IISD International Institute for Sustainable Development

Global Subsidies Initiative

POLICY BRIEF

How to Respond When Prices Go Up: Objectives and options for fuel price adjustments in Indonesia

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April 2017

Summary

This policy brief analyzes Indonesia's mechanisms for adjusting domestic fuel prices in response to fluctuating world prices, consistent with existing efforts to reform diesel and gasoline prices. It also offers some insights regarding the ongoing LPG pricing reform process.

Indonesia has done significant, groundbreaking work in reforming gasoline and diesel subsidies, including saving over USD 15 billion in subsidies and generating investments in infrastructure, health and education (Pradiptyo, Susamto, Wirotomo, Adisasmita, & Beaton, 2016). The country is also now in the midst of a major effort to reform liquefied petroleum gas (LPG) subsidies over the course of 2017. These ongoing efforts have reduced and eliminated subsidies where possible, while reforming the subsidy system to be more effective at targeting remaining subsidies to those who most need them. The current pricing system is fragile, and is still subject to shocks and increased pressure when international energy prices increase, which they started to do in late 2015.

Even small increases in international oil prices can have significant impacts on the economy and on consumers. In the aspects of the energy pricing system where there are fixed price subsidies—such as the long-standing system of subsidies for 3 kg LPG canisters, where prices have been fixed since 2009—increases in international energy prices lead to increasing requirement for subsidies to maintain the fixed price. This presents a major financial risk to governments and utilities, as LPG subsidies were the equivalent of nearly USD 4 billion in 2014 (Toft, Beaton, & Lontoh, 2016).

Passing through increasing energy prices directly to consumers presents problems of energy affordability, particularly for those on low or fixed incomes. An associated issue is market uncertainty, which can introduce significant volatility and fluctuations into the energy price, making it difficult for energy users to plan for and cope with price adjustments.

Approaches to managing fuel prices include ensuring long-term fiscal sustainability, limiting fluctuations and minimizing shocks. There are options directly related to strengthening the fuel pricing mechanism, and strategies specifically to mitigate the impacts of higher fuel prices. This paper highlights some of these options, including price smoothing, ratcheting and installation of price floors and caps, closing with recommendations for Indonesia.

Introduction: A history of price reforms

The Indonesian government has indicated its aims to continue reducing energy subsidies and target remaining subsidies to low-income persons who most need them. This began with diesel and gasoline reforms in 2015, and has moved forward to the implementation of LPG reforms, expected to take place over the course of 2017.

These changes have successfully created a new regime where subsidies for fossil fuels are either eliminated, or significantly curtailed and targeted. Billions of dollars have been saved and redirected to social goods like health and education as well as basic infrastructure.

However, subsidy reform must be an ongoing process to ensure that the new fuel pricing regime is economically and socially sustainable. Continual adjustments to the prices of fuels will have to be made: subsidies, where they remain, must balance consumer energy access with the economic realities of fluctuating fuel prices and the desire to avoid a return to massive subsidies.

Fortunately, there are a number of price adjustment mechanisms that can be used to avoid major shocks for consumers and ensure subsidies are kept in check. Some of these mechanisms are examined below; Indonesia may wish to consider these, both as adjustments to existing reforms for diesel and gasoline, as well as for new reform processes such as LPG.

Existing Reforms for Diesel and Gasoline

The reforms for gasoline and diesel were introduced at the end of December 2014. This involved removing subsidies to gasoline (except for distribution costs outside of the central islands of Java, Bali and Madura), and putting in place a new fixed subsidy of IDR 1,000 per litre of diesel (Pradiptyo, Susamto, Wirotomo, Adisasmita, & Beaton, 2016). Prices for these fuels were set close to market rates, with the intent that the government would adjust them at regular intervals to better align with market prices as international prices rose and fell. This was originally envisioned to be a fairly regular adjustment, but eventually settled into a pattern of roughly once every three months with minor adjustments up and down in 2015.

The initial result of the reforms, coupled with falling oil prices, led to a significant fiscal savings of IDR 211 trillion (USD 15.6 billion) (Pradiptyo, Susamto, Wirotomo, Adisasmita, & Beaton, 2016).

At the same time, there were significant investments in human and economic development, infrastructure and transferred funds to regions and villages. Investment in these three areas totalled roughly IDR 246 trillion (USD 18.5 billion) at the time that the removal of subsidies represented a savings of roughly IDR 211 trillion (USD 15.9 billion).

The intent was always for prices to be regularly adjusted (Pradiptyo, Susamto, Wirotomo, Adisasmita, & Beaton, 2016); however, an acknowledged risk at the time was that if the adjustments were managed more politically there could be backsliding (Lontoh & Toft, 2015a) and potential losses for PT Pertamina, indicating that a more programmed approach may be more effective in the long term.

This raises the question of how to address impacts on consumers should oil prices rise again, as they have started to in 2016.

The LPG Reform Process

Indonesia is also now looking to implement reforms to LPG subsidies over the course of 2017. The difference with gasoline and diesel is that some form of subsidy will have to stay in place for low-income Indonesians. This is to ensure continued access to modern and relatively clean forms of energy (compared to alternatives such as wood and kerosene).

Indonesia's current LPG subsidies arose from a 2007 program designed to assist people in converting from kerosene to LPG. At the time of the program kerosene served as the primary cooking fuel for Indonesian households (PT Pertamina & WLPGA, 2013). The challenge of this program was that kerosene was also heavily subsidized, requiring that the designated replacement fuel (LPG) also had to be economically competitive with kerosene, and therefore necessitated subsidies for LPG.

At the time of program introduction (2006) subsidies for kerosene totalled USD 3.8 billion and continued to rise to a high of USD 5.2 billion in 2008 even as the volume of kerosene fell from 10 million kl to 7.8 million kl (Toft, Beaton, & Lontoh, 2016). The program entailed a universal subsidization for 3 kg LPG tanks, with the goal of driving energy users to this alternative. The price of these tanks has been held at this same 2009 level since then. The program was successful in driving a shift from kerosene to LPG, which led to the kerosene subsidy eventually falling below USD 1 billion in 2011 (PT Pertamina & WLPGA, 2013).

However, as the program became more successful, it necessitated ever-increasing LPG subsidies, since the uptake of the program coincided with increases in international LPG prices. The LPG subsidy totalled nearly USD 2.5 billion in 2011, climbing to almost USD 4 billion in 2014, representing 2.76 per cent of all government expenditure.

A 2014 estimate of the impact of subsidies indicated that only roughly 4 per cent of the LPG subsidy was reaching the lowest income group (Toft, Beaton, & Lontoh, 2016). This has indicated that the current system needs reform to ensure it is providing the subsidies to those that need them most.

Adjusting to Greater Exposure to International Prices

Indonesians are now more exposed to international prices for gasoline and diesel—and may soon be for LPG as well—but there is a need to ensure that energy access is not jeopardized. In this report we look at ways governments can adjust domestic prices to address fluctuations in international fuel prices in order to achieve three core objectives.

The first objective is ensuring fiscal sustainability, in terms of both the government ensuring that it is not subject to significant structural subsidies, and fiscal sustainability for fuel consumers.

The second objective is to minimize fluctuations that can be painful for consumers and create unpredictability in the price of fuels. Prices should change gradually to allow for adjustment, and allow for softer rises and decreases.

The third objective relates to accommodating shocks in the world market pricing system.

This applies equally both in situations where prices are removed and where they are to be either be reduced or better targeted. The goal is to structure the pricing level to ensure it is sustainable in the long term, and does not place an undue burden on either the government or energy consumers should prices rise again in the future.

While the following scenarios refer to gasoline and diesel prices specifically, they can be also considered specifically in relation to the LPG reform process that is currently underway, or any other form of energy subsidy.

Scenarios for Fuel Prices in Indonesia

The following scenarios look at approaches to setting the subsidized price level for Premium gasoline and diesel under the new reform process being implemented in 2017. The focus is on how the subsidized price is adjusted in response to changes in international prices and exchange rates.

The Objectives of Price Adjustment

There are three objectives to any fuel price adjustment mechanism:

1. Ensuring fiscal sustainability
2. Minimizing price fluctuation
3. Minimizing fiscal volatility

Ensuring Fiscal Sustainability

A key government objective when considering alternative price adjustment mechanisms is fiscal sustainability. If the regulated price is held constant over long periods, while the cost of fuel on the international market rises (or the currency depreciates), then the gap between the regulated price and the true cost of fuel widens. This gap is filled by a subsidy, which can impose a significant burden on the government's budget. For example, from 2009 to 2014, the Indonesian government spent IDR 449 trillion (USD 33.8 billion) on subsidies just for gasoline. To avoid this gap, any price adjustment mechanism needs to ensure that regulated prices are, on average, around the same level as the international price of fuel. Note that, for fiscal sustainability, it is not necessary for the government to ensure that the prices are identical at all points in time—simply that, over the course of a year, the net subsidy is guaranteed not to exceed an agreed amount or share of the budget.

Minimizing Price Fluctuations

Fluctuations in fuel prices are painful for consumers, particularly those who do not have the ability to cope with significant changes in price. As a result, a second objective for fuel price adjustment is that it should not produce major price fluctuations. This does not mean that the price has to remain fixed—rather, when the price changes, the change should not be too large, so that consumers are able to cope with any price changes relatively easily.

Minimizing Fiscal Volatility

In addition to minimizing price fluctuations, the government may also aim to minimize fiscal volatility. If there are rapid changes in the international price of fuel, while the domestic price is kept relatively stable, then, by definition, there are also rapid changes in the size of the subsidy from month to month. Conversely, if the changes in the international market are matched by changes in domestic prices, then the size of the subsidy remains relatively stable. Hence there is a direct tradeoff between maintaining price stability for consumers and reducing the volatility of subsidy payments—more stability for consumers will mean more volatile subsidy payments and vice versa.

Alternative Approaches to Price Adjustment

Given the objectives above, there are a number of different ways of approaching price adjustment.

Fixed Prices

Prior to the January 2015 reforms, the government's approach was to maintain fixed regulated prices for Premium, with occasional adjustment. The main motivation for reform was that this approach allowed very large subsidies to accumulate, absorbing more than 2.6 per cent of the central government

expenditure (0.27 per cent of GDP) in 2015 (Audit Board of the Republic of Indonesia, 2015). The size of the subsidies forced the government to make infrequent but sometimes very large adjustments to the consumer price. Thus, fixed prices achieved none of the three objectives of a price adjustment mechanism: i) it was fiscally unsustainable; ii) while it kept the price stable for a period of time, the price changes that occurred were large and disruptive; and iii) it was volatile, creating a challenge for the Ministry of Finance.

Following International Prices

The current mechanism introduced in January 2015 is to apply a formula for the domestic price based on the international price. The current formula for Premium is:

EOMP = [(MOPS92 * 0.9842) * ER] + Distribution cost + Taxes

Regulated domestic price = EOMP.

EOMP is the Expected Open Market Price (i.e., our estimate of the international price in domestic currency terms); MOPS92 is the Mid-Oil Platts Singapore price for 92% Octane gasoline; 0.9842 is an adjustment factor to account for the fact that Premium is only 88% Octane; ER is the average Bank of Indonesia exchange rate from the 24th to the 25th days of the previous month; distribution cost is the amount announced each year by regulation to account for the cost of distribution of Premium around the country; and taxes include VAT (10 per cent) and Fuel Tax (5 per cent). In theory, the regulated domestic price is set equal to the EOMP each month.

This formula fulfills two of the objectives of an adjustment formula extremely well.

First, it is fiscally sustainable because there is no subsidy—domestic prices are simply equal to international prices with suitable adjustments for quality and distribution costs so that, in principle, fuel is sold at cost. The use of this formula has resulted in immense savings for the government, which have been put into a variety of public goods.

Second, by eliminating the subsidy, there is clearly no fiscal volatility either. The Ministry of Finance does not need to worry about the potential implications for the budget of changes in the international price, since these will be directly reflected in domestic prices and so no subsidy will emerge.

The only objective that the current formula does not fulfill is that it passes through the entire volatility in the international market to domestic consumers. This could lead to significant price changes from month to month. For example, if the current formula had been applied consistently each month since its introduction, there would have been changes of IDR 300-400 (two to three cents USD) (both up and down) every month.[1] Because of this, the government chose not to apply the formula each month, keeping the price fixed for several months before adjusting it. Because, in principle, it passes through international price volatility in full, there is often a reluctance on the part of policy-makers to pass the full costs through when price increases are significant. As a result, there is the risk that, if international fuel prices are rising, adjustments will be too infrequent and subsidies will re-emerge. Moreover, the longer the period between price adjustments, the larger such adjustments tend to have to be. The solution to this problem is to adjust the price very frequently—at least monthly—to try and ensure that adjustments are manageable in size, but this, in turn, guarantees significant volatility in domestic prices.

Smoothing Price Adjustment Formula

As with the "following international prices" approach above, smoothing works by calculating the Expected Open Market Price (EOMP) every month. However, instead of simply setting the regulated

[1] Had the formula been applied every month, the median absolute change would have been IDR 353 (USD 0.03).

domestic price to be equal to the EOMP every month, the smoothing formula shifts domestic prices gradually in the direction indicated by the EOMP. An example is as follows:

Regulated domestic price (current month) = Regulated domestic price (previous month) + α x [EOMP (this month) – Regulated domestic price (previous month)]

Thus if the EOMP is rising, then the regulated price will also rise, but it will not immediately jump up to the EOMP; rather it will just go part of the way up. Similarly, if the EOMP is falling (say because oil prices are falling), the regulated price will not fall immediately to the lower EOMP, but only move part of the way down.

The extent to which regulated prices follow international prices (i.e., the EOMP) is determined by the value of α. If the value of α is zero, the prices are completely fixed and do not move. If the value of α is one, then this is the same as following international prices. Thus the value of α determines how "smooth" we wish adjustment to be. A low value of α, say 0.1, makes price adjustment slow and smooth. This means that subsidies can re-emerge if the international price is rising. Equally, it can mean that surpluses emerge when the international price is falling. A high value for α, say 0.9, means that adjustment to the new international price is rapid; this would entail greater price volatility, but lower fiscal volatility. Because the regulated price is following the international price, on average over time, subsidies are likely to be minimal, so the formula is fiscally sustainable.

Figure 1 shows the prices for Premium from 2009 until October 2016. The green line shows the actual regulated domestic price for Premium. The blue line shows the international price (the EOMP). From 2009 until mid-2013, there was a widening gap between the regulated price and the international price, giving rise to large subsidies. In June 2013, the government increased the regulated price by 44 per cent. However, international prices continued to rise and the gap re-emerged. In September 2014, the government raised the regulated price by a further 31 per cent to IDR 8,500. By coincidence, this was the precise point at which international prices started to fall sharply. The new formula was introduced in January 2015, leading to a sharp fall in the regulated price. Although the government has not subsequently applied the new formula every month, with the result that the regulated price has not followed international prices precisely, the new formula, combined with falling international prices has dramatically reduced the size of subsidies.

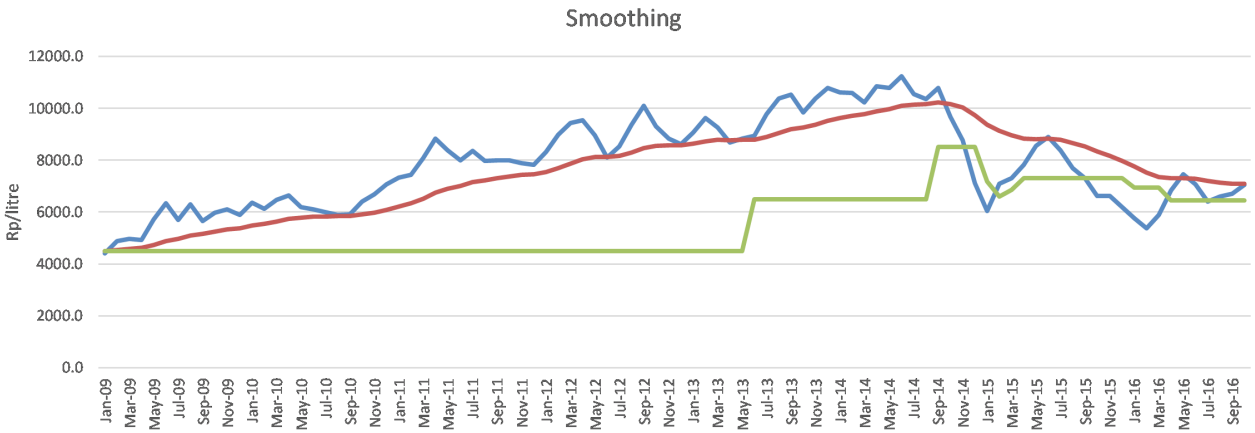

Figure 1. Price adjustment using a smoothing formula

The red line in Figure 1 shows what the regulated price would have been had it employed a smoothing formula with an α of 0.1. Unlike the actual policy pursued, the smoothing formula would have gradually increased domestic prices in line with international prices. The result is that no large subsidies would have arisen and no large adjustments would have been necessary. Moreover, when the international

prices started to fall, the smoothing formula would have gradually reduced prices, thereby generating surpluses during the periods in which the international price was falling sharply.

Figure 2 shows the estimated value of the subsidies under the actual policy and the smoothing formula. The subsidies under the actual policy pursued between 2009 and late 2014 were very large indeed—we estimate around IDR 435 trillion (around USD 43 billion) was accrued in subsidies over this period.[2]Early 2015 sees a dramatic reduction in subsidies (and the emergence of surpluses), primarily because of the fall in international oil prices. Under a smoothing formula, the subsidies from 2009 to 2016 would have been dramatically reduced. The steady rise of the international price from 2009 up until the end of 2014 meant that a smoothing formula would not have eliminated subsidies. However, over the entire period the value of subsidies using the smoothing formula would have been IDR 40 trillion (USD 6 billion), generating savings over the period of IDR 388 trillion (USD 38 billion).

Moreover, using the smoothing formula would have eliminated large price adjustments in favour of frequent smaller ones. The median monthly change would have been IDR 42, with a maximum change in any month of IDR 199. This contrasts with two increases of IDR 2,000 in 2013 and 2014 under the actual policy. Over the 106 months, there would have been only 17 months in which the price increased by more than IDR 100. By contrast, the actual policy had price changes exceeding IDR 100 only four times during this period—but these prices changes were very large.

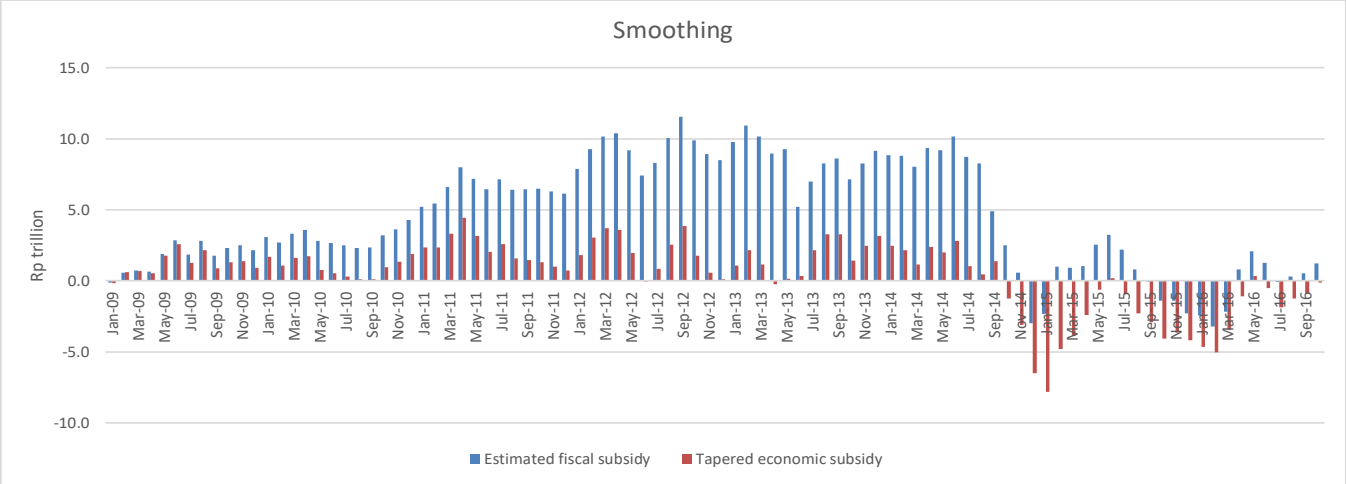

Figure 2. Subsidy payments using a smoothing formula

Ratcheting Price Adjustment Formula

One of the disadvantages of the smoothing approach is that when the trend of international prices is rising (even if there are monthly movements up and down around the rising trend), the smoothed price will also inexorably rise. Continuously rising prices can present a political difficulty for the government, even if the price rises are small. One way to achieve the same objective as the smoothing formula while overcoming this feature is to use a "ratcheting" formula. In this approach, the regulated domestic price each month is set equal to the previous month's domestic price plus some share of the change in the international prices between the current and the previous month. The share that is taken differs depending on whether the international prices move up or down. If the regulated domestic price is currently below the international price, the new regulated price adds a larger share of increases in international prices than decreases (and vice versa).[3] In this way, the domestic price "ratchets" its way up to the international price.

[2] This figure does not match the government's stated figure of IDR 449 trillion for two reasons. First, not all subsidies were budgeted—some are accumulated through losses in Pertamina. Second, the government does not publish the price at which it purchases fuel from Singapore. We have therefore used a proxy for MOPS92 prices that may not reflect the actual costs incurred by government.

[3] Full details of the formula are available on request.

The real value of the ratcheting approach is that when international prices fall, domestic prices do as well (although not to the full extent). Consumers can see that they are getting something back from the government, and this can make changes more politically acceptable. The disadvantage of the ratcheting approach is that price volatility is greater, although, conversely, fiscal volatility is typically smaller.

Figure 3 replicates Figure 1 above, but shows regulated domestic prices set using the ratcheting formula (the red line). Figure 4 shows the sizes of subsidies using the ratcheting formula.[4]

As with the smoothing formula, using the ratcheting formula would have gradually increased the domestic price between 2009 and the end of 2014, but this time with fluctuations driven by changes in the international price. Nonetheless, had the government used the ratcheting formula, the *reduction* in the total cost of subsidies would have been IDR 405 (USD 40 billion) relative to what it actually was. Figure 4 shows that the benefit of slightly greater price volatility for consumers is less fiscal volatility, as the profile of subsidy payments is smoother over time.

Figure 3. Price adjustment using a smoothing formula

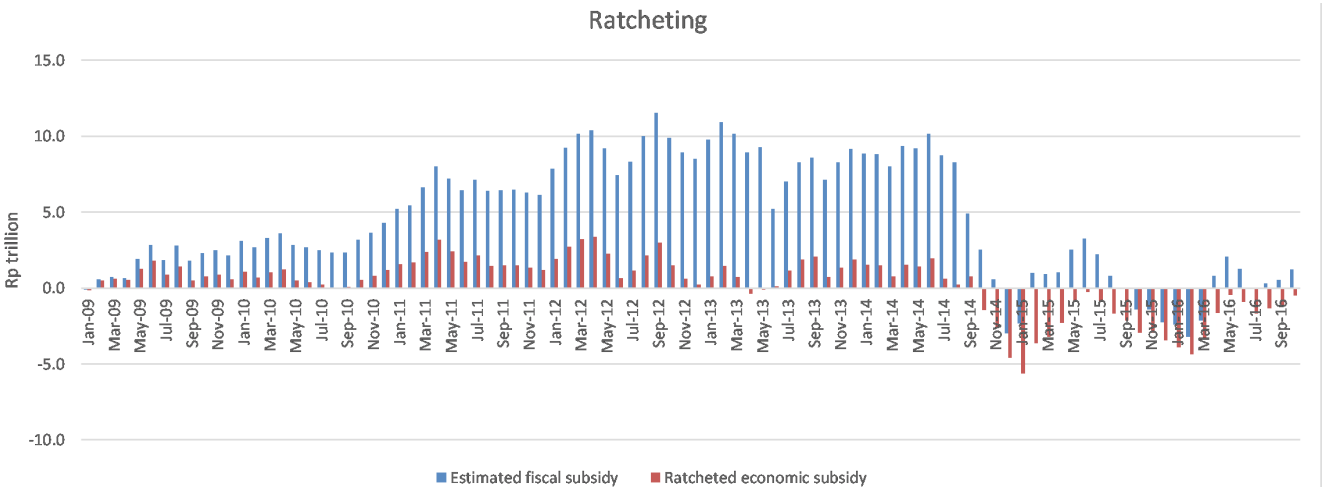

Figure 4. Subsidy payments using a ratcheting formula

[4] Like the smoothing formula, there is a parameter (in fact two parameters) than can be adjusted to make price adjustment more or less rapid and smooth.

Price Caps and Floors

The idea behind instituting price caps and floors is that they restrict price fluctuations between a predesignated maximum and minimum. As illustrated in Figure 5, a cap-and-floor system works by limiting the impact of market price changes on consumers, in this case people buying energy fuels. A cap and floor are set by government regulation and the price is allowed to fluctuate between these two levels. In this manner it ensures that the price paid is never more than the cap, and never lower than the floor. Like smoothing, this allows for protection against price spikes—as long as the price stays between the floor and cap levels it fluctuates as normal.

For example, if the cap price is IDR 9,750 (roughly USD 0.75) per unit of energy, and the floor price is IDR 3,250 (roughly USD 0.25) per unit of energy, the price is guaranteed to always be between these levels. If the market price is IDR 6,500 (roughly USD 0.50) per unit, this is what the purchaser pays; however, if it spikes to IDR 13,000 per unit, the actual price paid is still IDR 9,750 and the remaining 3,250 is covered as a form of subsidy. If the price falls to IDR 2,500 per unit, the purchaser still pays IDR 3,250, with the difference effectively serving as funds to government or energy companies that help offset the subsidy required when the market price is above the price cap.

Price caps have been shown to be able to significantly reduce economic uncertainty related to energy price fluctuations (Philibert, 2001). This enables them to meet the objective of limiting price volatility, and, depending on how narrow or wide the price cap is, it can also serve to meet the objective of limiting fluctuations. A very wide gap between the cap and the floor could lead to significant fluctuation, while a narrow gap between cap and floor would lead to minimal fluctuations.

A challenge for a cap-and-floor system lies in its fiscal sustainability tied to the allowance for fluctuation. A wide gap allows for greater fluctuation, but also protects the government and/or companies from having to pay potentially significant subsidies. Price caps address only the expected—not the actual—cost (Philibert, 2001). Unexpected changes in prices can therefore lead to a situation where there is significant misalignment between the cap or floor and the market price. Caps and floors may need adjustment over time to account for this, although it would mean less frequent changes than smoothing or ratcheting approaches, since there is some natural flexibility built into the pricing system. Cap-and-floor mechanisms are also subject to political influence, with the cap potentially being set too low, which can lead to significant subsidies. Ideally, the cap and the floor are only designed to protect from the highest peaks or lowest valleys, but there is a lot of fluctuation for those purchasing energy. A gap that is too narrow or misaligned creates either artificially high prices for purchasers if the market price is consistently below the floor, or potentially leads to high subsidies if the market price is consistently above the cap.

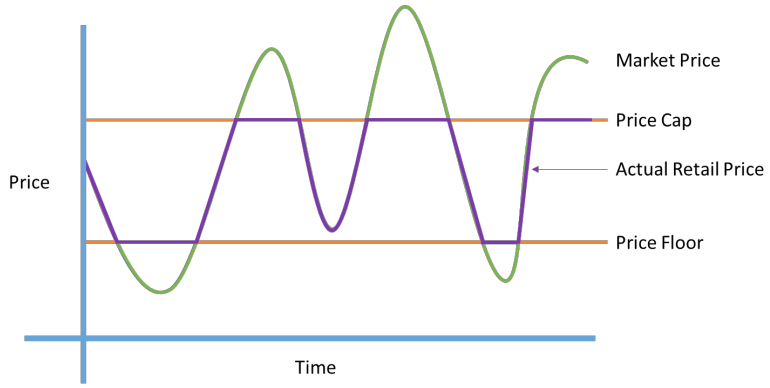

Figure 5. Illustration of a price cap/floor system

Adjustment to a Currency Depreciation or Oil Price Shock

One of the major challenges for price adjustment formulae is the risk of currency depreciation. From time to time, currencies in all countries come under pressure. Where the currency is allowed to float, this can result in a gradual depreciation of the currency, increasing the domestic price of imported fuel. Where the currency does not float, such pressures can result in sudden devaluations of the currency, with corresponding shocks to the domestic price of fuel where those prices are passed through. However, governments are often reluctant to pass through the full cost of devaluation to consumers. As a result, significant subsidies can re-emerge as domestic prices suddenly become significantly lower than international prices.

Figure 6 illustrates what can happen when domestic and international prices are initially identical and there is then a large (in this instance 30 per cent) devaluation.

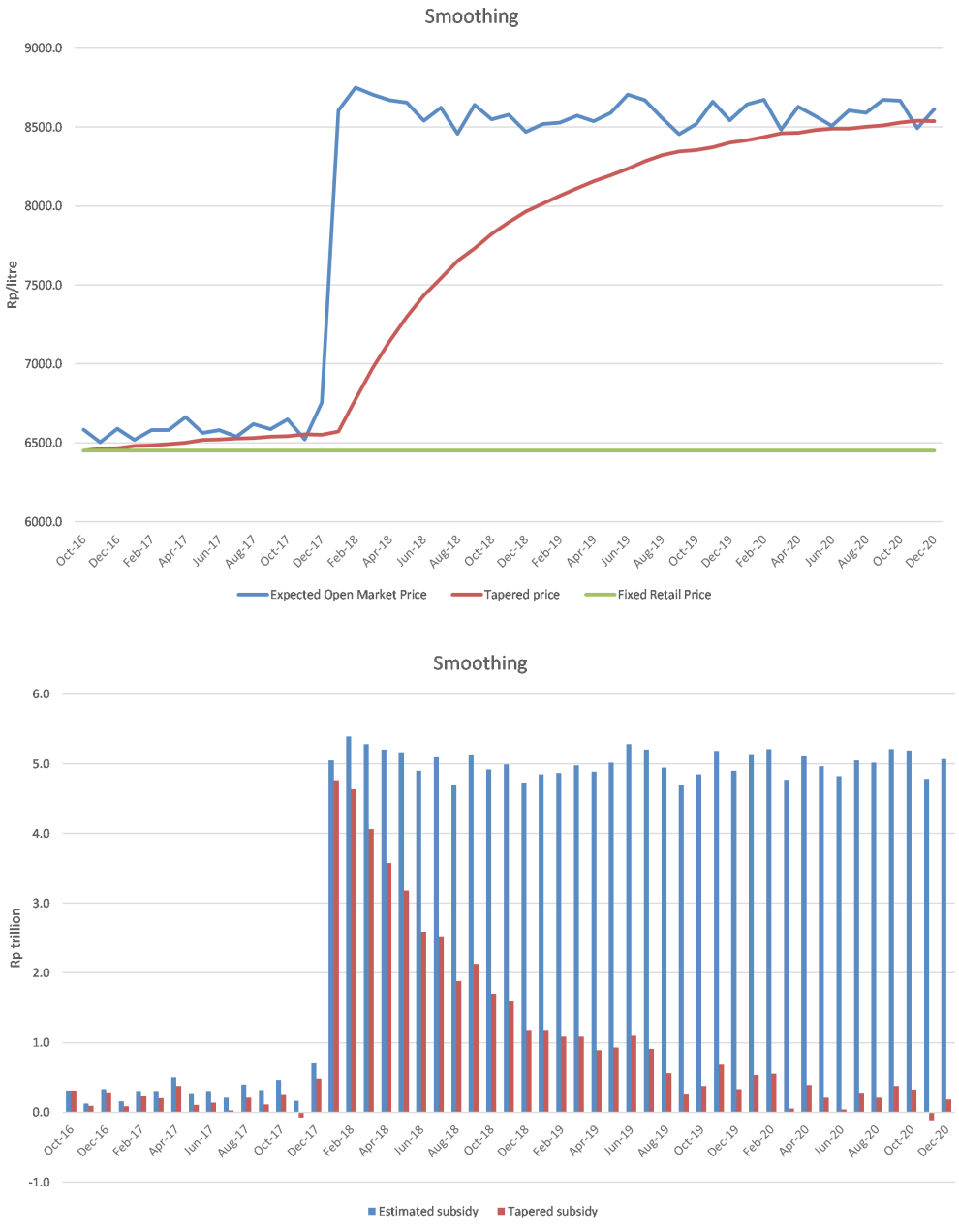

Figure 6. Impact of a devaluation on domestic prices and subsidies

After the devaluation, subsidies jump up to extremely high levels because the domestic price is now far below the international cost. However, if a smoothing formula is adopted, the domestic price immediately starts to converge on the new international price—but it does so slowly over the course of almost two years (the speed with which it converges is determined by the value of α). As it does so, the value of the subsidies gradually declines to zero. Thus the use of a smoothing formula can help create an automatic adjustment process to major shocks that limits the size of subsidies in the long run, while ensuring that consumers do not suffer a major price shock. Exactly the same argument applies for an oil price shock of 30 per cent.

Additional Options for Protection From High Energy Prices

There are other measures that can be taken to protect energy consumers from high prices. These include non-monetary measures such as transparency, enforcement and conservation, as well as fiscal measures such as hedging. Investment in the national social safety net can also help ensure protections are in place in the event that energy prices rise, no matter the energy price management structure

Social safety net: The stronger social programs are in a country, the more resilient the population can be to increases in energy prices. If there are programs in place that assist low-income residents in times when energy prices increase, the impact of these price increases on livelihoods is reduced. In some instances, the full market price for energy fuels can be passed through if the revenues that would normally be directed to subsidies are instead directed to more effective and robust social support programs. This can also assist with targeting supports to those that need them most. An example of this is the social investments that Indonesia has already made in light of its existing fuel price reforms, including cash transfers and social investments (Coady, et al., 2012). These investments have already led to improvements in the national poverty level, as shown in the information on welfare in the TNP2K Unified Database (TNP2K, n.d.b) which is used as a basis for poverty reduction and social assistance programming in the country (TNP2K, n.d.a). Continued expansion of the social safety net can address poverty concerns while containing cost.

Transparency and enforcement of prices: Along with any energy pricing system, transparency and enforcement can help ensure success and public buy-in. In relation to transparency, this can mean a transparent rate adjustment mechanism and its application in an automatic (ideally) or at least very scheduled fashion. Proper communication of the intent and benefit of reforms can also help governments build broad support for reforms (Toft, Beaton, & Lontoh, 2016).

There is also evidence that countries that have enshrined price adjustment mechanisms, with frequent updates, more formally, through independent agencies or other organizations that are not subject to outside influence, have been more successful in adjusting to fluctuations in world fuel prices (Kojima, 2016). Case studies of several pricing reforms and systems that are more ad hoc, or include lengthy price freezes, show a risk of reversion to subsidies over time (Kojima, 2016).

Enforcement can help to ensure that subsidies are going to those for whom they are intended. If subsidies are intended to become more targeted (for example through a coupon or voucher system), enforcement can include regular monitoring, auditing, and inspection of the implementation of the process to ensure all parties are acting in the proper manner, and that the system is behaving as intended.

Energy demand, conservation and diversification measures: Energy efficiency financing and assistance measures targeted at energy purchasers are a way to assist energy consumers by presenting more efficient ways to use energy, requiring lower-volume purchases, even if the price of energy is higher (Husar & Kitt, 2016). A common means of encouraging energy conservation in developing countries is support for transitioning to clean cook stoves.

One of the greatest tools to protect against fuel price shocks is deployment of alternative energy sources, both to diversify the potential energy options for users, and, where possible, to move to cleaner energy alternatives.

Recommendations for Indonesia

The Government of Indonesia has been a pioneer of subsidy reform. However, it could significantly reduce the current levels of subsidy while improving the protection it offers to consumers from large price changes by adopting the following recommendations:

1. Premium Price adjustments should be done using a transparent adjustment formula. The formula chosen should be based on international prices, so that the net subsidy over a period of time is zero or, if a subsidy is desirable, then not more than a specified amount.
2. Adjustments using the formula should be made frequently—at least monthly and preferably weekly or daily. This will have the important effect of getting consumers used to price fluctuations and will also ensure that any price changes that do happen are extremely small, so that they can be easily absorbed, even by poor households.
3. The adjustment formula and all the data used to calculate the new price every period should be published publicly and available online.
4. The administration of the adjustment mechanism should be put in the hands of an independent agency. Legislation should be developed and passed that requires the agency to develop and maintain a mechanism for fuel price adjustment that fulfills the criteria above. The agency should also be responsible for communicating the price adjustment mechanism, implementing the formula agreed, and putting forward amendments and changes to the formula where those changes would improve the ability of the formula to fulfill the criteria specified.
5. Appropriate independent audit and external scrutiny processes should be put in place to ensure that the agency is undertaking its responsibilities in accordance with the law.

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