Using Importers' Windfall Savings from Oil Subsidy Reform to Enhance International Cooperation on Climate Policies

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Fossil fuel subsidy reform would not only decrease consumption, but also lower the world market price of traded fossil energy carriers, in particular oil. As a consequence, oil importers would lower their import bills by more than US$ 30 bn per year. Recycling at least a part of these savings to support low-carbon energy technologies in countries that reduce their subsidies could provide a mechanism to jointly incentivize transformation of the energy system and alter the political economy of subsidy reform.

In the face of slow progress vis-à-vis a global climate agreement, many hopes rest on climate finance mechanisms (Carraro and Massetti 2012), such as the Green Climate Fund (GCF) (UNFCCC 2010). Yet, an agreement on a potential mechanism to raise this amount of money seems out of reach in the near future (Bowen 2011). At the same time numerous countries are heavily subsidizing consumption of fossil fuels (IEA 2014). These subsidies not only pose significant environmental problems and lead to an accelerated depletion of fossil fuel resources, but are also economically inefficient (UNEP 2008; GSI 2009; IEA et al. 2011). Despite the substantial gains in terms of economic efficiency that could result from a reduction of fossil fuel subsidies, political considerations, such as the opposition of powerful

interest groups, impose formidable obstacles for subsidy reform. For instance, some authors have pointed out that policy makers may use fossil fuels subsidies to reward their interest groups, as these subsidies are easier to deliver, observe, or target than other goods or services provided by the state (Strand 2013). Furthermore, it has been argued that citizens of countries with large resource endowments have a strong sentiment of entitlement to these resources, also described as 'resource nationalism' (Segal 2011). Finally, even though fossil fuel subsidies often have regressive impacts (Arze del Granado, Coady, and Gillingham 2012), subsidy removal without compensatory measures could have severe adverse impacts especially for the poorest segments of the population (Rao 2012).

In this essay we argue that an international arrangement linking fossil fuel subsidy reform to a climate finance mechanism could – by conjointly pursuing both objectives – overcome these political economy obstacles by increasing the benefits of subsidy reform as well as raising the economic and political costs of keeping fossil fuel subsidies in place. Our argument is based on the often neglected observation that reducing fossil fuel consumption subsidies would not only decrease domestic consumption, but also lower the price of fossil fuels traded on the world market, particularly that of oil, which receives the largest share of fossil fuel subsidies (Schwanitz et al. 2014). As a result, considerable savings could be realized by oil importing countries. Using some of these savings to finance the transformation of energy systems via a 'subsidy reduction fund' (SRF) could provide the political impetus to support the reform of fossil fuel subsidies. For instance the IEA estimates that a global removal of fossil fuel subsidies would lower annual consumption of crude oil by about 5% (IEA 2011). According to estimates by Schwanitz et al. (2014), this would correspond to a decline in oil prices of 5%; a similar figure of 5.6% is obtained by Burniaux et al. (2011). Using the 5% decline as a benchmark, the world market price of oil should (at the

crude oil price of US$ 55 at the time of writing) be expected to decline by US$ 2.8 per barrel. The top 5 oil importers – EU, US, China, Japan, and India – which together account for imports of almost 12 bn barrels per year (or about half of global imports) would then enjoy 'windfall savings' of about US$ 31 bn per year.

If at least a sufficiently large fraction of these windfall savings was recycled back to countries that have reduced their subsidies, anticipated transfers could alter the political economy of subsidy reform by creating interest groups that would benefit from those transfers and keep the opposition to subsidy reform in check. Subjecting the SRF transfers to an international climate finance mechanism would help to ensure legitimacy and transparency conveyed by the associated procedural arrangements and oversight. Possible existing mechanisms under which the SRF could be hosted include the Green Climate Fund (GCF) or the World Bank's Clean Technology Fund, Climate Investment Fund, or the Global Environmental Facility (GEF). Alternatively, the creation of a new fund would of course also be conceivable. That is, depending on the progress of future international negotiations, the SRF could either act as a complement or a substitute to existing mechanisms such as the GCF.

In the following we will focus on oil subsidies for the sake of simplicity. In reality it would be more efficient to apply the proposed mechanism to all fossil fuels to avoid potential market distortions, rebound effects and carbon leakage. Dedicating the funds for climate measures in countries that reduce their subsidies might raise political acceptance on the side of oil importers, who would also gain from the associated emission reductions in recipient countries. As an illustration of how such a scheme could be put into practice, Fig. 1 shows contributions to and payments from the SRF for selected countries assuming a scenario in which subsidies to oil products are completely phased out and windfall savings of the 5 largest importers are fully transferred in proportion to recipients' share in global subsidies in

oil products (see SI for details). Under these assumptions, roughly US$ 31 bn per year would be raised for the SRF. Even though countries with high fossil fuel subsidies are not necessarily the ones offering the most cost-effective opportunities for low-carbon technologies, the above amount of finance would help to reduce the high carbon intensities observed for practically all countries with large fossil fuel endowments (Friedrichs and Inderwildi 2013), which are – at least on average – also the countries featuring the highest subsidies. To the extent that windfall savings can be allocated without undermining exporters' incentives to reduce their subsidies, they could further be targeted to other countries where mitigation can be carried out at the lowest cost or where adaptation is most necessary.

Fig. 1 indicates that for the five exporting countries with the highest oil subsidies in place – Saudi Arabia, Iran, Venezuela, Egypt, and Mexico – export losses from a lower oil price would approximately be compensated by SRF finance. In particular, for Iran, Venezuela and Egypt, SRF flows would exceed lost export revenues by several billion US$. As in most cases the largest exporters are also those with the highest subsidies in place, one can regard this arrangement as a self-financing scheme. Taking into account the benefits of reducing economic inefficiencies from subsidizing oil use, for the above countries the total effect of subsidy removal is positive, amounting to gains of several billion US$ per year. Further, for importers that have subsides in place, namely China and India, the net change is also positive, even if reduction of deadweight losses – for which no data is available for these two countries – are not taken into account. Hence this scheme has the double benefit of not only providing incentives for fossil fuel subsidy reform, but would also raise funds to finance investments in low-carbon energy sources in two of the world's largest emitters.

[Figure 1 here]

There are serious motivations for countries to join the proposed scheme. Importers would benefit on the following accounts: first, they reap the so-called infra-marginal rent, which is given by the difference between willingness to pay and marginal costs for additional imports occurring at a lower oil price. Second, if windfall savings are not fully recycled back to countries that remove their subsidies, importers would be able to appropriate some of these windfall savings. That is, the scheme could include a provision that specifies how oil importers' savings are to be shared. In reality it will of course not be possible directly to observe by how much the oil price has decreased as a result of subsidy reform. However, estimates can be generated by combining empirical evidence of oil price elasticities with numerical models. The redistribution of gains would then depend on the oil price elasticity as well as the model parameters used to compute these estimates. Such methodology is routinely employed by policy makers (see e.g. Coxhead et al. 2013).

In how far oil importers will be able to keep some of the price decreases will be a question of political resistance to subsidy reform within recipient countries as well as all involved parties' bargaining power[1]. Third, all countries would benefit from the emission reductions achieved by subsidy reform – about 4.4% of global emission, according to the IEA (2011). Even more favorable climate benefits would accrue if the SRF were designed such that recipient countries are obliged to redirect a certain fraction of their fossil fuel subsidies toward low-carbon energy sources. Such conditionality has to take into account that fossil fuel subsidies will need to be redirected in a way to compensate losers, as discussed in detail

[1] With tighter domestic political constraints, a government can threaten to forgo transfer payments that are too low to receive support by domestic constituencies. In this way, it can establish a credible committed to only accept outcomes in which a large share of windfall savings are actually transferred (Putnam 1988).

below. Therefore, the extent to which existing subsidies can be redirected towards clean energy sources will crucially depend on each country's particular political economy setting and be subject to negotiation. Fourth, oil importers would further benefit from any additional emission reductions from climate measures financed by the SRF. Even though other oil importers could 'free-ride' and benefit from price reductions without making their windfall savings available to the SRF the number of participants required to achieve significant improvements is rather small, as shown in our above example, which raises hopes that this collective action problem could successfully be solved.[2] An additional motivation to refrain from free-riding could be established if at least some part of oil importers' SRF contributions would count as meeting GCF pledges. That is, for a country providing financial resources to the SRF, GCF contributions could be lowered by a proportional amount (which could e.g. be determined by a mutually agreed factor that determines an 'exchange rate' between SRF and GCF funds). One major advantage in this regard is that – unlike the GCF, for which funding is still largely undetermined (Bowen 2011) – the SRF assigns clear responsibilities for contributions, as oil importers are required to provide contributions in proportion to their windfall savings.

At the same time, for exporting countries with substantial energy subsidies in place it would likely be economically rational to reduce or completely phase out these subsidies even without additional support (Sterner 2011). First, Davis (2013) reports global deadweight losses of US$ 44 bn per year from economically inefficient subsidies on oil products (with

[2] It is of course also conceivable that single countries pay other countries to reduce their fossil fuel subsidies. However, as other countries would also benefit from the reduced world market price for oil and the lower emissions, unilateral action could well be hampered by free-rider incentives and only seems likely to occur if the benefits for a single country are large enough to mandate the costs of paying off subsidizing countries.

Saudi Arabia, Venezuela and Indonesia among the countries suffering the greatest losses)[3]. Second, in addition to reducing (or even avoiding) these economic losses, subsidy reform would probably also have progressive distributional effects. That is, subsidy reform would arguably reduce economic inequality, as mostly high- and middle-income households benefit most from these subsidies rather than the lower income ranges (Arze del Granado, Coady, and Gillingham 2012). For instance, the IEA (2011) has pointed out that only 8% of fossil fuel subsidies accrue to the poorest 20% of the world population. Third, even though resource owners would be negatively affected by declining export revenues, their fossil fuel resources would be depleted more slowly, which would lead to a more equitable inter-generational resource allocation. Fourth, fossil fuels subsidies are found to have a number of additional negative effects, such as increasing local air pollution, encouraging smuggling, black markets and fuel adulteration (IEA 2014).

In summary, the proposed scheme would create a 'win-win' situation. More efficient allocation of economic resources resulting from fossil fuel subsidy reform creates an economic rent that can be shared between oil importers and countries that reduce their subsidies in a way that makes both groups better off. As a consequence of this potential Pareto-improvement, both types of countries would then benefit from joining the SRF. Payments from the SRF would then act as a 'carrot' rewarding countries for reducing their subsidies rather than a 'stick' punishing them for keeping their subsidies in place. The prospect of such a reward could help to overcome political economy obstacles hindering unilateral subsidy reform.

Evidence from successful subsidy reform suggests policies that compensate losers are crucial to create and sustain interest groups. Mechanisms identified to successfully promote

[3] Note that this number was derived for an oil price of about US$ 110. It seems likely that subsidies and deadweight losses have declined as a result of the recent oil price decline.

reforms include cash transfers (Iran and Georgia), public spending (Indonesia, Niger and Ghana) and improving social security and safety nets (Indonesia, Jordan and Moldova) (IMF 2013; World Bank 2012). In addition, the IEA (2014) highlights the importance of transparently communicating the potential benefits of subsidy reform and gradually phasing-in energy price increases to allow affected stakeholders to adjust. In this regard, a promising avenue to gain political support could lie in emphasizing how subsidies could be used in an alternative, more efficient, way, such as using some part of the savings to invest in e.g. health and education, or to reduce public debt. Finally, if fossil fuel subsidies are redirected towards subsidies for alternative, low-carbon energy sources, it is conceivable that end-user prices remain largely unchanged by the reform (Matar et al. 2014), which should reduce political resistance to subsidy reform to a great extent.

In particular, subsidy reform needs to be undertaken in a way that does not have a negative impact on the poorest segments of the population, which can be achieved by providing affordable alternative sources of energy and supporting social measures to ease the burden of transition e.g. for employees of state owned utilities being laid off in the wake of the reform (Clements et al. 2014). For the case of the SRF, supporting measures yielding visible and immediate advantages in terms of improving energy access and reliability of the electricity grid as well as reducing air pollution would seem likely to increase political feasibility of subsidy reform (Jakob et al. 2014).

There are also important strategic considerations in favor of participating in the proposed scheme: on the one hand, lost export revenues resulting from a decline in oil prices are distributed over all exporters, such that if only some countries reduce their subsidies, they may receive compensation payments from the SRF that exceed their losses with regard to export revenues. On the other hand, countries that do not join the scheme would – at least

if some countries reduce their subsidies – be affected by declining export revenues without receiving associated compensation. These dynamics could result in a 'domino effect' of increasing participation (i.e. participation by some countries makes it more costly for the others to not participate in the scheme) that has been conjectured for international trade agreements (Baldwin 1993).

Evidently, putting the proposed scheme into practice would face a number of practical challenges. First, revenues generated for the SRF in the way described above need to be distributed in an equitable and incentive compatible way. A straightforward way would be distribution proportional to each country's share in the reduction of global subsidies. Under such an approach, the resources provided for the SRF by major importers would only benefit a few countries that account for the lion's share of total subsidies (Fig. 1), but would largely exclude e.g. adaptation in least developed countries that are most vulnerable to the impacts of climate change. It could surely be argued that funding for these considerations should come from other sources, such as industrialized countries' budgets for development assistance or multilateral donors. Alternatively, a certain fraction, perhaps 10%, of windfall saving could be dedicated to this end. The upper bound of this fraction is determined by the compensation that needs to be provided to countries that reduce their subsidies in order to still make it worthwhile for them to join the proposed scheme.

The widely applied 'price gap approach', which measures subsidies by the difference between domestic and the world market price (Koplow 2009) would constitute a starting point to assess the amount of subsidies in individual countries. In any case, a mutual agreement on commonly accepted accounting practices would be required. Moreover, sound institutional frameworks are necessary to provide the necessary monitoring, reporting, and verification and to ensure that financial inflows from the SRF do not

overwhelm recipients' absorptive capacity (Jakob and Steckel 2014). Second, a mechanism to appropriate the windfall savings in importing countries would be required. This could be achieved by a tax on oil consumption – as it would not exceed the drop in oil prices, it would not have adversely affect economic growth or make consumers worse off. Another possibility would be introducing a (or raising an already existing) price on carbon emissions which, due to its broader tax base, would likely achieve additional environmental benefits and might provide a basis for future policies aimed at reducing domestic emissions (Edenhofer et al. 2015).

While these challenges are significant, they do not appear to be unsurmountable. In the terms of game theory, the underlying issue is not a prisoners' dilemma, in which non-cooperation is a dominant strategy, i.e. each country would gain from unilaterally breaking a commitment. Rather, the proposed institutional set-up would transform the game structure into a coordination game, in which cooperation is the optimal action for each player given that all other players cooperate as well (Barrett 2005). In such a setting, appropriate institutions can contribute to welfare improvement by sharing information, align information, and provide focal points (Keohane 1984). In addition, recent literature on the emergence of trade agreements has emphasized that such treaties can be understood as mechanisms to rein in domestic interest groups (Regan 2006). That is, international commitment is regarded as providing a counter-weight to powerful domestic lobbies that influence policy making in a way that benefits them, but is detrimental to overall social welfare (Maggi and Rodriguez-Clare 2005). The same line of argumentation can be applied to the case analyzed in this paper. For the case of fossil fuel subsidy reform, the potential gains seem large compared to the transaction costs to create an institution such as the SRF; that is, they actually appear to be too large to remain unexploited in the long run. However,

assessing whether they are indeed sufficient to overcome barriers to subsidy reform on the national level – such as vested interests and lack of confidence in the ability of governments to use the revenues in a way that is beneficial for the population (Clements et al. 2014) – requires a deeper understanding of the historical context under which energy subsidies have been introduced and their path dependency. This particularly concerns the balance between 'ownership' of SFR funds by recipient countries (which are likely unwilling to fully cede control to an international authority) and oversight by the SFR required to ensure that the monies are spent effectively. For this reason, further research on country-specific factors as well as their interplay with the international political environment will be needed to successfully tackle fossil fuel subsidies. In addition, it seems very unlikely that the proposed scheme could act as a substitute for an internationally treaty to reduce emissions. By correcting 'negative carbon prices' and supporting the uptake of low-carbon technologies it could, however, support and complement existing initiatives and hence ease the way for a global climate agreement.

Figures:

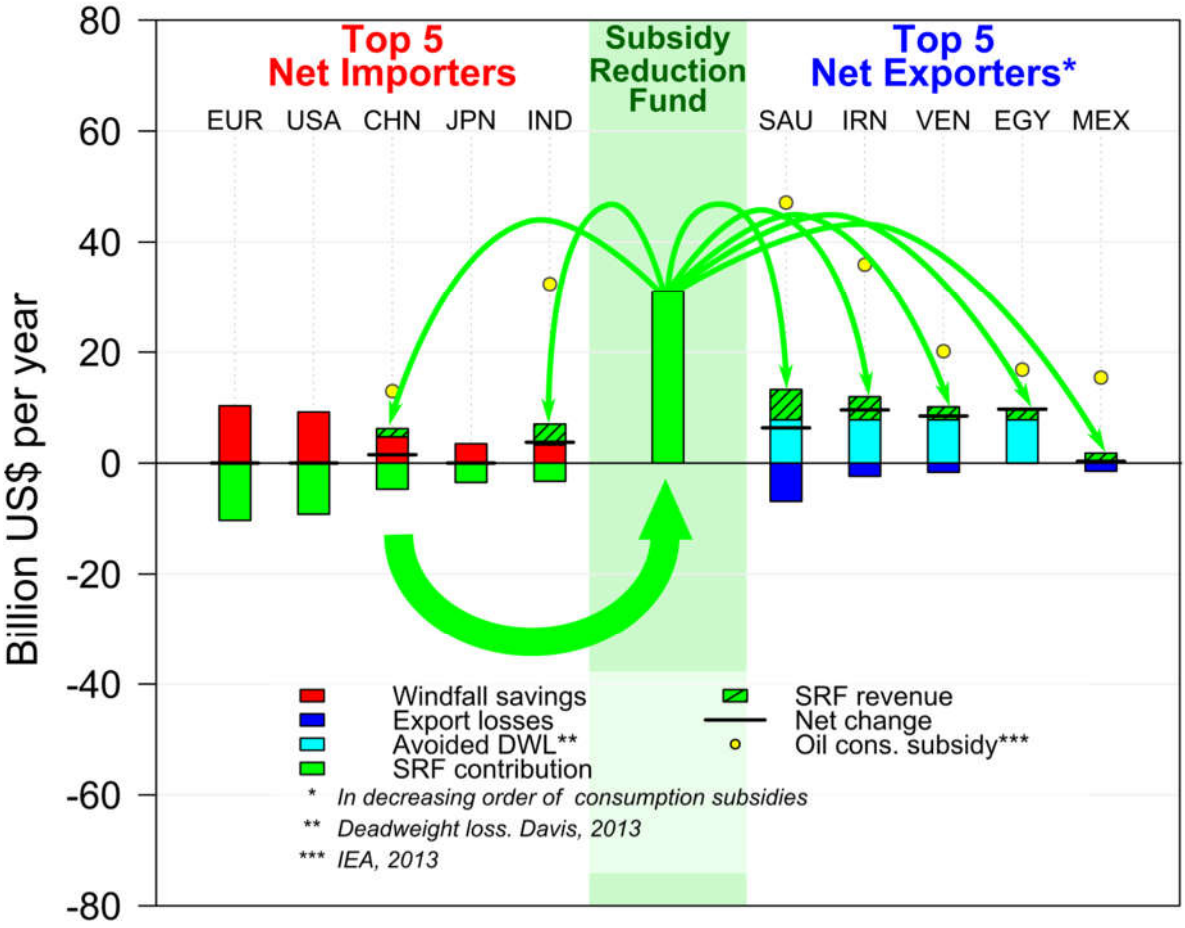

Figure Fehler! Es wurde keine Folge festgelegt.. Oil subsidy reform and subsidy reduction fund (SRF) financing mechanism. It is assumed that phasing out subsidies for oil consumption lowers the global oil price by 5% and that main importers' windfall savings are fully recycled via the SRF. For details see SI.

Supplementary Material:

Tables S1 and S2 provide an overview of oil imports and exports, spending and revenues on oil, the current amount of consumption subsidies for oil products and their associated economic distortions (i.e. deadweight loss) for the 10 most important importers of oil and the 10 most important subsidizers that are at the same time oil exporters.

Subsidies are determined using the price-gap approach, i.e. the difference between the world market price and costs for domestic users as a measure of financial advantage conveyed by a public policy or regulation (such as price controls that make fossil fuels accessible to domestic users for prices below the world market price). The price-gap then measures the revenue that is forgone by selling fossil fuels more cheaply than what could be obtained from selling on the global market.

While it can be argued that this approach under- as well as over-estimates subsidies, it is the most commonly used measure (Koplow 2009) and by our knowledge the only one for which comprehensive cross-country data is available. It also has the advantage that no benchmark for extraction costs is required and that it implicitly includes all taxes and royalties, such that one can abstract from them without requiring estimates for every country. Finally, the price gap approach can be applied for exporting as well as importing countries, as it will provides a metric of 'net subsidies/taxes' (e.g. for the case in which oil consumption is taxes and subsidized at the same time through different policies).

Deadweight losses from oil subsidies include the wedge between supply and demand, but neither environmental damages nor welfare losses from foregone tax revenue (as e.g. no VAT might be levied on oil, see Davis (2013) for more detail).

Throughout the paper, a decline of the world market price of 5% was used. This is in line with numerical estimates that calculate by how much the oil price would change if all fossil fuel subsidies (also including coal and natural gas) were removed. Depending on substitution elasticities between different fossil fuels and the availability of alternative technologies, the price change if only subsidies on oil products were removed can be higher or lower. For this reason, we also provide estimates for importers' savings and exporters lost revenues for a price change of 2.5% and 10% as a sensitivity check.

Table S1: Top 10 Importing countries and regions

#	Country / Region	Oil imports	Import costs	Savings (2.5%)	Savings (10%)	Savings (5%)	Consumption subsidy	Deadweight loss
	Sources	*(CIA 2014)*					*(IEA 2013)*	*(Davis 2013a)*
	Units	*Bn bbl/year*	*Bn US$*	*Bn US$*	*Bn US$*	*Bn US$*	*Bn US$(2012)*	*Bn US$(2012)*
1	EU28	4	206	5	21	10	0	0.0
2	United States	3	184	5	18	9	0	0.0
3	China	2	94	2	9	5	13	NA
4	Japan	1	70	2	7	3	0	0.0
5	India	1	66	2	7	3	32	NA
6	South Korea	1	52	1	5	3	0	0.0
7	Germany	1	37	1	4	2	0	0.0
8	Italy	1	32	1	3	2	0	0.0
9	France	0	26	1	3	1	0	0.0
10	Singapore	0	23	1	2	1	0	0.0

Table S2: Top 10 subsidizing exporters

#	Country	Exports	Revenues	Losses (2.5%)	Losses (10%)	Losses (5%)	Consumption subsidy	Deadweight loss
	Sources	*(CIA 2014)*					*(IEA 2013)*	*(Davis 2013a)*
	Units	*Bn bbl/year*	*Bn US$*	*Bn US$*	*Bn US$*	*Bn US$*	*Bn US$(2012)*	*Bn US$(2012)*
1	Saudi Arabia	3	138	3	14	7	47	12
2	Iran	1	47	1	5	2	36	8
3	Venezuela	1	33	1	3	2	20	10
4	Egypt	0	1	0	0	0	17	3
5	Mexico	1	29	1	3	1	15	NA
6	Iraq	1	52	1	5	3	14	NA
7	Algeria	0	22	1	2	1	13	2
8	Malaysia	0	2	0	0	0	6	NA
9	Ecuador	0	4	0	0	0	5	0
10	Kuwait	1	28	1	3	1	5	1