

The new reality of fossil fuel subsidies

Abstract

For more than a decade, countries have been urged to abolish subsidies for fossil fuels—particularly gasoline and diesel—to reduce carbon pollution, cut wasteful spending, and generate other health and environmental benefits. After years of climbing subsidies, since 2014 many governments have announced sharp reductions in gasoline subsidies. We assess these reforms using an original data set of monthly gasoline prices, taxes, and subsidies, covering 157 countries from 2003 to 2017. Our data show that from July 2014 to April 2017, consumer subsidies fell dramatically. But it was not the victory for climate change policies it might seem at first: about three-quarters of the subsidy decrease came from falling international oil prices, not policy reforms. Some countries announced reforms but never implemented them; others implemented reforms but later reversed them, or saw them eroded by inflation or falling exchange rates. We show that the fall in subsidies is unlikely to bring about most of the anticipated environmental benefits, including reduced carbon emissions. Both scholars and policy advocates should refocus their efforts on a broader range of reforms, affecting a wider range of countries, which we believe are more likely to reduce carbon pollution.

Keywords: Fossil fuel subsidies; Political economy; Policy reform

1 Introduction

For more than a decade, countries have been urged to abolish subsidies for fossil fuels—particularly gasoline and diesel—to reduce carbon pollution, cut wasteful spending, and generate other health and environmental benefits [1, 2, 3, 4, 5, 6, 7]. After years of climbing subsidies, since 2014 many governments have announced sharp reductions in gasoline subsidies. We assess these reforms using an original data set of monthly gasoline prices, taxes, and subsidies, covering 157 countries from 2003 to 2017. Our data show that from July 2014 to April 2017, consumer subsidies fell dramatically. But it was not the victory for climate change policies it might seem at first: about three-quarters of the subsidy decrease came from falling international oil prices, not policy reforms. Some countries announced reforms but never implemented them; others implemented reforms but later reversed them, or saw them eroded by inflation or falling exchange rates. We show that the fall in subsidies is unlikely to bring about most of the anticipated environmental benefits, including reduced carbon emissions.

Our analysis finds that between 2003 and 2017, gasoline subsidies were overwhelmingly concentrated in 22 oil-exporting countries, all of which had policies of selling gasoline to citizens at fixed prices. When global oil prices rose between 2003 and 2014, these governments spent ever-larger sums to keep local prices low; conversely, most of these subsidies went away after the collapse of global oil prices beginning in July 2014 caused most of these subsidies to disappear. Yet the mean retail gasoline price in these 22 states has changed little since July 2014, meaning it gave their citizens no new incentive to reduce their gasoline consumption. Both scholars and policy advocates should refocus their efforts on a broader range of reforms, affecting a wider range of countries, which we believe are more likely to reduce carbon pollution.

2 Measuring Gasoline Price Policies

All governments either tax or subsidize the sale of gasoline, resulting in large country-to-country variation in retail prices: in June 2017, prices ranged from \$0.01 per liter in Venezuela to \$1.91 in

Hong Kong. Since 2001, the Intergovernmental Panel on Climate Change (IPCC) has suggested that removing fossil fuel subsidies is one of the simplest and least expensive ways for countries to curtail carbon pollution [3]. Many subsequent studies quantified the harmful effects of these subsidies and their high costs [8]. Estimates of the global cost of fossil fuel subsidies depends in part on how they are defined; for 2015, estimates range from \$325 billion (IEA 2016) to \$5.3 trillion [4].

To measure fossil fuel subsidies we gathered monthly data on gasoline prices for 157 countries from 2003 to 2017 using both primary and secondary sources [9]. We estimate the size of the taxes or subsidies for each country-month using the price gap method, which entails comparing the observed retail price to a benchmark price that represents the international supply cost. The difference between the two represents, for consumers, the ‘net taxes’ (when the local price is above the international supply cost) or ‘net subsidy’ (when the local price is below the international supply cost). We refer to these as the ‘implicit’ taxes or subsidies, which are comparable to what the International Monetary Fund calls “pre-tax subsidies” and represent a lower-bound estimate of total fossil fuel subsidies.

2.1 Gasoline Subsidies Are Concentrated in 22 Oil-Exporting Countries

During the 2003-15 period 22 countries had mean gasoline prices that were below the mean benchmark price; we classify them as the “persistent subsidizers.” These 22 countries—which were scattered across Latin America, Africa, the Middle East, and Central and Southeast Asia—accounted for 96.5 percent of the implicit subsidies during this period.¹ All were oil exporters.

Gasoline subsidies are often popular in oil-producing countries [10, 11]. Despite their high cost, governments fear that raising gasoline prices will lead to destabilizing protests: since 2006 there have been demonstrations against gasoline price increases in at least 20 countries. The 2007 “Saffron Rebellion” in Myanmar was sparked by protests against gasoline price increases, while demonstra-

¹Algeria, Angola, Azerbaijan, Bahrain, Ecuador, Egypt, Indonesia, Iran, Iraq, Kuwait, Libya, Myanmar, Malaysia, Nigeria, Oman, Qatar, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, and Yemen.

tions against higher gas prices in Indonesia in 1998 and Kyrgyzstan in 2010 became part of larger movements that led to the fall of both governments. In January 2017, a 20 percent hike in gasoline prices in Mexico led to widespread riots and looting.

Even though all 22 subsidizers were oil exporters, not all oil exporters were subsidizers: 11 countries exported comparable amounts of oil and gas during the 2003-15 period (on a per capita basis) yet did not maintain gasoline subsidies. This group includes seven low and middle income countries (Bolivia, Chad, Congo-Brazzaville, Gabon, Kazakhstan, Mexico, and Russia) and four upper-income countries (Canada, Denmark, Netherlands, and Norway).

Nor were the 22 subsidizers unique in their use of fixed, government-set gasoline prices. From 2003 to 2015, 65 countries kept gasoline prices fixed for more than half the time; besides the 22 persistent subsidizers, 43 other states made frequent price adjustments that kept their fuel prices above the supply costs. Most of these countries are in sub-Saharan Africa, where governments regulate prices in order to shield consumers from the volatility of global supply costs. The Central African Republic, for example, has relatively fixed prices—changing only eleven times in 156 months—yet maintains some of the highest gasoline taxes in the developing world.

3 The Causes of the 2014-17 Drop in Subsidies

In January 2014, the mean subsidy in these 22 states was 41.5 US cents per liter; by April 2017 it had fallen to 10.5 cents per liter, a 75 percent drop (Figure 1). How much of this change was caused by deliberate policy reform, and how much by falling oil prices that automatically shrank the size of the subsidy?

The two processes are easily confounded since the price collapse triggered a wave of policy changes in oil-exporting states, which were forced to cut their budgets in the face of sudden drops in oil revenues. From January 2003 to June 2014, the subsidizers adjusted their prices an average of once every 21 months; from July 2014 to April 2017, however, they adjusted them on average once every 7 months.

Some of these adjustments led to important reforms to fixed-pricing mechanisms (Figure 2). The Angolan government adopted the most far-reaching reforms, moving from a net subsidy of 20.7 cents per liter in July 2014 to a net tax of 42.9 cents per liter in April 2017. Sudan and Yemen also removed their gasoline subsidies, moves that reflected unusually severe budget pressures—in Sudan, due to the independence of oil-rich South Sudan, and in Yemen due to the civil war and depletion of its limited petroleum reserves.

Other reform efforts were less successful. Both Nigeria and Saudi Arabia announced reforms but failed to implement them. Venezuela, Sudan, Egypt and Azerbaijan all raised gasoline prices but the gains from these reforms were nullified by falling exchange rates or rising inflation. Indonesia began to eliminate subsidies at the beginning of 2015 but never completed the necessary steps; as a result, the subsidy remained in place while its cost was shifted from the budget of the central government to the balance sheet of Pertamina, the state-owned oil company.

Overall, most of the drop in subsidies has come from falling international prices, not policy reforms. A simple model comparison indicates that 74 percent of the variation in month-to-month subsidies (or taxes) can be explained by month-to-month changes in the global oil price, and just 26 percent by changes in government pricing.² Comparing the change in global benchmark prices and government pricing reforms to the change in subsidies shows that the dynamic relationship between benchmark prices and subsidies is nearly one-to-one ($\hat{\rho} = 0.997$), while the change due to reforms shows only a minor intercept shift of 11 cents per liter with no noticeable change in slope (Figure 3).

4 The impact on carbon emissions is likely to be small

In 2013 the International Energy Agency estimated that fossil fuel subsidy reform could reduce carbon emissions by 360 Mt by 2020 [12]; in 2014 the IPCC Assessment Report stated that subsidy

²The following two models are estimated using data from all 22 persistent subsidizers:

$$\Delta \text{Subsidy}_{i,(t,t-1)} = \alpha_0 + \alpha_1 \text{Reform}_{i,t-1} + \epsilon_{i,t} \quad (1)$$

$$\Delta \text{Subsidy}_{i,(t,t-1)} = \beta_0 + \beta_1 \text{Reform}_{i,t-1} + \beta_2 \Delta \text{Benchmark}_{i,(t,t-1)} + \tau_{i,t} \quad (2)$$

The variation explained by reforms versus changes in the global oil price is estimated as $\frac{R_{[2]}^2 - R_{[1]}^2}{R_{[2]}^2}$.

reform could produce significant emissions reductions at a negative social cost [13]. These and many other studies assumed that if fuel subsidies were removed, local gasoline and diesel prices would rise. The resulting higher prices—not the removal of subsidies *per se*—would reduce gasoline consumption, which in turn would lead to fewer carbon emissions and many other health and environmental benefits.

But the collapse of oil prices led to a result that few observers anticipated: a drop in subsidies but little net change in local gasoline prices. From June 2014 to May 2017, retail gasoline prices rose in 9 states and fell in 13 states, producing a negative 2.6 cents per liter (−5.8%) change in the mean price and a positive 3.0 cents per liter (+7.2%) change in the median price. This suggests consumers in these countries have little incentive to reduce fossil fuel consumption or switch to cleaner fuels. While all 22 governments benefited from the reduced cost of subsidies, the hoped-for social and environmental benefits of lower consumption are not likely to materialize.

5 Resetting the agenda

The problem of fossil fuel subsidies has not gone away. But the most visible and widely-criticized type of fossil fuel subsidy—the sale of gasoline to consumers for less than the international supply cost—has gotten much smaller, without leading to the higher retail prices that might discourage consumption and reduce carbon emissions. This is hence a good point for reassessing the priorities of policymakers and scholars concerned with fossil fuel subsidies.

Eliminating fossil fuel subsidies and discouraging wasteful consumption are both important policy goals, but the case of retail gasoline subsidies shows that they do not always go together. Tracking the relationships between prices and subsidies, in turn, depends on the collection of significantly more frequent and precise time-series data on a wider range of prices and subsidies for fossil fuels beyond gasoline, such as coal, natural gas, diesel, and kerosene. For researchers and policy analysts, the drop in gasoline subsidies is less a victory than a reminder of how slow, difficult, and important it can be to achieve true reform.

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Figures and Tables

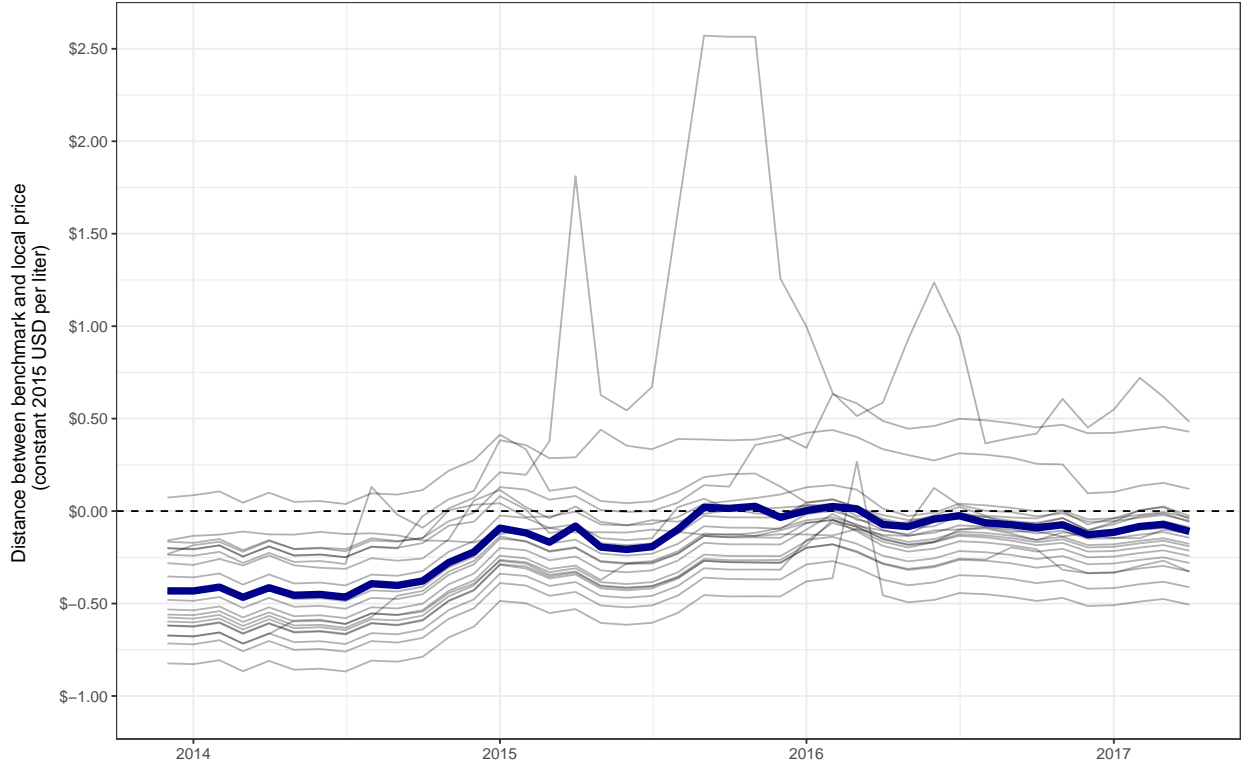


Figure 1: **Net taxes and subsidies over time, January 2014 to April 2017.** Individual country tax and subsidy trends are shown in grey. These are computed by subtracting the monthly local price from the monthly benchmark price in constant US dollars. The average net subsidy is shown in blue.

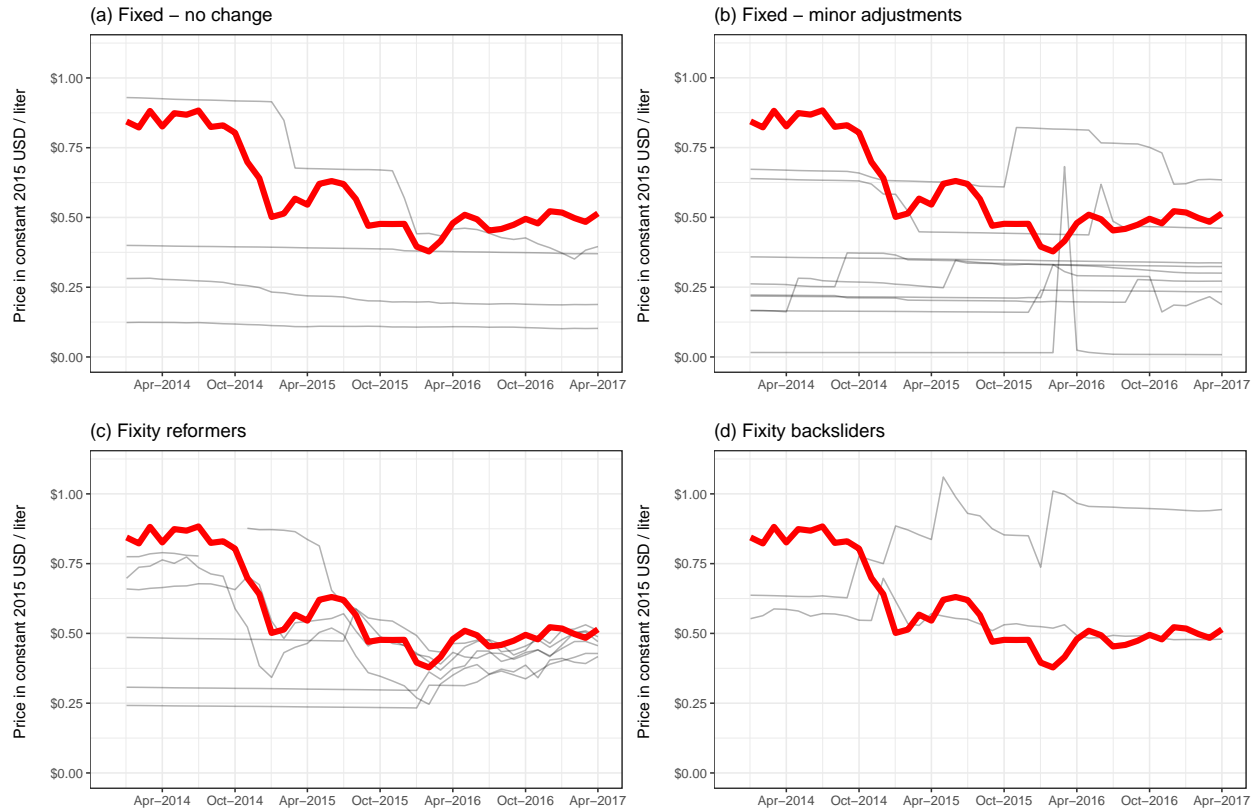


Figure 2: **Fixity reforms across 22 persistent subsidizers.** Panel (a) displays four countries which did not change local prices at any point since 2014; note that Azerbaijan’s declining price is due to its changing exchange rate but not local gasoline prices. Panel (b) displays nine countries which continued using ad hoc pricing mechanisms but made at least one price change since 2014. Panel (c) shows six countries that by 2016 reformed price mechanisms to allow month-to-month fluctuations in line with global prices. Panel (d) displays two countries which pursued fixity reform in 2014-2015 but reverted in 2016 to fixed prices. Each plot also includes the global benchmark price in bold red.

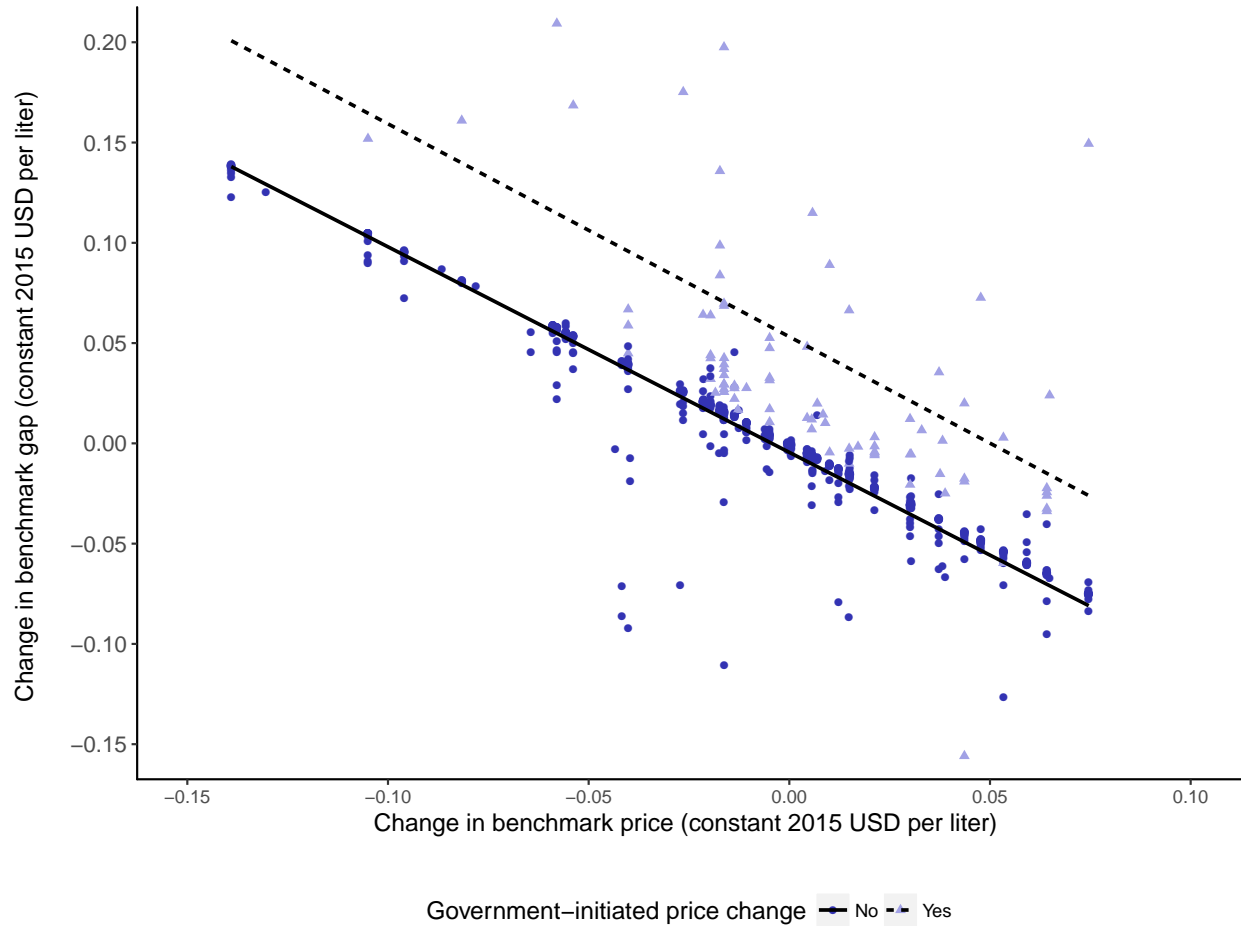


Figure 3: **Change in net subsidy (benchmark gap) vs. change in benchmark price..** The plot shows country-month data for instances when governments initiated an ad hoc price change (points as light blue triangles) and instances when there was no price change from the prior month (points as dark blue circles). The line of best fit from a multivariate regression is plotted as a dotted line for ad hoc changes and as a solid line for no changes. That the slopes are nearly identical indicates that, aside from a small intercept shift of 0.11 dollars per liter, changes in subsidies are largely driven by changes in the benchmark price. The coefficient for the relationship between change in subsidy and change in benchmark is 0.997—suggesting a roughly one-to-one relationship between the two.