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5

Reforming Energy Subsidies

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5.1 Introduction

Energy subsidies make for popular policy across the world (Coady et al. 2017, 2019; Min 2015; Bello, 2022). However, especially in developing countries, they also command a very large share of government spending. Figure 5.1 shows state expenditures as a share of gross domestic product (GDP) on energy subsidies compared to other social protection spending.[1] As the chart shows, although these subsidies are large everywhere, they dwarf other social protection expenditures in lower-middle and low-income countries. Given that governments in these countries have very limited fiscal room to fund social safety nets, the size of these subsidies implicitly comes at the expense of other social protection spending.

The prevalence of energy subsidies is surprising in part because of the widespread policy criticism they consistently attract. Not only is it expensive for the state to lower household energy bills, doing so is also typically regressive. In addition, cheap power risks hampering economic growth by distorting consumption choices, increasing deadweight loss, and inducing the many environmental externalities associated with energy use (Coady et al. 2017; Inchauste and Victor 2017; Jiang, Ouyang, and Huang 2015; De Granado, Coady, and Gillingham 2012; Coady et al. 2019). These characteristics are the basis for frequent arguments for ending these subsidies (World Bank, 2022), recommendations that invariably bump up against the reality of their enduring and widespread existence and remarkable political popularity.

The point of departure for this chapter is the notion that energy policy forms a central component of social protection policy in developing countries, and it is essential to both appreciate what makes energy subsidies difficult to dislodge and to identify creative but *politically feasible* approaches to reform.

A short story—one of many from around the world—helps illustrate how energy subsidies emerge as an outsized part of social protection policy. Recently, in a 2023 election in the state of Karnataka in India, the Indian National Congress ran a campaign focused on expanding social protection expenditures on several dimensions. One of these was the provision of 200 kWh of power every month for free to every resident. This single policy

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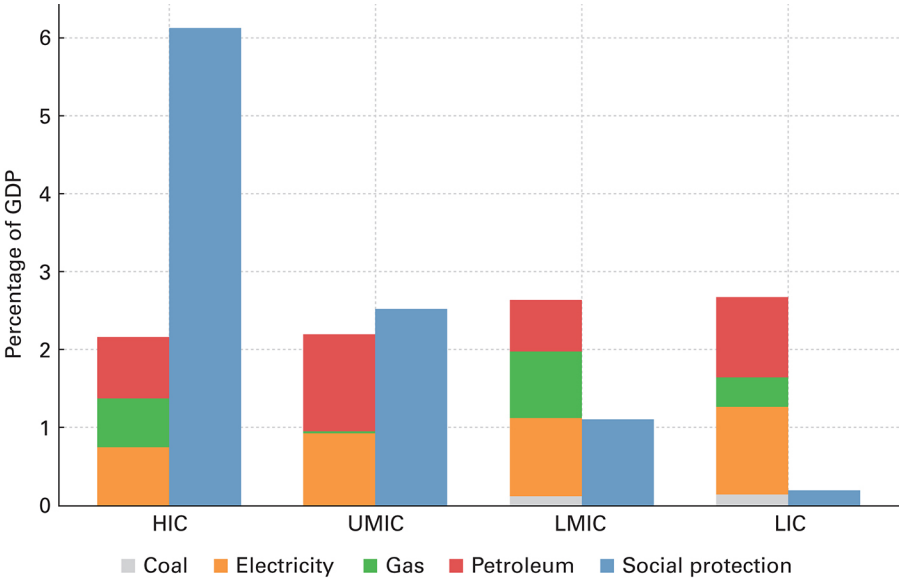

Figure 5.1
Comparison of social protection spending against energy subsidies for high-income, upper-middle, lower-middle, and low-income countries. Modified from World Bank (2022).[2]

estimated costing approximately 130 billion Indian rupees, or 1.6 billion US dollars (IANS 2023). To put this in perspective, this number is approximately equal to the entire health budget for the state in the year of this election. In a world with budget constraints, generous energy subsidies make other social spending difficult. To quote the deputy chief minister of Karnataka some months after victory: "This year, we can't provide development. Even in irrigation and public works, we can't give [funds for development]" (Joshi 2023).

Meanwhile, political rhetoric focused on reform is often less predictive of eventual outcomes than would be desirable. To take another example, this time from Indonesia, in 2014, then-incoming president Jokowi pledged to eliminate Indonesia's fossil fuel subsidies: "In four years, the fuel subsidy should be eliminated gradually, step by step, until it's gone" (Sambijantoro 2014). Despite these lofty promises, however, in 2024—two terms later—his outgoing government had a projected energy subsidy bill of US$12 billion annually (Sidik 2024).

In the remainder of this chapter, we provide a brief overview of what we know about energy subsidies, approaches to reform, and a discussion of the many areas where additional research would be valuable. In section 5.2, we discuss the monetary costs of these instruments, including environmental externalities. In section 5.3, we discuss the incidence of this spending and more subtle but pernicious spillovers such as political interference and increased theft. In section 5.4, we offer some reasons why removing these subsidies may be difficult. We go beyond political factors to discuss aspects of how energy subsidies are

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designed, and some underappreciated benefits that may be difficult to replicate through other instruments. In section 5.5, we consider feasible options for reform and the design challenges that reform policies need to overcome. We conclude in section 5.6. Overall, we suggest that the role of energy subsidies as part of the social safety net in poor countries is still severely under-researched, with a significant need for more empirical evidence from Africa in particular.

5.2 The Costs of Subsidized Energy

The full costs of energy subsidies can be hard to estimate and go well beyond their substantial budget line items. In this section, we discuss both directly observed and more indirect economic costs.

5.2.1 Pretax Costs

We begin with the most direct measure of the cost of energy subsidies: funds that might appear as line items on state or public utility budgets. This number is sometimes referred to as a "pretax" subsidy and is approximately the difference between the supply costs (or procurement costs) of energy and the price that end-use consumers pay. Globally comparable measures of these numbers are hard to obtain, so we focus here on estimates from different parts of the world that serve to highlight the importance of this spending.

Assembling data from Tanzania, Ethiopia, and the Democratic Republic of Congo (DRC), Burgess et al. (2020) estimate that the average price of domestic electricity is 3.6 cents per kWh, compared with a procurement cost of 6.4 cents per kWh. They report an average annual consumption of 1,176 kWh, implying an annual subsidy bill of about US$33 per household. Compared to other social protection spending in these countries, this number is very large. For example, Barroy et al. (2014) report that annual per capita health expenditures in the DRC were approximately US$15.

Similar conclusions hold in developing countries with higher incomes than the DRC as well. Barnwal and Ryan (2023) evaluate the subsidy bill for electricity in India. Their estimates imply that in 2021–2022, state and central governments spent about US$22 billion on electricity subsidies and funds for distribution utilities.[3] For 2019–2020, they estimate approximately US$18.6 billion. Beyond electricity, India also spent US$4.7 billion on cooking gas subsidies and another US$640 million on kerosene for the poor in the same year (Mishra 2019). Finally, transportation fuel subsidies for gasoline and diesel are estimated to have cost the state approximately a further US$10 billion (Vibhuti Garg et al. 2020). Taken together, the pretax cost of these subsidies was approximately US$29 billion in India in 2019–2020. To put this in context, India's Ministry of Health and Family Welfare reported budget estimates for the same year of just US$9.2 billion.[4]

How might these costs evolve in the face of economic growth and a changing climate? On the first point, Gertler et al. (2016) use evidence from the *Oportunidades* cash transfer

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scheme in Mexico to show that the energy-using asset ownership grows rapidly and nonlinearly with income. On the second, Rode et al. (2021) find that climate change will cause tropical emerging economies to dramatically increase electricity use for cooling. Absent rapid reforms, it is critical to understand how these two forces might affect the energy subsidy burden for developing countries in the short and medium term and the concomitant implications this might have for other forms of necessary social spending.

5.2.2 Posttax Costs

Large though they may be, pretax subsidy figures underestimate the full economic costs of energy subsidies. Because energy consumption is associated with large environmental externalities, including the production of both local pollution (e.g., $PM_{2.5}$) and global pollution (e.g., CO_2), when accounting for their full social cost, global energy subsidies come with a much larger price tag.

Coady et al. (2017) carry out a careful accounting of so-called posttax subsidies that capture the gap been social costs and prices. Their estimates indicate that posttax subsidies are an order of magnitude larger than pretax subsidies. They find that posttax subsidies were about US$4.9 trillion worldwide in 2013. Twenty-two percent of these costs were due to climate change externalities, 46 percent due to air pollution damages, 13 percent due to congestion and vehicle externalities, 11 percent due to undercharging supply costs, and 8 percent due to foregone consumer taxes.

Figure 5.2, redrawn from Coady et al. (2017), shows the breakup of energy subsidies into externalities (inclusive of climate change and air pollution), pretax subsidies, and foregone consumption taxes. Note that, as in the rest of the world, in Emerging and Developing Asia and Sub-Saharan Africa, environmental externalities dwarf pretax subsidies. Because the majority of these environmental costs are local and short term (air pollution, congestion, etc.), there are sound policy reasons to address them, even if governments prefer to privilege short-term national growth considerations over a longer-term climate change agenda.

5.2.3 Deadweight Losses

In addition to these direct and external costs, artificially lowering prices is also distortionary. When energy is artificially cheap or even free, consumers may use too much (Davis 2017). Inefficient energy consumption can also have knock-on effects on other natural resources, such as groundwater extracted using electric pumps (Ryan and Sudarshan 2022; Burlig, Preonas, and Woerman 2021). Subsidies may distort appliance markets, for example, by reducing the demand for energy efficiency (Fowlie and Meeks 2021).

Although these mechanisms are uncontroversial, there is room for more work to empirically quantify these different distortions. For instance, although the theoretical link between energy subsidies and underinvestment in energy efficiency is straightforward, there is little empirical evidence from developing countries on how important this is in practice and how it varies with the size of subsidies. Similarly, quantifying dead weight losses due to energy

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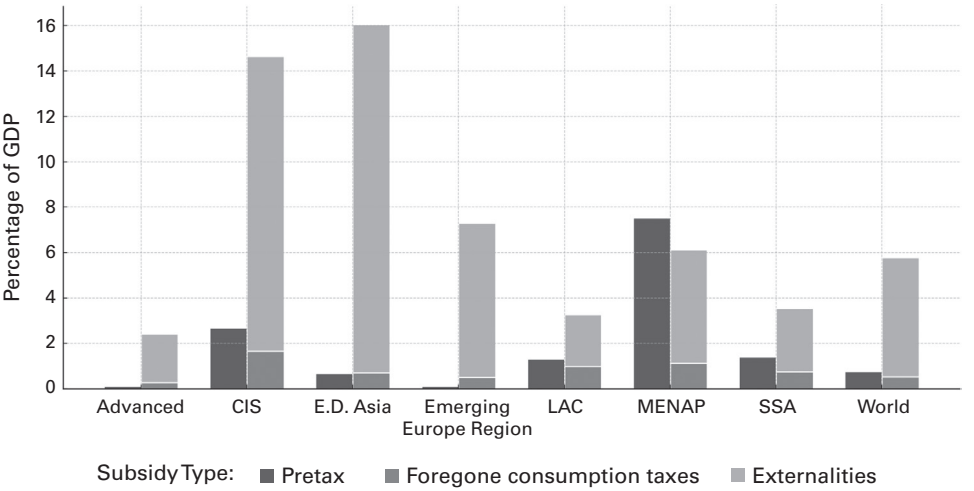

Figure 5.2
Pretax energy subsidies compared with unpriced environmental externalities and foregone consumption tax revenues (components of post-tax subsidies) for different global regions. Modified from figure 5 in Coady et al. (2017). See Coady et al. (2017) for countries included in each of Emerging and Developing Asia (E.D. Asia); Advanced Countries (Advanced); Commonwealth of Independent States (CIS); Middle East, North Africa, and Pakistan (MENAP); Latin American Countries (LAC); Emerging Europe; and sub-Saharan Africa (SSA).

subsidies depends on the price elasticity of energy consumption. While prior work in low-income countries suggests households are relatively inelastic (Filippini and Pachauri 2004; Bose and Shukla 1999; Balarama et al. 2020; Labandeira, Labeaga, and López-Otero 2017), much of this work is focused on South Asia. Understanding the extent to which this holds across developing economies is an important area for future work.

5.3 Distributional Considerations and Politics

In the context of a government's social safety net, another critique of energy subsidies is that they may be highly regressive. Fiscal analysis suggests that in low- and middle-income countries (LMICs), roughly 50 percent of spending on energy subsidies goes to the richest 20 percent (IEA, IRENA, UNSD, World Bank, WHO 2020). In Ghana, research using household survey data from 2009–2010 found that the top 20 percent by income benefited twice as much as the bottom 20 percent from petrol subsidies (Soile and Mu 2015). In Indonesia, Dartanto (2013) estimates that, in 2008, the top income decile received fuel subsidies of approximately IDR 111,533/month/capita while those for the lowest decile were an order of magnitude lower, at approximately IDR 10,787/month/capita. Changing the incidence of energy subsidies thus seems an important area for more research. Different subsidy designs yield different incidence curves, and given that energy subsidies themselves show little

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signs of disappearing, "second-best" strategies of making them more progressive and/or improving targeting may be extremely useful.

The incidence of energy subsidies depends not only on prices and baseline consumption but also on energy access and supply quality. In an interesting case study, Harish and Tongia (2014) used administrative utility data from rural areas surrounding the Indian city of Bengaluru and suggest that after accounting for differences in supply quality, low-income rural consumers were effectively cross-subsidizing richer urban consumers. If poor households are subject to frequent outages that further dampen their consumption—as in Colombia (McRae 2015), as well as many other developing countries—these subsidies can be extraordinarily regressive. On the other hand, if states can guarantee high-quality supply and introduce more stringent limits on who qualifies for cheap energy, then targeting may improve significantly. Similarly, the choice of fuel may affect targeting because the marginal willingness to pay for different fuels varies with income. For example, wealthy households may not use kerosene for lighting, even when it is heavily subsidized.

Quantifying the incidence of subsidies, ideally coupled with structural modeling to provide counterfactual policy guidance, would be highly valuable. However, these exercises are complicated by the fact that energy subsidies around the world are often built into complex, nonlinear tariff structures (Ito 2014; Borenstein 2012). Khanna and Rowe (2022) describe a subsidy regime in the state of Delhi in India with interesting threshold characteristics where power was made free up to a cutoff level, above which households were liable to pay not just for their additional units but rather for their entire consumption. These designs make subsidy incidence less regressive but arguably set up extremely high-powered incentives for households to cheat.[5]

Understanding how these nonstandard tariff structures influence subsidy targeting, incidence, and consumer responses is an area of work where more empirical evidence would be very valuable in developing new designs. Here, work on electricity pricing from developed contexts such as Japan may provide useful theoretical and econometric insights (Ida et al. 2022; Ito, Ida, and Tanaka 2023).

5.3.1 Theft and Political Interference

Beyond the direct cost of environmental externalities, energy subsidies may have insidious and unintended effects on consumer behavior. For example, policies providing free or subsidized electricity may serve to generate a broader social norm that electricity is a right, rather than a commodity that is bought and sold (Burgess et al. 2020). These norms may result in frequent protests at attempts to raise energy prices. This is particularly challenging in low-income countries where governments have very little fiscal headroom. For instance, Agbonifo (2023) discusses the policy implications of public opposition to reducing fuel subsidies in Nigeria. Political challenges to subsidy reform are widespread: In just the three-year period from 2019 to 2022, protests against reductions in energy subsidies were reported in countries as diverse as Kazakhstan, Ecuador, Pakistan, Iran, Zimbabwe, Lebanon, and

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even France (Kasturi 2022). Other important examples of recent protests include Angola, Azerbaijan, Bolivia, Egypt, India, Mexico, Sudan, and Venezuela (Mahdavi, Martinez-Alvarez, and Ross, 2020).

Beyond explicit policy, the effect of shifting social norms may be to reinforce a *hidden* energy subsidy, namely, electricity theft. The cost of illegal nonpayment can be very large. Burgess et al. (2020) document the extent of transmission and distribution losses across countries. They find evidence consistent with widespread theft in developing countries, with transmission and distribution losses exceeding 20 percent on average in low-income countries. In India, for example, electricity distribution losses are now a substantial burden on the state exchequer, and many states report distribution losses exceeding 30 percent in 2022 (Burgess et al. 2022). Issues of theft, nonpayment, and corruption extend beyond the electricity sector, with recent research quantifying a substantial quantity of theft and corruption in markets for subsidized cooking gas (Barnwal 2024).

A small but growing body of evidence suggests that politicians may actively interfere in billing and supply, perhaps because doing so can become a means of rewarding supporters (Mahadevan 2023; Min and Golden 2014). In Colombia, state support to utilities has been structured in ways that remove incentives to improve metering, supply, and payment rates (McRae 2015). These facts suggest that the dividing line between explicit electricity subsidies and unrecovered costs is blurred rather than sharp.

These facts also highlight some clear gaps in the literature. For instance, Burgess et al. (2020) posit that subsidies set up a social norm that encourages nonpayment. This is a plausible hypothesis with potentially immense implications for the full costs of subsidies. However, we have no direct empirical evidence testing this hypothesis. Research quantifying the extent to which free or subsidized power changes long-term payment behavior or attitudes toward theft would constitute a significant contribution. In a similar vein, one explanation for persistent nonpayment is that utility employees tolerate such behavior given the perverse social norms that have been created. However, we lack evidence on whether enforcement instruments currently available to utilities would improve matters. In other words, are inaction and widespread nonpayment the result of a colluding state utility or a helpless one? Lastly, although we have some evidence linking political interference with electricity theft (Min and Golden 2014; Mahadevan 2023) and data showing that formal subsidy announcements are linked to political imperatives, election cycles, and government transitions (van Beers and Strand 2013; Klomp 2020), we still know relatively little about the political returns to energy subsidies. Since these promises are expensive, it would be useful to gather evidence on how much they matter for political outcomes and under what conditions.

5.4 Why Do Subsidies Persist?

It can be difficult to reconcile the substantial downsides of energy subsidies with their popularity. One might imagine that voters would prefer social protection programs that,

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unlike energy subsidies, allocate most of the available money to the majority poor rather than the minority rich, through nondistortionary instruments such as cash transfers, as these would be both sound economics and good politics. Nevertheless, energy subsidies persist. In this section, we explore some of what makes these subsidies "sticky."

5.4.1 Universal Access

We note first that although a rich literature in economics has come to mixed conclusions on the causal effect of electrification policy on economic growth, energy access as an end in itself is nevertheless a widespread policy priority.[6] Indeed, the 7th UN Sustainable Development Goals (SDG) explicitly state as its primary target: "By 2030, ensure *universal* access to affordable, reliable, and modern energy services." Subsidies likely have a key role to play in this process. Burgess et al. (2023) estimate a structural model using a field experiment in India and data from several African countries and argue that the large difference in electricity access between rural India and rural Africa can be almost entirely explained by India's heavy electricity subsidies. In other words, energy subsidies may not be efficient, but, conditional on universal access being the goal, they are very effective.

5.4.2 Cooking Fuel Choices

The full economic costs of cooking fuel subsidies are complicated to assess because households are making choices across a bundle of different energy sources. Some of these fuels are sold in informal markets or obtained outside markets with nonmonetary costs (such as the time costs of women collecting fuelwood). These relatively dirty fuels may impose a substantial indoor air pollution burden on households who use these fuels directly (Berkouwer and Dean 2023), but even households who themselves use cleaner fuels are indirectly impacted by ambient pollution exposure driven by cooking fuel usage (Hanna, Duflo, and Greenstone 2016). This is particularly important in low-income countries, where households often use multiple fuel sources for cooking and lighting.

Governments may have legitimate reasons to intervene in cooking fuel markets. Clean cooking practices are potentially hindered by many market failures—lack of access to credit to pay for associated appliances (Berkouwer and Dean 2022), inability to pay high operating costs due to the monetary costs of clean fuels (Afridi, Barnwal, and Sarkar 2024), and a failure to internalize health externalities within and outside the home. The last of these may be exacerbated by the fact that men make purchase decisions while women and children are much more exposed to pollution when cooking (Miller and Mobarak 2013). Since it is impractical to tax these informal fuels, subsidizing cleaner alternatives may be an alternative instrument for achieving the goal of moving people toward clean indoor cooking fuels. This observation underscores the need for more empirical evidence in the economics literature on the causal link between subsidies and transitions to clean cooking; and on how energy subsidies and capital subsidies for appliances such as electric or gas stoves interact with each other to affect take-up. Berkouwer and Dean (2022) present evidence that credit

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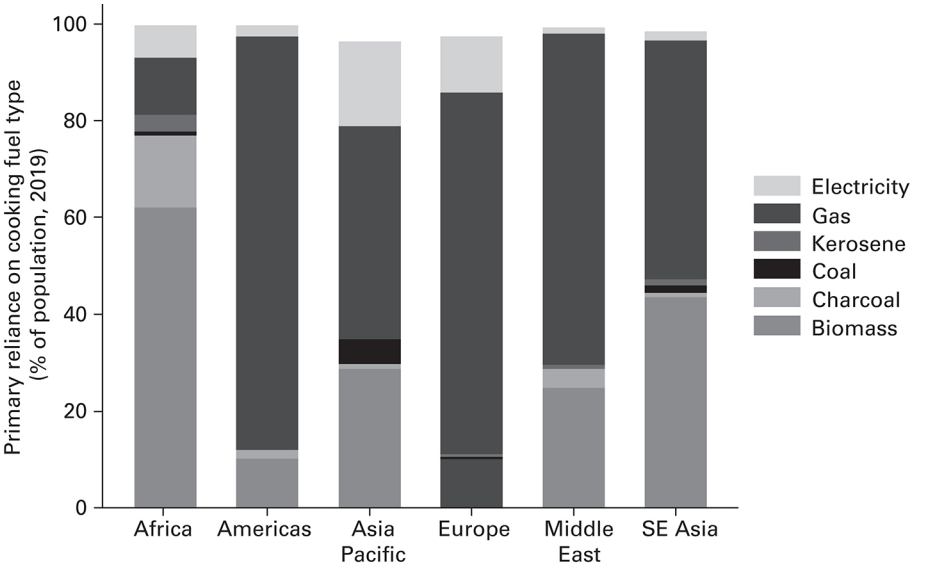

Figure 5.3
Primary sources of cooking fuel around the world. Data source: WHO Household Energy Database (2021).

market failures hold back the purchase of efficient stoves, and providing loans can increase appliance purchases and reduce the use of charcoal. This raises an additional question: Should governments prefer marginal energy subsidies, lump sum transfers, or credit interventions to encourage appliance adoption and to help households to climb the energy ladder?[7] We note that the answer to these questions is likely to be different in different settings, as biomass use is much more prevalent in the household energy mix in Africa than elsewhere (figure 5.3). More broadly, given that households use multiple fuels for cooking, it is important that analysis of policy in this area account for the sometimes-complicated patterns of substitution and choice that might arise.

5.4.3 Concentration Versus Incidence

Third, although energy subsidies often benefit the rich more than the poor in terms of expenditure levels, this masks the important fact that poor households face a greater "energy burden," spending a larger share of their income on energy than do the rich (Pachauri and Spreng 2004). Although this is true across countries, it is particularly stark in LMICs. While low-income households in the United States spend 8.1 percent of their income on energy (Drehobl, Ross, and Ayala 2020), this share can be much higher in poor countries. As an example, Berkouwer and Dean (2022) find that the median household in a sample of Nairobi slum dwellers spends 22 percent of their income on energy. As a result, poor households in LMICs are particularly susceptible to energy price shocks (Guan et al. 2023). Furthermore,

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because the poor consume very little energy, their *marginal* willingness to pay (as distinct from ability to pay) may be much higher than rich households. These facts help to explain the widespread protests from the poor that have accompanied attempts at subsidy reform.

This raises the crucial question of how reform policies should be implemented and designed to ensure buy-in from the poor. A key challenge is that, although governments may propose more progressive targeting of funds that might leave the poor better off on paper, their increased vulnerability to energy price shocks means that practical concerns, such as whether the government can credibly commit to cash transfers that are timely or keep up with energy prices, become very important.

5.4.4 Spillovers to Other Areas of the Economy

Fourth, energy subsidies are linked to other sectors. Household electricity access is a prerequisite for several other services that governments may be interested in. These include home water purification, health care, opportunities for household work for women, access to information services and digital payments infrastructure, and educational technology. Many of these services have positive social externalities or private benefits that households may not internalize (such as the health benefits from cleaner water). In other words, policymakers may reason that universal *restricted* subsidies (such as a limited amount of free power) are very likely to provide higher social benefits than costs, because of such "knock-on" effects. Documenting these links rigorously would be of significant policy value especially since studies of the long-term effects of electrification suggest meaningful benefits (Lipscomb, Mobarak, and Barham 2013).

Lastly, for liquid fuels, reform is complicated even further by the fact that subsidies for transport fuels propagate throughout the economy, so that removing them would raise prices differentially across goods, unequally affecting poor versus rich households (Coady, Flamini, and Sears 2015; Rentschler 2016).

5.5 Subsidy Reform

The substantial costs of energy subsidies we describe in section 5.2 in combination with the reasons for stickiness in section 5.4 raises critical questions: What does *feasible* reform look like, and what design challenges must reform policies overcome? Evidence-based answers to these questions are both sorely needed and in short supply.

One approach that has appeared to work is to take advantage of global price fluctuations. Over the last decade some of the most substantial cuts in subsidies, without attracting public outrage, have occurred for liquid fuels. Developing-country governments have been able to enact reforms without substantial pushback by taking advantage of times when the supply-side costs of energy have fallen. This creates the fiscal space to reduce subsidies by simply choosing not to pass these savings through to consumers, thus reducing state costs without raising prices (see Jain [2018] for a detailed case study of India). Unfortunately, such reforms

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may not be structural in the sense that the state may still retain the ability to influence prices. As a result, political temptations to cushion the blow from future cost increases may remain in place.

A different starting point is the observation that the money spent on energy subsidies might be better used to fund unconditional cash transfers. These instruments could allow for better targeting and therefore might enable a budget-neutral *increase* in transfers to the poor (World Bank 2022). This argument is based on sound economics, and cash transfers should leave households strictly better off than equivalent amounts of energy.

Unfortunately, there is very little empirical evidence comparing outcomes under cash transfers and equivalent subsidies. Hanna and Oliva (2015) find that a permanent increase in household income in India is not sufficient to get households to switch from dirtier to cleaner fuels. This suggests that it is not necessarily the case that replacing subsidies for modern energy with equivalent cash transfers would yield similar outcomes as far as access to *energy* is concerned. This distinction becomes important once we acknowledge that individual governments—and, indeed, even the UN SDGs—might be interested in ensuring energy access as an end in itself.

Although a horse race between conventional subsidies and cash alternatives would produce necessary and interesting new evidence on consumption outcomes, such comparisons do not fully engage with the problem confronting policymakers. Governments in developing countries do not have before them a tabula rasa upon which they may etch the optimal design of social protection expenditures. Rather, they must identify a credible policy framework that substitutes away from status quo energy subsidies in favor of more efficient instruments and can be implemented in a democracy. In the words of Roland Coase, "Whatever we may have in mind as our ideal world, it is clear that we have not yet discovered how to get to it from where we are. A better approach would seem to be to start our analysis with a situation approximating that which actually exists, to examine the effects of a proposed policy change, and to attempt to decide whether the new situation would be, in total, better or worse than the original one" (Coase 1960).

The experience of past attempts at energy subsidy reform suggests that even modest changes may be hard to pull off without simultaneous compensation. Figure 5.4 presents data from Moayed and Guggenheim (2021), categorizing case studies of attempted subsidy reform across space and time by whether they involved simultaneous cash compensation, whether they generated public protests, and whether they (even partially) succeeded. This history suggests that in the absence of contemporaneous compensation, protests are likely and success is unlikely. We should stress that these examples are not exhaustive, and as Moayed and Guggenheim (2021) point out, successful examples of reform seem to be decreasing over time.

Swapping subsidies for cash compensation may also be challenging if such an exchange creates a large number of losers (as discussed in Sallee [2022]). Studying small farmers in India, Ryan and Sudarshan (2022) show that status quo energy subsidies—which take the form of free electricity and a six-hour power ration to pump groundwater—act like a

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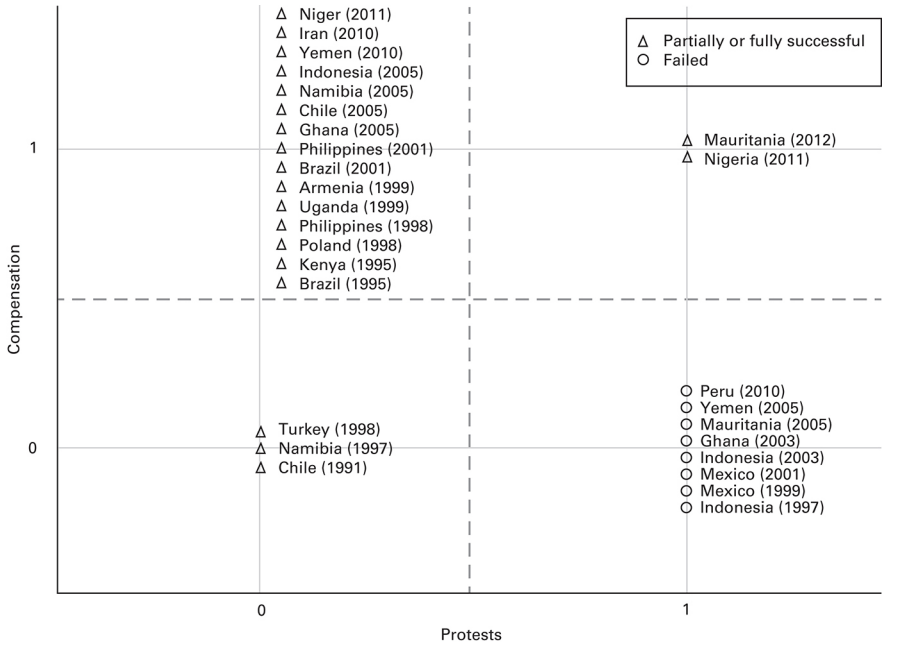

Figure 5.4
Subsidy reform attempts categorized by whether they involved simultaneous cash compensation and whether they generated public protests. Figure modified from Moayed and Guggenheim (2021) with additional data from Clements et al. (2013).

heterogeneous and somewhat regressive transfer of surplus to farmers. Eliminating these inefficient subsidies in favor of pricing power at its full social cost significantly increases total agricultural surplus. Ryan and Sudarshan (2022) show that unproductive farmers benefit most as do farmers who use more water. The distribution of benefits is not straightforward. On the one hand, the ration limits how regressive the subsidy can become, and on the other, farmer productivity does not necessarily track income. These facts also mean that it may be difficult to make compensatory transfers without creating losers. In this setting, the authors test several possible transfer criteria that rely on farmer characteristics that the government observes (such as landholdings or the size of their water pumps). They show that compensatory transfers based on these rules leave many farmers worse off, primarily because it is hard for the government to predict the level of compensation that would make farmers willing to give up subsidies. This occurs even though there would be additional surplus generated by efficient pricing without rations.

Although this example is specific, the problems it highlights are more general. Beyond the targeting of payments, a more pragmatic concern is whether the government can credibly commit to cash transfers that are timely and keep up with energy prices. Timeliness is important because electricity cannot be stored, so if subsidies were replaced with a lump

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sum progressive transfer, payments must reach consumers in a timely manner. This is a requirement that is more easily met in states that have a digital payment infrastructure that reaches all or at least most beneficiaries of electricity subsidies. Countries such as India have been able to replace subsidies for cooking gas applied at the point of sale with ex post transfers to consumers, a reform that appears to have significantly reduced the illegal diversion of subsidized cooking cylinders toward commercial uses (Barnwal 2024).

A final complication is that, in low-income countries, household energy consumption is often determined by a *combination* of a subsidized price and a binding ration. For instance, although clean cooking fuels are frequently subsidized, households cannot claim an unlimited quantity at the low price. Storage considerations and the very high transaction costs involved in secondary markets[8] imply that even were such caps not in place, household demand, even at very low prices, might be limited. In the case of electricity, a combination of outages, appliance ownership, and technical limitations on the power drawn by domestic connections mean that even if power is completely free, demand is constrained. This fact implies not all beneficiaries of subsidized energy are of equal concern when assessing the economic inefficiencies of artificially low prices. Households whose marginal willingness to pay for power at the quantity cap exceeds the full costs of energy do not contribute to deadweight losses. For these households, the subsidy acts as a transfer, and they are constrained on quantity.[9]

5.5.1 Direct Benefit Transfers of Energy

From the previous discussion we suggest five desiderata for successful energy subsidy reform. First, an alternative policy instrument must improve economic efficiency. Second, even if reform is not Pareto improving, it should not create many losers. Third, it should be progressive. Fourth, it should be budget neutral, given the constrained resources available. And fifth, it should present a credible alternative to households, providing for some households a guarantee that they will not be worse off under the reform.

It is immediately clear that the second and third items on this list are at odds with each other. Progressive designs for both electricity and cooking fuel subsidies may leave not only the very rich but also households with more moderate incomes worse off. It is unclear how many losers are "too many," but the widespread conflict and protests that have accompanied reform attempts in many countries suggest this is a difficult matter to get right (Moayed and Guggenheim 2021).

An alternative approach is replacing subsidized energy tariffs with *voluntary* unconditional cash transfers, approximately equal to the value of the energy subsidy and accompanied by an increase to Pigouvian pricing. By setting the transfers based on prereform subsidy spending, this instrument remains budget neutral and addresses the four desiderata we outline previously: improving economic efficiency, providing a Pareto improvement, retaining budget neutrality, and ensuring that households can credibly believe they will not be worse off under the alternative.

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This combination could be implemented through energy bills that combine negative fixed costs (the unconditional transfer) and a positive marginal price.[10] In theory, this switch should leave all households better off. If households were to consume the same energy as under the price subsidy, their incremental costs due to higher tariffs would equal the unconditional transfer, by construction. Thus, if there is no change in behavior, there are no changes in household expenditure. This might happen in the case of households who were quantity constrained and thus had a marginal value of electricity higher than its full price.

Conversely, if a consumer had a marginal willingness to pay under the original subsidy regime that was below social cost (e.g., equal to the subsidized tariff in the absence of quantity constraints), they are better off reducing the quantity of energy they use, leaving them with cash in hand available to spend on other goods they value. This bundle of goods should be strictly preferred to the energy subsidy.

A key is that this type of contract could be made voluntary. This is because the consumers most likely to opt in are those who would value cash much more than cheap energy. These are precisely the consumers contributing the most to deadweight losses. This form of advantageous selection would allow such a reform to be introduced without imposing mandates, thus providing a path forward even in settings where many households have low trust in government. A disadvantage of this instrument is that because the fixed charge is negative, the government must have the ability to make (digital) transfers to consumers. In addition, this instrument could be just as regressive as the original subsidy because it is designed to ensure there are no losers. That said, adjusting the unconditional transfer allows governments to introduce more progressive regimes, at the cost of foregoing Pareto improvements and increasing the risk of opposition. Ultimately, further empirical work is needed to assess the extent to which these instruments are feasible across settings, and to measure the extent to which they reduce overconsumption of energy.

5.6 Conclusion

In this chapter, we document that energy subsidies constitute one of the largest de facto social protection programs in low-income countries. We highlight the challenges associated with these subsidies and call for subsidy reform. We argue that any reforms must be done in a manner that is both feasible and informed by economics—and need to take seriously the notion that their persistence suggests that they have attractive features that any reforms must incorporate. Given the large size of these subsidies—both compared to other social protection and to the volume of existing research on them—the path to subsidy reform must involve creative solutions. In this regard, we encourage academics and policymakers alike to experiment with alternatives to costly fuel subsidies. Horse races that evaluate second-best—but feasible—solutions against existing subsidies may be particularly valuable.

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Notes

1 The definition of social protection expenditures in this context—based on the World Bank's ASPIRE indicators—is broad, covering policies relating to conditional and unconditional cash transfers, noncontributory pensions, school meals, public works, food and in-kind transfers, education, housing assistance, noncontributory health services, and other social assistance paid for by the state (e.g., childcare services). Unlike energy subsidies, these instruments tend to be efficient, progressive, or both (World Bank 2022).

2 Required disclaimer: "This is an adaptation of an original work by The World Bank. Views and opinions expressed in the adaptation are the sole responsibility of the author or authors of the adaptation and are not endorsed by The World Bank."

3 The authors report INR 178,694 crore net of both operating losses and subsidies and INR 16,968 crore in operating losses. We take the difference and use an exchange rate of INR 74 = 1 USD.

4 We calculate this number using an exchange rate of INR 70 per US dollar applied to budget estimates of 64,559 crore INR, as reported by the Ministry of Health and Family Welfare.

5 Szabo (2015) discusses South Africa's Free Basic Water pricing scheme, which works in a similar way.

6 Lipscomb, Mobarak, and Barham (2013) estimate large benefits from electrification writ large; Lee, Miguel, and Wolfram (2020) find that subsidized rural electrification is welfare-reducing; and Burlig and Preonas (2022) highlight heterogeneity in the welfare consequences of rural electrification by community size.

7 This question is complicated by a considerable gap in many settings between engineering solutions and real-world solutions. As an example, several studies have documented the difficulty in encouraging households to take up "improved" cookstoves, finding that these supposedly better products often faced low household demand (Hanna, Duflo, and Greenstone 2016; Miller and Mobarak 2013). In certain cases, (e.g., Berkouwer and Dean 2022), subsidizing a particular technology may be warranted, but economics typically warns against "picking winners."

8 For example, secondary trade between households and (say) commercial users might be illegal and difficult to execute given that energy in different forms is not easy to transport.

9 Such transfers may nevertheless be undesirable to policymakers from a distributional point of view, especially if richer households have higher valuation for power.

10 Borenstein, Fowlie, and Sallee (2023) discuss a two-part tariff with a positive fixed charge in the context of raising funds to encourage energy transitions using a more progressive and efficient design than raising marginal prices well above costs.

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The Handbook of Social Protection

Evidence and New Directions for Low- and Middle-Income Countries

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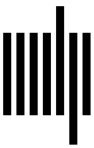

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