateral trade or environmental agreements) may press governments to push for a change in national policies.

- Examination of recent agricultural policy reform experiences, in China, the EU, India, and the United States, highlight the potential challenges and opportunities.
  - The failure of India's recent marketing reform proposals highlights the power of ideas and the power of blocking interests, and the need for policy reforms that deal with these constraints.
  - Successive agricultural policy reforms in China have been strongly influenced by new institutional commitments, including China's accession to the WTO and its commitment to the Paris Agreement on Climate Change.
  - The EU's common agricultural policy (CAP), originally designed in the1960s, for long was encapsuled in long-held ideas, like food self-sufficiency, and heavily supported by

powerful interest. Multilateral trade agreements and internal problems in sustaining high price support induced important reforms to the CAP in the 1990s and 2000s with support of agricultural exporters within the EU whose interests shifted with accession of Eastern European countries to the EU. Commitments to environmental agreements pushed for further, fundamental reforms recently.
    - United States experience with promoting the production and use of biofuels highlights the danger of building a policy coalition that creates and sustains a policy that is both economically inefficient and environmentally damaging.

- The lessons learned from recent experiences with agricultural policy reforms for national and internationally concerted agendas points to some promising paths and some dead ends:
    - Simply arguing for abolition or rearrangement of current support is likely neither to find political support nor to generate more than modest reductions in emissions.
    - Approaches that impose certain types of 'green' conditionality to farm support (like reduced usage of fertilizers and pesticides as proposed as part of EU's CAP reforms), might come at the cost of lowering land productivity which then could induce new conversion of land for agriculture (with adverse effects for emission reduction), as well as strong resistance from farmers.
    - Moving away from market-distorting price support or subsidies coupled to production levels or input use and towards providing incentives through direct payments to farmers is mostly sensible from an efficiency perspective and eases identification of winners and losers, making such a reform negotiable.
    - A promising approach would be to reallocate part of existing support to R&D focused on innovations that both increase productivity and lower emission intensities. Reallocation of resources to R&D focused on raising productivity and reducing emissions is expected to produce major societal gains, including benefits for those farmers who benefit from current support. However, the gains from innovation in sustainable production methods may be perceived as uncertain and adoption may come at a cost to producers in the short run. Compensatory payments to losers and to offset adoption costs for producers could help win political support. Importantly, appropriate regulations, such as mandates on the use of renewable energy or limits on the conversion of land for farming, may be essential to overcome the resistance of some agricultural producers to more environmentally sustainable reforms.
    - Using commitments to international agreements and frameworks (such as WTO rules and the Paris Climate Agreement) to promote reform has proven effective in several important national and regional agricultural policy reforms, including in the EU and China.
    - International agreements, including the WTO and Paris Climate Accord, could also provide an opportunity for developing an *internationally concerted* repurposing agenda. The case for such an agenda is easily made. Climate change is an existential threat to food systems globally and the repurposing scenarios analyzed in this paper clearly show that international cooperation for repurposing achieves superior outcomes on all environmental, economic, and social dimensions for all countries compared with current

non-cooperative agricultural support policies. Just as for national reform agendas, detailed analyses of global societal gains, and how these would be distributed across countries, in the short and long run and of likely winners and losers could help to build support for an internationally concerted reform agenda.

- There are interactive and mutually reinforcing dynamics between the domestic and global policy arenas. Creating constituencies for reform at the domestic level is essential to achieving global action:
    - To spur domestic action and overcome resistance, an even-handed global diffusion of technologies and financial resources is needed to let all countries reap the benefits of agricultural policy reform.
    - Given that climate change and environmental sustainability transcend borders and given that national policies have strong international spillover effects, international coordination is essential. However, reaching a common understanding of the benefits of acting together (and the cost of failure) will not be easy. Intense dialogue, informed by continuous and credible assessments of the gains to be obtained and trade-offs to be reckoned with, will be essential to smart repurposing of agricultural support. Existing platforms for international policy dialogue, such as the G20 and relevant UN bodies could champion and spur such dialogues stressing agreement on common goals.
    - Within countries, committed governments must identify ways of framing the importance of reform in non-partisan ways so that reform efforts are not derailed by electoral turnover or leadership changes. Across countries, the legitimacy of such reform agendas requires incorporating the concerns of countries in the Global South in an equitable and transparent manner so that the benefits of international collaboration are clear and easily justified to governments' domestic constituencies.
    - Coordinated investments might be achieved by negotiating support for a research agency or program of green innovations to meet the collective need for action, recognizing countries' differences in ability to support research and the different research needs and opportunities by agro-ecological zone.

Introduction

In both developed and developing countries, agricultural support policies provide enormous transfers of resources to agriculture — about US$817 billion per year worldwide in the 2019–2021 period (OECD 2022). Some agricultural support policies, such as input subsidies, have boosted global food production, particularly of staple crops, thereby reducing hunger and poverty. Yet, there are serious concerns about their impacts on achieving sustainable, healthy, and inclusive food systems. Redirecting or "repurposing" agricultural subsidies toward investments that support both increased production and greater sustainability — such as agricultural research and development (R&D) and rural infrastructure —has the potential for win-win-win gains for people, planet, and prosperity.

This paper first considers how shifts in agricultural support would affect global efforts to promote healthy and sustainable food system transformation. However, since such reforms are contingent on a variety of political economy considerations, the paper subsequently presents a framework for analyzing how interests, institutions, ideas and information, and policy characteristics intersect to facilitate or stymie reform efforts. Case studies of attempted reforms from different regions are presented that highlight the relevance of the framework. The paper concludes by summarizing some potentially enabling political economy conditions for repurposing agricultural support policies.

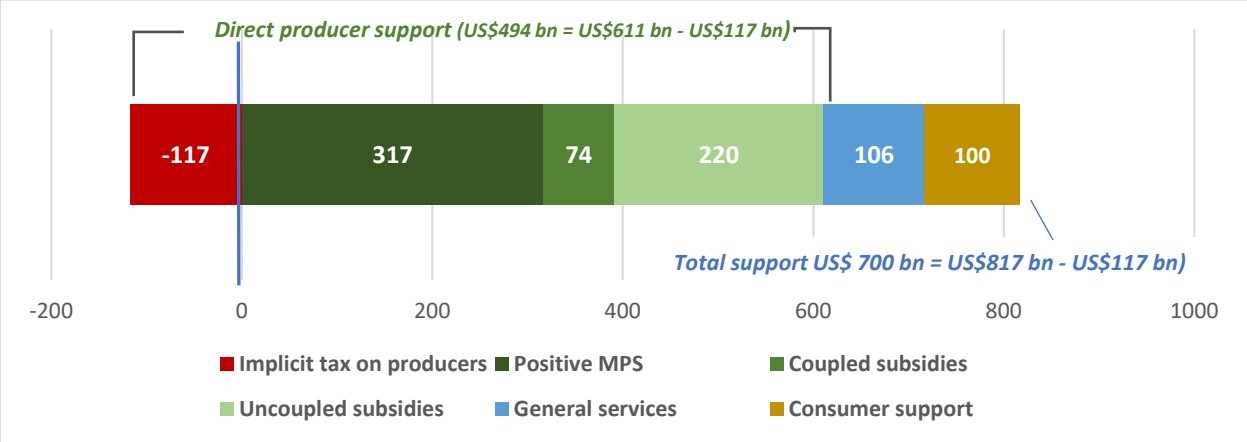
Current Agricultural Support and its Impacts

Current support

Current agricultural support goes largely to agricultural producers, primarily in forms that affect market prices and distort incentives for producers and consumers. Agricultural support (provided by 54 countries for which comparable data are available) amounted to US$ 817 billion per year, in 2019–2021 (OECD, 2022). Individual producers received US$ 611 billion per year in positive support (that is support excluding taxes on exports), representing 17% of gross farm receipts in OECD countries and 13% in the 11 emerging economies for which data are available. Of this support to producers, more than half, or US$ 317 billion per year, took the form of support

through higher market prices paid by consumers ("market price support"), while the remaining US$ 293 billion was paid by taxpayers through farm payments (Figure 1).

Figure 1: Agricultural producer support by main types of support, 2018–2020 (billions of US$ per year)



Source: OECD 2022.

The larger component in the form of market price support (MPS) generally does not entail use of government budget resources. Rather, it involves implicit transfers from consumers to producers by creating a price gap between domestic market prices and border prices for specific agricultural commodities. Border measures can take the form of import licenses, tariffs, tariff rate quotas, or export bans that raise domestic prices, benefiting the farm sector. Some emerging and developing countries, including Argentina, India, Indonesia, Kazakhstan, Russia, and Viet Nam, implicitly tax producers of certain agricultural commodities through export taxes or export restrictions, which depresses the domestic price of these products. This "negative" market price support amounted to US$ 117 billion per year, already mentioned above, but has risen significantly recently with many countries responding with such measures to the global food, feed and fertilizer market impacts of the war Ukraine.

Support measures requiring fiscal expenditures amounted to US$ 500 billion per year in 2019-2021. These include direct transfers to producers and consumers such as farm output or input subsidies, consumer food subsidies, and spending on public goods in support of agricultural development. About 60% of this support (US$ 294 billion) goes directly to farmers: US$ 74 billion in the form of subsidies directly coupled to levels of production and/or to input use and

US$ 220 billion in payments to farmers that are not directly linked to agricultural production. Only a limited portion of budgetary support is for R&D and agricultural innovation systems, infrastructure, and other general services for the sector, with only 4% of total support allocated specifically to R&D. In 2019–2021, direct support to consumers in the form of food subsidies amounted to 14% of total positive support (or US$ 100 billion per year globally).

The European Union and the United States, both large agricultural producers, jointly account for two thirds of the total provided by rich countries. The support in the 11 emerging economies increased to US$ 464 billion per year in 2019-21, of which China provided US$ 278 billion per year to its farm sector.

Impacts of current support

Support coupled to output or input use increases output, leading to increased greenhouse gas (GHG) emissions from agricultural production and land conversion for agriculture. Some types of support—such as fertilizer subsidies—also encourages the use of production techniques that increase emissions per unit of output. Support provided through trade barriers, however, may reduce global emissions because it couples incentives to increase output with higher prices to consumers. The strong focus of many agricultural support policies on promoting staple crops has improved access to basic calories but has done much less to improve dietary diversity. Moreover, social impacts of support are often regressive — often benefiting wealthier commercial farmers, while denying poorer farmers access to markets — and raising the cost of nutritious food and harming poor consumers.

Government support to agriculture is often justified by perceived needs to protect farm incomes, ensure food availability, and promote agricultural productivity. However, its efficiency in delivering benefits to farmers is low, providing a return for farmers of 35 cents to every dollar spent (Gautam et al. 2022), with the remainder either shared with consumers or dissipated as economic waste. Only a small share of total support is invested in public goods, including R&D and rural infrastructure, although both the private and social returns of such investments are estimated to be very high. Many interventions create trade conflicts between countries and very few help reduce the GHG emissions that are driving climate change, despite the threat of devastating climate change impacts on agriculture, especially in tropical zones.

The need for reforms is now well recognized (see e.g., OECD 2021; 2022), and the urgency of reducing GHG emissions and adapting to climate change has added impetus to the calls for reform. However, recent studies — discussed below — have shown that simply eliminating all existing support would not greatly reduce GHG emissions, but would depress farm incomes, increase poverty, and increase the cost of healthy diets (Searchinger et al. 2020; Laborde et al. 2021; FAO-UNDP-UNEP, 2021; Gautam et al. 2022). Public discourse thus has shifted to how existing support might be repurposed to create better incentives for producers and consumers. The 2021 United Nations Food Systems Summit (UNFSS) called for such repurposing as part of a just rural transition to sustainable food systems.[1]

Global scenario analysis: Removing all support

A series of recent studies estimated the impact of a complete withdrawal of current agricultural support on GHG emissions, farm output, poverty, food security, and diets (Laborde et al. 2020, 2021; FAO-UNDP-UNEP 2021; and Gautam et al. 2022). A first, perhaps surprising, result is that current measures have only a small influence on the overall (global) volume of agricultural production (Figure 2), although they do have important impacts in individual countries. The small impact on the current level of output should be understood in the context of decades-long sustained support to the buildup of present systems, and that the removal of such support now would not lead producers to suddenly reverse all they have built up in capacity with the support. Second, at the global level, withdrawal of domestic subsidies and border measures have offsetting impacts on production and emissions. Removing subsidies reduces both global food output and emissions, but removing border protection, which acts as a tax on demand, slightly increases global output and emissions in protecting countries. The combination of removing both subsidies and border support slightly reduces global output and GHG emissions from agriculture (Figure 2), lowers farm output, and raises the costs of healthy diets. Thus, simply abolishing all support would not be a game-changer and would involve trade-offs between environmental, economic, and social objectives.

[1] See: https:// https://foodsystems.community/game-changing-propositions-solution-clusters/repurposing-public-support-to-food-and-agriculture-2/

The impacts of removing all agricultural subsidies differ substantially between rich and poor countries (Table 1). The drop in farm income per worker would be four times larger in developed countries than in developing countries. Farm employment would decline in developed countries but increase in developing countries, where higher world prices would induce a supply and employment response. However, global poverty, as higher food prices push more people below the poverty line. GHG emissions would fall by over 6 percent in the developed countries, but by only 1.5 percent globally.

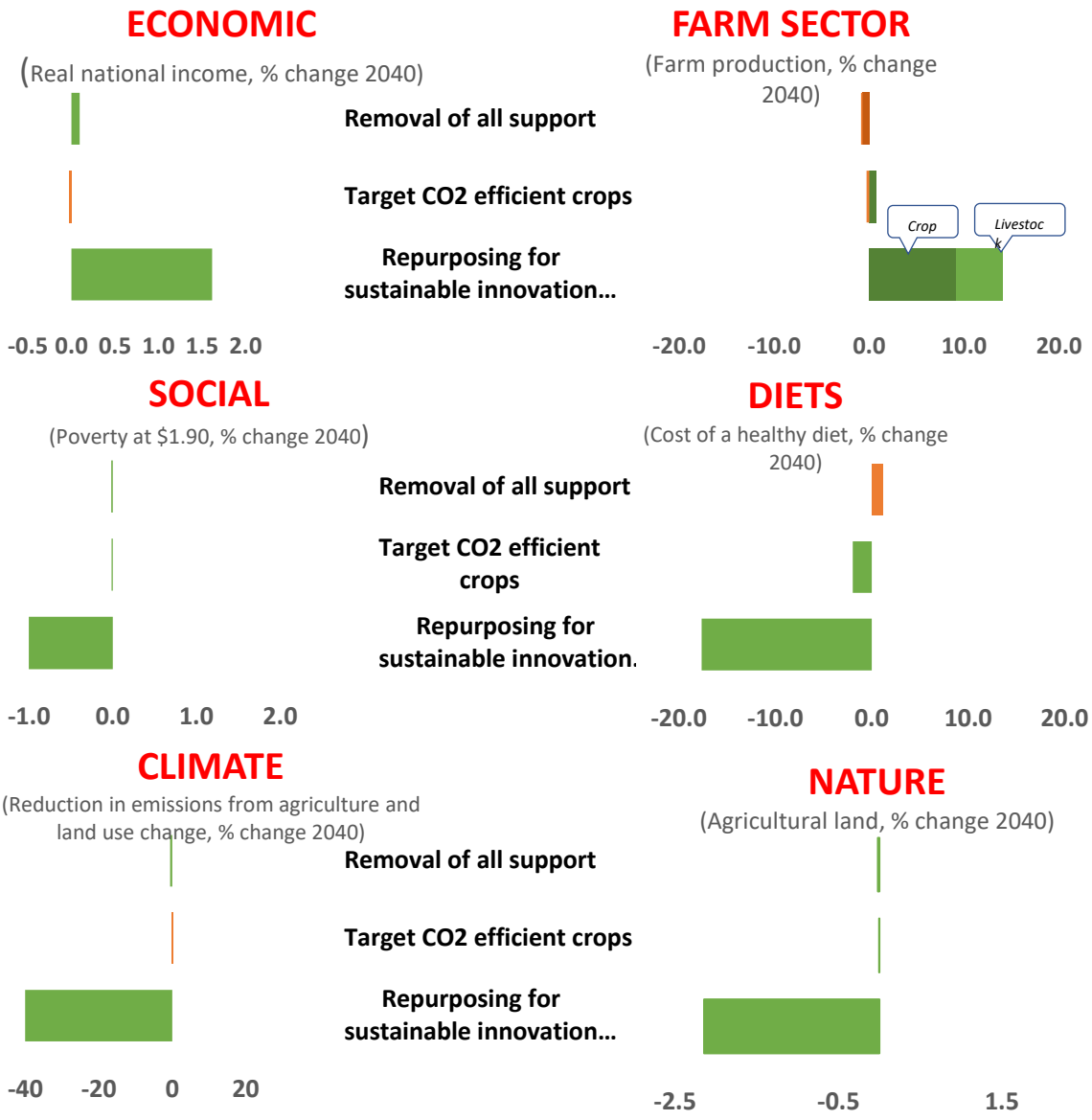
Clearly, agricultural policy reform must be carefully thought through to achieve the drastic reductions in GHG emissions that are needed to avert disastrous climate change impacts. Given the multiple goals that food systems are now called upon to address, how can the substantial resources that support agriculture be repurposed in ways that simultaneously provide strong incentives to reduce GHG emissions, improve food system efficiency and farm productivity, and help combat poverty, hunger, and malnutrition?

Global scenario analysis: repurposing support

Existing subsidies can be repurposed in ways that would make significant progress toward achieving both global climate and food security goals. Additional model-based analysis (Gautam et al. 2022) indicates that investing an additional 1 percent of agricultural output value in R&D for technologies that both increase the efficiency of production and reduce emission intensities—such as modified diets for ruminants and alternate wetting and drying for rice—complemented by incentives to farmers for the adoption of those technologies could achieve greater gains with fewer trade-offs than simply eliminating subsidies. There is ample empirical evidence indicating that the economic returns to R&D in agriculture are high. Alston et al. (2020) for one, estimate the benefit-cost ratio investments for rural R&D of 10:1. If the benefits of this type of R&D follow the 50-year distributed-lag they identified, a sustained increase in output of just over 30 percent would require an investment equal to one percent of agricultural output (assuming a discount rate of 5%). At the same time, the type of emission-reducing technologies mentioned above are also productivity enhancing pointing at a high potential for win-win gains (see, e.g., Barrett et al. 2020; Herrero et al. 2020; Chang et al. 2021; Kinley et al. 2020; Gautam et al. 2022).

To optimize global gains, an internationally concerted strategy will be required in which all countries shift resources from current market-distorting subsidies toward more spending on R&D that reduces emissions and, by raising productivity, creates incentives for farmers to adopt the improved technologies. The scenario results are promising: global welfare and food output increase; food prices fall, making food and healthy diets more affordable for many people; and poverty rates fall worldwide (Figure 2). Global GHG emissions from agriculture and land use change would drop by about 40 percent, both because of the direct reduction in emissions from crop production and because higher productivity reduces the need for agricultural land. Farm incomes would fall with the removal of subsidies, although returns to farm labor would rise if policy reform were combined with rural development policies to reduce the barriers to movement of labor out of agriculture.

Figure 2: Global implications of repurposing domestic support
(% change relative to baseline projections for 2040)



Source: Gautam et al. (2022).
Note: **Green** bars indicate movement toward societal goals; **orange/red** bars indicate movement away from societal goals.

Table 1. Impacts of abolishing all agricultural subsidies by country group (% change)

	World	Developed	Developing
Macroeconomic			
National Real Income	0.05	0.05	0.04
Farm Sector			
Real Farm Income per Worker	-4.51	-11.36	-2.70
World Prices	2.93	2.93	2.93
Production Volume – Crops	-1.31	-2.56	-1.02
Production Volume – Livestock	-0.49	-1.10	-0.07
Social			
Farm Employment	-0.53	0.25	-0.60
2040 Poverty at PPP$3.20	0.05	-0.01	0.06
Nutrition/Diets			
Dairy Consumption per Capita	-0.42	-0.49	-0.37
Veg & Fruits Consumption per Capita	-0.48	-0.54	-0.45
Healthy Diet Food Prices	1.70	2.17	1.44
Climate			
Emissions from Production, % of ALU	-0.59	-1.52	-0.38
Emissions from Land-Use Change, % of ALU	-0.89	-4.52	-0.07
Total Emissions, % of ALU	-1.48	-6.04	-0.44
Nature			
Agricultural Land	-0.06	-0.15	-0.01

Source: Gautam et al. (2022).

FAO, IFAD, UNICEF, WFP and WHO (2022) in collaboration with IFPRI present further scenario analysis showing that reorienting existing support to encourage production and consumption of nutritious foods through subsidies and border measures has great potential for achieving both affordable, healthy diets and significant progress towards environmental goals.

Political Economy Framework for Reform

Reallocation of agricultural support to R&D focused on productivity-enhancing and emissions-reducing technologies could produce better outcomes for food security and nutrition and for the natural environment, especially if carried out in an internationally coordinated manner. However, even the best reform agenda will inevitably face considerable political hurdles.

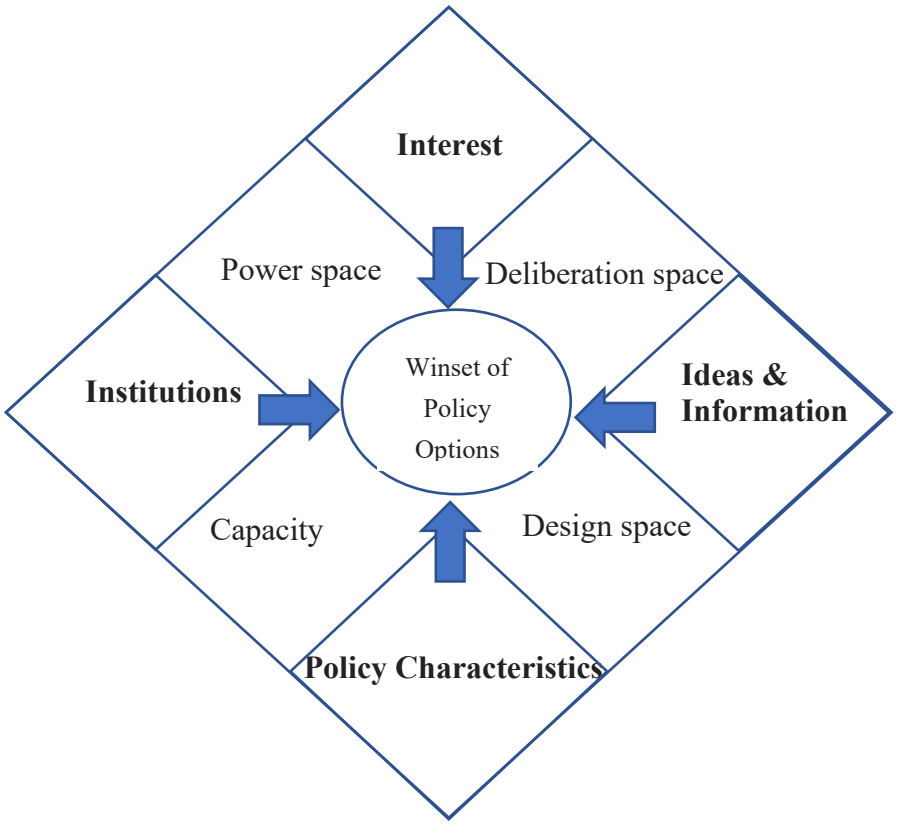
Specifically, path dependence and political disincentives contribute to the persistence of policies that no longer resonate with contemporary goals around improving nutrition or reducing emissions of greenhouse gases (GHGs). To understand the prospects for reforming policies to meet these new goals, we provide a framework in Figure 3 to show how interest groups, institutions, ideas and information, and policy characteristics combine to delineate who exercises leverage, opportunities for debate and deliberation, influences on policy design, and capacities for implementation. Where those spaces intersect reveals the set of politically viable policy choices for reforming agricultural support. Only a subset of these policies will be economically and socially desirable. The framework is used to review recent reform attempts and identify possible reforms that are politically viable and economically, environmentally, and socially desirable.

Interest groups

Interest groups play a central role in the political economy of agricultural support policies. Some individuals derive their interests from material goals based on either their position in the economy (farmers vs. consumers, rural vs. urban, white collar vs. blue collar) or in the political arena (president, parliament, military, judiciary). The opportunity to secure profits, votes, job security, and prestige, among others, may all shape who favors which policies. For instance, many political economy analyses of fertilizer subsidy programs hypothesize that politicians favor these programs because they maximize their chances of re-election (Dionne and Horowitz 2016; Mason, Jayne, and Van De Walle 2017). The growing emphasis on food systems, rather than

agriculture alone, upends traditional fault lines across interest groups because it requires considering a more complex array of interests and coalitions (Anderson, Rausser, and Swinnen 2013; Swinnen 2015).

Figure 3: Identifying Political Economy Influences on Policy Options



Source: Authors' depiction.

Just like individuals, countries have their own interests based on, for example, their global trading positions or the degree to which they contribute to GHGs. Attempts by countries to improve their terms of trade—restricting imports or exports—may raise world prices of their exports or reduce prices of their imports (Bagwell and Staiger 2016). One of the reasons that potentially large importers of rice—like China, Indonesia, and the Philippines—discourage imports is the fear that expanded imports will drive up world prices—particularly in periods of high prices. Exporters of many commodities have, in the past, sought to raise prices by restricting supply or imposing minimum prices (Gilbert 1996; Bardsley 1996).

Institutions

Not all interest groups have equivalent influence and power to secure their objectives (Grossman and Helpman 1994). More concentrated interest groups are frequently able to harness the support from policymakers to gain distortions that narrowly benefit them, even at considerable economic, environmental, and social costs to the economy (Anderson 1995; Olson 1965). In rich countries, for instance, farmers can organize much more easily than in poor countries and have historically been able to secure much more support than farmers in poor countries. And farmers in industries that require close coordination for processing—such as dairy and sugar—tend to get much higher protection than those more geographically spread, such as grains or vegetables. Small groups of processors are often much better able to organize to seek support than large groups of farmers. For instance, crushers of soybeans in exporting countries are often able to have export taxes imposed on raw soybeans.

The structure of institutions largely shapes both whose interests gain traction with policymakers and the prospects for policy coordination and implementation. The importance of institutions spans a wide range of modalities, including domestic regime types (e.g., democracies, autocracies, anocracies), parliamentary and presidential systems, federal or unitary settings, the World Trade Organization, and international conventions (e.g., Cartagena Protocol on Biosafety, Codex Alimentarius). Entities such as statutory and regulatory agencies and marketing boards often have important implications for policy. In some settings, decisions on agricultural policy may be controlled by a small but politically powerful constituency, epitomized by military involvement in wheat flour milling in Sudan, fertilizer production in Pakistan, or agricultural extension in Uganda (Resnick 2021a, 2021b). Attention to such institutions also underscores the "two-level games" (Putnam 1988)—simultaneous negotiations at national and international levels—encountered when trying to address global climate and trade issues. In such instances, the gains from international cooperation are diffuse but the costs are concentrated among certain interest groups and sectors who may have substantive domestic influence to block reform.

Ideas and information

Ideational concerns, however, can be just as powerful as material ones in shaping interests. In this view, policy preferences are derived from historical experience, cultural norms, and societal expectations (Abdelal 2009; Blyth 1997). This may lead policymakers and citizens to, for

instance, favor the market over the state, food security over dietary diversity, or nationalism over multilateralism. A particularly salient ideational view adopted by many governments is that food self-sufficiency is tantamount to food security (Sen 1980). Such aspirations can contribute to autarkic practices, such as Nigeria's year-long border closure with Benin in 2019 to increase domestic production of rice or result in high food costs and a dangerously high level of price volatility in an isolated market (Burgess and Donaldson 2010). In addition, aspirational goals around cereal self-sufficiency are one, albeit not the only, driver spurring many low-income countries to allocate a disproportionate share of agricultural expenditure budgets on fertilizer subsidies (Jayne et al. 2018). Often, ideational and material interests intersect; concerns about self-sufficiency can provide justification for policies that ultimately support the interests of a narrow group of elites.

Information derived from empirical analysis, media outlets, or learning of policy experiences from other contexts can, like ideas, cause interest groups and policy actors to update their preferences. The credibility of the source and the means of diffusion do, however, play a key role in determining how information is perceived and whether it is acted upon. This is especially true in more polarized political environments that can result in even high-quality information being dismissed if it does not resonate with extant biases of policymakers (Kosec and Wantchekon 2020).

Policy characteristics

Differences between policy options in key dimensions like the dispersion and concentration of costs and benefits, time to demonstrate impact, visibility to the public, and differences in the sophistication of implementation may have important implications for their political acceptability. Economic analysis suggests that policies like pollution taxes have a key advantage over regulatory approaches in encouraging adjustment on a wide range of margins—such as choice of production techniques, level of output, and creation of incentives for innovation—perhaps leading to entirely new and unanticipated ways to reduce pollution. But pollution taxes tend to be very unpopular, particularly if imposed on powerful interest groups. While it might, in principle, be possible to recycle the revenues from a pollution tax to benefit those in a position to oppose the tax, this is challenging to do without undermining some of the incentives created by the tax.

In many contexts, a transferable quota regime can provide the same incentives as a pollution tax. A key difference, however, is in the possibilities it creates for compensating those who would otherwise lose from the reform. If, for instance, pollution quotas are allocated based on past output levels, current producers may be willing to support the introduction of a regime that sharply reduces pollution.

Where results-oriented approaches like transferable quotas are not feasible, the key alternatives remaining are regulatory approaches that require changes in production practices, and support for innovations that can reduce undesirable outcomes like pollution. A challenge with regulatory approaches is that they require policy makers to specify the approaches to be taken, in contrast with results-oriented approaches like transferable quotas that allow producers and consumers to identify the lowest cost ways of achieving the goals of the reform. The experience of the tradable quota system used to reduce Canadian and US emissions of Sulphur Dioxide suggests that the benefits of results-oriented systems may be very large. This law generated the required reductions in emissions at vastly lower costs than anticipated, or achievable through regulatory approaches (Chan et al 2012), while providing the flexibility needed to compensate powerful interest groups that would otherwise have lost (Joskow and Schmalensee 1998).

Another approach to reducing emissions is the use of conditionality or incentive subsidies to induce behavioral change by tying practices with desirable social or environmental outcomes, such as low-carbon management practices, to the receipt of a benefit (Searchinger 2020). Several studies in Southern Africa have found that incentive subsidies increased farmers' adoption of conservation agriculture methods (Bell et al. 2018; Ngoma et al. 2018; Ward et al. 2018). Similarly, in the US, the Wetland Reserve Program pays farmers to restore wetlands (Searchinger 2020). Such policies are less likely to generate contention among stakeholders but require strong oversight to ensure farmer compliance with program conditions. Even if compliance can be achieved, such policies need to be carefully evaluated. The fact that incentives are needed to adopt the proposed technology suggests that they are less privately productive than the techniques that farmers would have chosen without the incentive. This means they may require an increase in the global agricultural land footprint, raising emissions from land use change (Gautam et al. 2022).

Regulatory approaches without compensation, such as imposing limits on GHG emissions or compelling producers to use organic practices, are much more contentious because they concentrate costs on specific interest groups. The viability of regulation depends on where such interest groups operate in the "power space." These approaches have had some success in particular cases like ozone-depleting refrigerants (Montreal Protocol), where an alternative technology is available. But they proved much less effective than tradable quotas in dealing with acid rain spillovers between the US and Canada. Establishing regulation can be difficult in low-capacity settings since enforcement is essential to policy efficacy. By contrast, de-regulation is considered a quintessential "stroke of the pen" reform (Grindle 1999) because it requires governments to desist from doing something, such as managing quantitative controls on trade or overseeing price controls; in other words, while it may be potentially difficult to get affected actors to agree to adopt de-regulation—such as during recent attempts at marketing reforms in India discussed below—implementation on the ground is likely more tractable as long as the property rights involved are well-defined.

The degree of resistance to removal of subsidies or to imposition of commodity taxes can depend on whether distinct constituencies benefit from the measure, or whether the redistribution of revenues results in investments in public goods of benefit to the affected interest groups. For instance, in Côte d'Ivoire and Kenya, export levies on certain agricultural commodities are intended to be used for reinvestment into agricultural research (Andae 2021; Stads and Doumbia 2010). The success of proposal such as that suggested by Gautam et al (2022) to invest part of current agricultural support into R&D designed both to reduce emission intensities and to raise productivity will depend heavily upon whether the affected interest groups recognize the potential to raise productivity and hence increase farm incomes.

Case Studies of Agricultural Support Policy Reforms

Each of the key variables discussed in the framework above has demonstrated an important impact on the success or failure of policy reform efforts in several key case study settings. Below we focus on four cases— in India, China, the United States, and the European Union—that not only vary significantly with regards to political institutions but also notably different types of interest group dynamics and policy priorities. This comparative case study approach allows for

elucidating which political economy factors have played a more prominent role over time. While these four experiences do not address all the types of policy challenges facing national policymakers, including collective action problems at the subnational level, they do offer important insights about when and why certain policy options become more feasible.

Failed attempts at market reform in India

India's agricultural policies have long had twin goals, resulting in supporting farmers through input subsidies (fertilizer, electricity, and hence groundwater) but also frequently reducing domestic food prices below world levels to satisfy consumers. Moreover, strong ideational objectives have underpinned interventions, such as the goal of national self-sufficiency in staple foods and price stabilization for key staples. As a result, staples such as rice and wheat receive substantial price support, and subsidized food distribution schemes rely on public procurement that likewise benefits farmers. Electorally driven credit subsidies (created by forgiving formal sector loans) are also sizable. However, agriculture does not provide a viable livelihood for most Indian farmers, with 86 percent of farms working less than 2 hectares and mostly growing staple foods (Government of India, 2020).

Subsidies have also contributed to environmental degradation and greenhouse gas (GHG) emissions; most notably, methane emissions from rice cultivation are sustained through rice price supports and electricity subsidies. Depletion of valuable water resources is also aggravated by support policies, both directly (through electricity subsidies that promote groundwater withdrawal) and indirectly (through output subsidies that promote overproduction of water-intensive rice). However, much of the policy debate on environmental damage stemming from agriculture has focused on air pollution, as crop-residue burning is a major contributor to poor air quality in northern India. Crop-residue burning is a common practice in the paddy-wheat crop rotation sustained by support prices (Kumar, et. al., 2015). Reduction of GHG emissions is yet to receive similar attention.

Resolving trade-offs between supporting livelihoods and food security, on the one hand, and environmental sustainability on the other is a challenge in India. Current agricultural subsidies amount to about 2 percent of GDP, but account for about 20 percent of farm income (Ramaswami, 2019). Any repurposing of support, including toward R&D and promotion of climate-smart policies, could thus cause hardship for poor farmers.

In the past decade, successive Indian governments have experimented with reforms. Historically, open-ended procurement of rice and wheat has been a major mechanism to provide price support to farmers. The system is logistically demanding, however, and leaves the government with unwanted stocks. For other crops, policymakers have favored price deficiency payments, which are easier to administer despite being expensive and reproducing some of the market distortions of the procurement system. Policymakers increasingly see direct (uncoupled) transfers as an alternative to these distortionary subsidies. Progress has been made in financial systems to facilitate such payments, but gaps remain in reaching all farmers, in part because of poor land records and insufficient digital connectivity.

Agricultural policy reform would serve India's national interests and potentially make an important global contribution to climate change mitigation, but it lacks political ownership and is electorally costly. In addition, the country's federal structure gives state governments considerable influence over agricultural policies. As seen in 2020, these constitutional constraints on federal authority can make policy reform challenging.

Specifically, in May 2020, India's Finance Minister announced three major market reforms to the agricultural sector.[2] The first allowed farmers to sell outside of the government-regulated *mandis* (wholesale markets), engage in barrier-free inter and intra-state trade of farm commodities, and provide a framework for the e-trading of agricultural produce. This was seen as a way to overcome fragmented supply chains created by the mandis. The second aimed to de-regulate commodities such as cereals, pulses, oilseeds, onion, and potato, by no longer allowing them to be exposed to stock-holding limits, except under extraordinary circumstances. The third sought to allow farmers to engage in contract-pricing schemes with agro-processors that would reduce price risk to the farmers and encourage private sector investment in agricultural inputs and technology. The latter was viewed as especially beneficial to producers of perishable fruits and vegetables who appeared to be losing out by relying on slow-moving government agencies to procure and distribute them (Singh & Rosmann, 2020). Collectively, these reforms were touted as part of a larger government strategy to double rural incomes between 2016 and 2022 (Agence France-Presse & Krishnan, 2020).

[2] The announcement on May 15 of that year was part of a five-day set of measures announced as part of the Self-Reliant India Special Economic Packages. See Singh (2020) for a detailed list of all government measures intended to support the agriculture and food sectors.

On June 3, 2020, the Union Cabinet approved the policy resolutions and two days later, the Ministry of Law and Justice issued three ordinances that corresponded with the resolutions: the Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, the Essential Commodities (Amendment) Act, and the Farmers (Empowerment and Protection) Agreement of Price Assurance and Farm Services. The farm laws were then passed by the majority BJP Parliament in September 2020, despite resistance from all the countries' main opposition parties who claimed that the bills were against the interests of small and marginal farmers and pushed forward using emergency powers under Covid-19 with minimal legislative discussion (Jadhav & Bhardwaj, 2020).

In fact, their resistance reflected opposition by different interest groups about the implications of the laws. While the ability to sell outside APMC mandis could improve competition and reduce transportation costs, concerns emerged about the ability of small farmers to negotiate good prices with large buyers. In addition, there was opposition from the commission agents in the mandis, known as "arhatiyas," who are influential with farmers and who would potentially lose commissions from the reforms. State governments have been concerned about the loss of tax revenue as a result of the anticipated decreased fees that typically are collected from levies on trade outside the APMC markets. The provision allowing contract farming further raised suspicions that this would result in small farmers losing access to their land and enabling large agribusinesses to dominate markets (Sahoo et al., 2020).

In addition, the disputes over the reforms revealed deeper tensions between the states and the center, across states, and among different farmers groups. For instance, in BJP-controlled Gujarat, Madhya Pradesh, Uttar Pradesh, and Karnataka, state governments had already approved amendments to the APMC Acts in early May that de-regulated trade outside the mandis (Kaur, 2020). By contrast, in opposition-controlled Punjab and Rajasthan, disgruntled farmers were supported by their state governments, which refused to adopt the three farm bills (Bhatia, 2021).

Starting in October 2020, opposition protests were organized by farmers' unions that were predominantly from Punjab, Haryana, and Rajasthan—major wheat producing states—and often led by the Bharatiya Kisan Union (Indian Farmers' Union). By late November, opposing farmers marched to New Delhi. In December, farmers' unions under the All India Kisan Coordination

Committee from other states, including Bihar, Kerala, Tamil Nadu, and Telangana, expressed their support for the farm reforms. Eight rounds of talks between the government and the opposing farmers did not lead to a resolution of concerns. In January 2021, India's Supreme Court temporarily suspended the new agricultural laws to allow further time for negotiation and to build consensus (Agence France-Presse & Krishnan, 2020).

Shifting agricultural priorities in China

The Chinese setting is notably different due to more centralized political institutions that do not require such an incremental approach. This has enabled the government to shift its policy emphasis over time according to the priorities of the ruling Chinese Communist Party, especially as the importance of climate change has gained more resonance.

China's agricultural performance has been impressive, averaging 4.5 percent annual sectoral growth and 7 percent annual growth in farm incomes since the 1980s, while substantially diversifying production. Yet, the rural–urban income gap has widened, and agricultural expansion has come at the cost of natural resource degradation and high greenhouse gas (GHG) emissions (Huang and Yang, 2017).

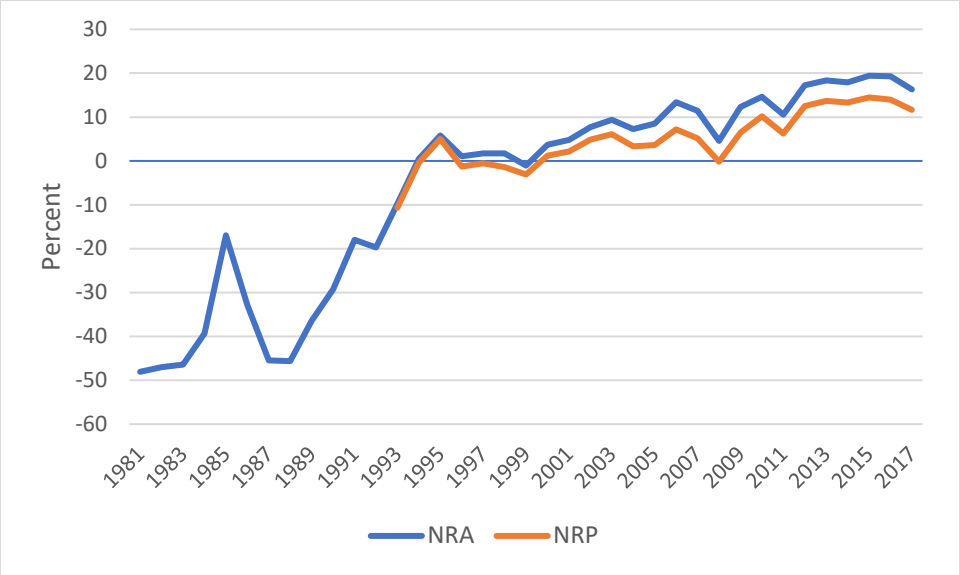
Achieving self-sufficiency in staple foods and stability of domestic food prices are policy priorities in China. The Chinese government implicitly taxed agriculture until the early 1990s by keeping urban food prices low. This policy was reversed in the mid-1990s as concerns grew about the expanding rural–urban income gap and urban consumers became less concerned about food prices. The government allowed domestic prices to rise above world market prices and began providing direct payments to farmers — thus shifting from taxation of producers to protection of domestic production. As a result, the nominal rate of protection (NRP) in agriculture increased from −50 percent in 1981 to around +13 percent in recent years, with direct payments adding 5 percentage points (as reflected in the nominal rate of assistance, NRA; see Figure 4).

The transformation of China's agricultural policies might have been even greater if it had not been limited by the country's commitment to multilateral trading rules. For instance, protection of domestic rice production would likely have been higher if not for China's commitment to a tariff binding (cap) of 65 percent at the World Trade Organization (WTO). While the country's

policymakers remain committed to ensuring grain self-sufficiency, they managed to do so without raising protection for rice, in contrast with earlier high-growth economies in the region, such as Japan and Korea.

To support farm incomes, in 2004, the Chinese government introduced a direct payment scheme largely decoupled from agricultural production and increased support through crop procurement schemes. Despite the huge fiscal cost, these reforms had only a modest effect on average farm incomes, and benefits from procurement were unequally shared. As a result, the government phased out public procurement of all commodities, except for rice, wheat, and cotton, and converted all farm subsidies to lump-sum income transfers to farmers in 2015.

Figure 4: China's support to agriculture, 1981–2017



Source: Data compiled from Huang et al. (2010) and OECD (2021).

Note: Nominal rate of protection (NRA) is calculated as support from border protection divided by the value of agricultural production at world prices. Nominal rate of assistance (NRA) is calculated as support from all sources divided by value of agricultural production at world prices.

Environmental concerns and international commitments to reducing GHG emissions led the Chinese government to enhance its Store Grains (Food) in Land (SGiL) and Store Grains (Food) in Technology (SGiT) programs to raise productivity, enhance food security, and promote sustainable production. The program enlargement, introduced in 2015, included large-scale investments in "high-standard farmland," defined as land with a high degree of resilience to

impacts of droughts and floods, water-saving production practices, high yields, and soil improvement. Through the SGiT, public expenditure on agricultural R&D was raised to RMB 26 billion (about US$ 4.1 billion), overtaking US spending and making China the world's largest public investor in agricultural R&D (Chai et al., 2019). The additional R&D is primarily focused on biotechnology and digital technology.

In 2016, the Chinese government also introduced a special project to reduce fertilizer and pesticide use and a subsidy program to promote the use of organic fertilizers. In 2018, Technical Guidelines on Green Agricultural Development were issued, promoting low-carbon and circular-economy technologies to raise productivity, reduce GHG emissions, and enhance carbon sequestration. This strategy is part of China's effort to comply with its commitments under the Paris Agreement to reduce GHG emissions by 2030 and achieve carbon neutrality by 2060. This exemplifies how institutions (international agreements, in this case) can drive national policy reform.

CAP Reform in the European Union

European policy reforms between the 1980s and the early 2000s illustrate how even policies that are rooted in long-held ideas, like food self-sufficiency, and heavily supported by powerful interest groups can sometimes be fundamentally changed. In particular, when the European Union (EU)'s Common Agricultural Policy (CAP) was designed in the 1960s it featured administratively determined market price support, with an important role for import barriers. Farm organizations had strongly lobbied for this system to protect them against internal and external competition. The policy also found support in widely felt concerns about food security — typically identified with food self-sufficiency — given the challenges of accessing food in many parts of Europe during and after World War II.

High support prices ignited a strong supply response and turned the EU into a major commodity exporter by the 1980s. The farm support required export subsidies, provoking the ire of other agricultural exporters, particularly the United States, which responded with its own program of export subsidies. As world agricultural prices fell to unprecedented lows during the mid-1980s, pressures from other countries increased as did budgetary pressures with rising costs of export

subsidies and storage. The unsold stocks accumulated in embarrassing “butter mountains” and “wine lakes.”

Agricultural exporters pushed hard for reform of global agricultural trade during the Uruguay Round of global trade negotiations (1986–1993). Given European desire to contribute to the Uruguay Round and the internal problems with the price support system, important CAP reforms were introduced in 1993 (Swinbank 2016). Reforms reduced support prices and replaced them with direct payments to farmers.

The prospect of accession of ten Eastern European countries with large agriculture sectors to the EU in the 2000s caused much concern. Expectations were that, unless the CAP was further reformed, it would lead to exploding budgets, a massive inflow of cheaper Eastern agricultural products, and a conflict with WTO agreements. Food safety and animal welfare crises in the 1990s compounded the pressure for reform. Reform was made easier by institutional changes as decisions no longer required unanimous agreement of EU member states, removing veto power of those most opposed. These factors contributed to the 2003 reform which decoupled farm subsidies from production decisions, while maintaining the overall level of farm support, and allowing the gradual integration of the Eastern countries in the CAP (Swinnen 2008).

Environmental goals have been gradually integrated into Europe’s agricultural policies. Subsequent incremental reforms over the past 30 years have introduced agri-environmental policies and shifted more of the budget to such measures (OECD 2017). However, the global food price spikes in 2008-2011 provided arguments for those lobbying against environmental measures that restricted input use and production – weakening pro-environment reforms (Swinnen, 2014).

Current reforms aim to build a Farm-to-Fork strategy as part of an EU-wide Green Deal that is designed to make Europe the first climate neutral continent by 2030 (EC 2020a/b). The reforms include payments to farmers conditional on reduced use of pesticides and fertilizers, a shift to organic farming practices, and adoption of new technologies that reduce GHG emissions from agriculture. A possible trade-off is that the reduction in chemical fertilizer use as part of a shift to organic farming practices could reduce productivity, which – in turn – could create pressure to expand agricultural land, be it in the EU or elsewhere, potentially leading to increased global GHG emissions from land-use change or a shift to regions with higher emission intensities

(Gautam et al. 2022). As a decade earlier, high food prices on global markets in 2022 trigger the same political economy reactions, reinforcing lobby pressure from farmers and agribusiness against environmental policies that would reduce productivity and the EU's potential to produce food.

Unintended Consequences of Biofuel Policies in the United States

Biofuel policies in the United States are an energy and agricultural strategy with important environmental dimensions. Biofuel policies were first introduced in the 1970s, with the goal of replacing expensive petroleum-based fuels and lead-based additives then used to improve engine performance. They were also supported by interest groups — first farmers and then ethanol producers. As concerns about global greenhouse gas (GHG) emissions increased, biofuels were increasingly justified on environmental grounds (Lawrence 2010).

Support for biofuels was initially provided by a subsidy in the form of a tax credit (Tyner 2008). Production of ethanol tripled between 2000 and 2007, thanks to the combination of a fixed subsidy and a sharp rise in the price of oil. Reforms in 2005 and 2007 introduced a mandate for the use of biofuels, with targets rising from 13 billion gallons in 2010 to 36 billion gallons in 2022. This policy was enormously popular with ethanol distillers and blenders, who otherwise would face substantial uncertainty about profitability and throughput; however, the mandate makes the demand for feedstock unresponsive to price changes, hence likely increasing the volatility of grain prices.

Because of concerns that transferring large shares of grain output to production of biofuels would raise food prices (Wright 2014), the mandate required only a 25 percent increase in conventional biofuels and targeted a twentyfold increase in advanced biofuels, mainly from vegetation unsuitable for human consumption. However, at the time, there was no established technology to achieve this increase, nor have substantial advances have been made yet, with the result that advanced biofuel output has increased only sixfold (CRS 2022).

Another drawback to promoting ethanol for environmental purposes (e.g., Searchinger 2008, EPA 2018) is that while bioethanol use may decrease fossil fuel emissions relative to use of fossil fuels, its production increases emissions through the land use change required to grow bioenergy crops. Considering only the land use change entailed within the United States, recent

estimates suggest that US ethanol has a higher GHG intensity than oil-based gasoline (Lark et al. 2022).

Several lessons can be drawn from this experience. One is that environmental goals, and particularly mitigation of climate change, may provide important pressure for change. A second is that it may be helpful to build coalitions, including among interest groups with different but potentially compatible goals — such as energy self-sufficiency and farm income support — to achieve rapid, widely supported reform. However, no single instrument such as biofuel policy can hope to achieve multiple goals, so additional policy instruments are needed (Lawrence 2008). Finally, simply mandating a goal, such as a major expansion of output using new technologies, is unlikely to be successful unless it is backed by investments in targeted R&D.

Summary

Table 2 below syntheses some of the key political economy factors that enhanced or undermined policy reforms in the above four cases. In the China and EU cases, despite institutional variations, similar policy instruments were implemented to create incentives rather than penalties for more environment-friendly practices. In addition, outlays of agricultural investments for R&D, which are usually seen as low visibility to voters and therefore marginalized by policymakers (Mogues 2015), have been a distinguishing feature of China's recent agricultural strategy. By contrast, the US relied on regulatory mandates for biofuels without concurrent R&D investments, therefore creating unintended consequences, i.e., the promotion of increased fossil fuel emissions from land use change. India's agricultural market reform attempt, which required buy-in at both the federal and state levels and from powerful farmers unions and middlemen, was a much broader and complex undertaking that ultimately failed.

Table 2: Comparison of Political Economy Dynamics

Country	Interest groups	Institutional factors	Ideas & Information	Policy instruments and outcomes
India	Subsidy, trade, and procurement policies are electorally popular and benefit well-organized cereal farmers	Federal system results in concurrent powers over agriculture between the national and state governments, creates many veto players	Food self-sufficiency still predominant over environmental concerns	Stalled efforts at market procurement reforms in 2020/2021
China	Concern over rural-urban wage gaps increased importance of farmers and agriculture in national investment strategies	WTO commitments and international climate agreements Political regime less beholden to popular interests	Food self-sufficiency but growing desire to assert role in global governance, including on environment	SGiT facilitates increases in biotech and digital tech through increased ag R&D Subsidies to promote organic fertilizer application
EU	Strong farm lobbies but budgetary burden from subsidies and pressures from trading partners	WTO negotiations at Uruguay Round	Growing norms about environmental sustainability	Two rounds of CAP reforms, decoupling farm subsidies from production decisions, payments conditional on reduced pesticide and fertilizer use Green Deal currently under consideration
US	Farmers and ethanol plant investors saw income benefits from biofuels and forged unlikely coalition for reform	Environmental Protection Agency	Growing norms about environmental sustainability	Subsidies and mandates to improve ethanol now reconsidered due to ethanol's impacts on land use change

Source*:* Authors' compilation.

The importance of the factors highlighted in Figure 3 and Table 2 are bolstered by the conclusions from other studies around the political economy of agricultural support program reforms. For instance, in comparing fertilizer subsidy reforms in Rwanda and Burundi in 2012, Chemouni (2014) notes the importance of institutional factors and interest group pressures. Namely, in Rwanda's highly centralized political system, the fertilizer subsidy program contributed to a high level of debt opposed by the Ministry of Finance, which had greater veto

power in the policymaking process than the Ministry of Agriculture. This, combined with aid cuts due to Rwanda's involvement in the conflict in neighboring Democratic Republic of Congo, led the presidency to agree to a full privatization of the fertilizer market. In Burundi, however, donors were willing to fund a better targeted fertilizer program. Although the reforms resulted in powerful economic groups losing opportunities for patronage that had prevailed under the previous system, the ruling party saw that a better managed fertilizer subsidy system would be electorally advantageous, especially in its rural strongholds.

If the policy characteristic involves providing incentives, these need to be properly aligned with community preferences and capacities. The provision of payments for ecosystem services is a clear example. In rural Mexico, weak institutions—in the form of contested land tenure arrangements and low levels of collective action among communities—meant that efforts to encourage farmers to engage in sustainable land management practices in Chiapas were unsuccessful (Corbera et al. 2019). Similarly, in Brazil, payments for ecosystem services in some riverine communities experienced low uptake due to high risk aversion among farmers to deviate from conventional production techniques and mistrust about high levels of government monitoring (De Motta et al. 2018).

National and Global Repurposing Agendas

Repurposing agricultural support clearly holds great promise for generating more sustainable, resilient, inclusive, and equitable food systems. Existing government agricultural support budgets offer a potential source of public finance for innovations and incentives to producers and consumers. Currently, only an eighth of total government support to agriculture is invested in R&D, inspection and control systems, and rural infrastructure — all areas where the private sector tends to under-provide — while three-quarters is allocated to individual producing firms, many of which are commercial and large-scale operations, thus reinforcing inequality. Hence, a strategy to mobilize both public and private finance for food system transformation should include repurposing of the agricultural support that contributes to solving serious environmental, food security, and equity problems.

Current beneficiaries will undoubtedly resist policy reforms, while those who might gain from reforms are likely to be uncertain about the benefits or insufficiently organized to mobilize for

change. Consequently, most policy reforms emerge from development of policy instruments that improve the balance between gains and losses — such as the EU's provision of financial support to farmers who engage in forest conservation and organic practices — or identifying windows of opportunity for change (Resnick et al. 2018).

The lessons learned from recent experiences with agricultural policy reforms for *national* agendas points to some promising paths and some dead ends:

- Simply arguing for abolition or rearrangement of current support is likely neither to find political support nor to generate more than modest reductions in emissions.
- Approaches that impose certain types of 'green' conditionality to farm support (like reduced usage of fertilizers and pesticides as proposed as part of EU's CAP reforms), might come at the cost of lowering land productivity which then could induce new conversion of land for agriculture (with adverse effects for emission reduction), as well as strong resistance from farmers. Farmer protests in the Netherlands in 2022 over proposed restrictions on nitrogen emissions to meet EU directives offer a prime example of such resistance.
- Moving away from market-distorting price support or subsidies coupled to production levels or input use and towards providing incentives through direct payments to farmers is mostly sensible from an efficiency perspective and eases identification of winners and losers, making such a reform negotiable. Direct payment schemes would need to be clearly targeted, and any conditionality attached to such payments be linked to verifiable farm and food sector targets and objectives and cognizant of possible trade-offs (as per the previous bullet). While desirable, such requirements will make reform complex and no doubt contentious, though not impossible. The focus on societal goals and targets can be supported by insisting on commitments to international agreements (see also below) and laying out costs and benefits based on credible scenario analysis as presented in the paper. As learned from the Indian case study discussed in this paper, where attempted reforms were announced rapidly as part of Covid-19 measures, alienating farmers, it is essential to engage stakeholders early on and iteratively in the process of designing policy reform.
- A promising approach would be to reallocate part of existing support to R&D focused on innovations that both increase productivity and lower emission intensities. Reallocation of resources to R&D focused on raising productivity and reducing emissions is expected to produce major societal gains, including benefits for those farmers who benefit from current

support. However, the gains from innovation in sustainable production methods may be perceived as uncertain and adoption may come at a cost to producers in the short run. Compensatory payments to losers and to offset adoption costs for producers could help win political support. Importantly, appropriate regulations, such as mandates on the use of renewable energy or limits on the conversion of land for farming, may be essential to overcome the resistance of some agricultural producers to more environmentally sustainable reforms. Shifting resistance to reforms that result from ideas, such as the notion that self-sufficiency should be prioritized, may require policy analysis to overcome misperceptions about the impacts of particular policies, reframing reform benefits in new ways to secure political support. It may require identifying policy options that minimize the cost of a goal that cannot be changed — for instance, replacing a goal of zero imports or exports of any staple with a broader goal of net food self-sufficiency. Hence:

    - Done right, this could generate innovations that are politically popular, achieve game changing reductions in emissions, lower costs of healthy food, and reduce poverty.
    - Direct payments to farmers could serve as incentives for the adoption and adaptation of such innovations and overcome the start-up costs of introducing new technologies and practices.
    - Collective action would ultimately be needed but initial unilateral reforms could help build support by making clear the feasibility and effectiveness of the approach and creating negative emission leakage by crowding out non-adopters.
- Using commitments to international agreements and frameworks (such as WTO rules and the Paris Climate Agreement) to promote reform has proven effective in several important national and regional agricultural policy reforms, including in the EU and China.

International agreements, including the WTO and Paris Climate Accord, could also provide an opportunity for developing an *internationally concerted* repurposing agenda. The case for such an agenda is easily made. Climate change is an existential threat to food systems globally and the repurposing scenarios analyzed in this paper clearly show that international cooperation for repurposing achieves superior outcomes on all environmental, economic, and social dimensions for all countries compared with current non-cooperative agricultural support policies. Nonetheless, getting to a common approach will not be easy:

- This is so because some key tools for emission reduction—such as carbon taxes or transferable emission quotas—work less well in agriculture than in sectors dominated by energy-use emissions. For instance, it is difficult to monitor and tax process emissions from livestock or rice production. This means a carbon tax would create little incentive to change production techniques. Regulatory approaches, such as mandating reduced use of chemical fertilizer or target levels of organic farm production, may be less effective than they appear if they reduce yield (as the evidence suggests) and increase the agricultural land footprint, and hence emissions from land use change.
- Just as for national reform agendas, detailed analyses of global societal gains, and how these would be distributed across countries, in the short and long run and of likely winners and losers could help to build support for an internationally concerted reform agenda.
- Lastly, there are interactive and mutually reinforcing dynamics between the domestic and global policy arenas. Creating constituencies for reform at the domestic level is essential to achieving global action:
    - To spur domestic action and overcome resistance, an even-handed global diffusion of technologies and financial resources is needed to let all countries reap the benefits of agricultural policy reform.
    - Given that climate change and environmental sustainability transcend borders and given that national policies have strong international spillover effects, international coordination is essential. However, reaching a common understanding of the benefits of acting together (and the cost of failure) will not be easy. Intense dialogue, informed by continuous and credible assessments of the gains to be obtained and trade-offs to be reckoned with, will be essential to smart repurposing of agricultural support. Existing platforms for international policy dialogue, such as the G20 and relevant UN bodies could champion and spur such dialogues stressing agreement on common goals, as we have argued elsewhere (Vos et al. 2021; 2022).
    - Within countries, committed governments must identify ways of framing the importance of reform in non-partisan ways so that reform efforts are not

derailed by electoral turnover or leadership changes. Across countries, the legitimacy of such reform agendas requires incorporating the concerns of countries in the Global South in an equitable and transparent manner so that the benefits of international collaboration are clear and easily justified to governments' domestic constituencies.

- Coordinated investments might be achieved by negotiating support for a research agency or program of green innovations to meet the collective need for action, recognizing countries' differences in ability to support research and the different research needs and opportunities by agro-ecological zone.

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