

Masami Kojima and
Robert Bacon

Masami Kojima is a senior energy specialist at the World Bank focusing on joint energy, environment, and transport policy issues, especially fuel quality, vehicle emission control, fuel pricing policy, and the health impact of pollution. She has worked on these issues in Bank projects in Latin America, South Asia, Central Asia, and the Caucasus. Robert Bacon is manager of the Bank's Oil and Gas Policy Division. He works on energy sector reform and the links between reform strategy and poverty alleviation; the impact of sector reform on the macroeconomy; and oil product taxation and subsidies. He has recently worked on Bank programs in the Islamic Republic of Iran, Mexico, and Central



Abuses in Fuel Markets

How to Protect Consumers and Public Health

In the fuel business, smuggling, adulteration, mislabeling, and short-weighting are widespread in many developing countries. Not only do these commercial abuses reduce consumer welfare and government excise revenue, but the combustion of substandard fuels can have a serious public health impact. This Note looks at how the structure of the fuel industry affects incentives for such abuses and shows how some developing countries have worked to combat the practices.

Where products of comparable quality have different prices, or consumers have trouble distinguishing products of different qualities, unscrupulous operators will always try to exploit the situation for illegal profits. Many countries have seen illegal practices in the retail fuel business—with operators adding lead to gasoline in Kazakhstan, adulterating diesel with lower-priced kerosene in Asia, smuggling low-priced fuels out of Nigeria into neighboring countries, and evading fuel taxes in Brazil.

There are three main types of such abuses:

- **Adulteration**—such as adding kerosene to gasoline.
- **Mislabeling**—such as short-weighting customers, mislabeling the octane of gasoline, or labeling leaded gasoline as unleaded.
- **Tax evasion**—such as forging customs declarations or smuggling fuel to avoid or reduce excise duty payments.

These practices lead to welfare losses in several areas—damaging engines, worsening air

quality, and reducing consumer welfare and collective or social goods. Evading fuel taxes reduces government revenue. Short-weighting customers leads to consumer losses. Adulterating and mislabeling products can have serious consequences, through both externalities and private welfare losses. Doping gasoline with iron and other metallic additives can leave harmful deposits in engines (there have been complaints about red deposits from iron in Central Asia and in the Caucasus). Fueling catalyst-equipped cars with mislabeled leaded gasoline will permanently damage catalytic converters and lead to higher emissions (though some vehicle owners may care more about buying gasoline as cheaply as possible than about these externalities). Adding low-taxed or subsidized kerosene to gasoline increases engine deposits and emissions. In contrast, adding kerosene to diesel, while leading to a loss of government fiscal revenue, is unlikely to have adverse environmental impacts.

Incentives for abuse

The incentive to engage in these commercial abuses depends on the relative cost and benefit for the firm. The benefit comes from lower input costs. The principal cost is the *expected* value of any penalty, which is incurred only if the practice is detected. The probability of detection in turn depends on the characteristics of the monitoring regime. This probability can be increased by introducing more accurate testing processes or by increasing the frequency of testing with current techniques. The penalty imposed can be monetary (for example, a fine based on turnover or a fixed value) or non-monetary (such as impounding offending items, barring the firm from trade, or “naming and shaming” the firm).

Whether to engage in abusive practices, and on what scale, is an ongoing decision. For firms in the market with a long time horizon, the expected cost of detection might depend not only on the scale of abuse, but on whether the firm has been caught engaging in the activity in previous periods. A firm that has been caught might face more frequent testing or higher fines. And the benefit in each period might fall as a result of past detection—as the publication of information about the firm’s conduct affects customer demand—or as quality differences become apparent to customers.

With tax evasion, a firm reduces or avoids tax payments, but it may have to make additional payments to ensure a chance of success. For example, the firm may have to pay bribes to officials or pay higher transport costs for moving loads on nonstandard routes. Still, avoiding taxes lowers the effective cost of supply and may result in lower prices for consumers, leading to higher sales. Tax evasion is an integral part of smuggling.

When mislabeling takes the form of passing off a product as another of higher quality, it is likely to succeed if the purchaser cannot directly observe the quality of the good and cannot verify it except at prohibitive cost or over a long period. Most consumers will probably be unable to tell that a retail outlet is selling gasoline with a 92 research octane number (RON) as 95 RON gasoline, for example, or that it is consistently short-weighting customers by 5 percent. These

consumers will suffer an unperceived loss in welfare. Selling leaded gasoline as unleaded can lead to much greater damage. But if the market is one in which repeat purchases are common, it may become evident over time that the retailer offers substandard products. In this case the threat of losing customers can act as a strong disincentive to abusive practices.

With adulteration—for example, illegally adding lead to low-octane gasoline to increase the octane—a (typically imperfect) substitute product is manufactured at a lower cost. But adulteration is limited by such factors as “acceptable” limits on additives or the cost of acquiring the additive. In New Zealand, for example, unscrupulous firms exceeded “acceptable” limits when they added too much of the off-specification toluene to gasoline as a cheap source of octane—and caused many car fires.

How market structure affects incentives

The prevailing market structure—whether competitive, monopolistic, or oligopolistic—affects the incentive to engage in commercial abuses and determines the appropriate penalty system.

Competitive market

Without effective regulation, a competitive fuel market, with a large number of small suppliers, is likely to lead to partial or total product degradation. A low-quality (adulterated) product drives out a high-quality product because of consumers’ difficulty in distinguishing between the two—especially if there is no effective monitoring and enforcement. Even if prices initially are kept at a level that would cover the costs of the high-quality product, the excess profits that unscrupulous firms can gain by selling the adulterated product would encourage them to cut prices in order to increase sales. Eventually prices would drop until they cover only the costs of the adulterated product. But with sufficient enforcement and reputational risk, firms known not to engage in abuses might be able to expand their market shares and drive out unscrupulous firms.

Where firms are small, the punishment for abusive practices could well take the form of barring them from trade, since other firms can easily enter and consumers are unlikely to be

affected. But if the punishment is a fixed fine intended to leave firms in business, the amount would have to be relatively small.

Monopoly

Monopolists may have the greatest ability to coordinate abuse on a large scale. And a monopolist will not fully pass on the cost savings from abuse through a price cut, instead choosing the price that will maximize its profits.

But one characteristic of a monopolistic market has the potential to reduce the incentive to engage in one form of abuse. Because there is only one firm to monitor, for a given expenditure the monitoring regime is much more likely than in a competitive market to identify any abuse. Punishing an unscrupulous monopolist by removing its license would lead to serious supply problems until a new owner was found. But a fixed fine could be quite large, since monopolies typically have excess profits that could be appropriated. Regulatory control over the firm could be undermined, however, if the monopolist can lobby politicians and bribe the officials in charge of monitoring and enforcement.

Oligopoly

In an oligopolistic market the company undertaking abusive practices needs to consider the responses of the other players in the market as well as the direct costs of being caught. If reputation and brand loyalty are important, these factors might affect the decision to engage in abuse: a customer perception of abuse would reduce the likelihood of attracting market share from other firms with similarly loyal customers, and at the same time increase the likelihood of customers switching to other firms. But because of the small number of firms, there may also be a greater chance of collusion—with all firms engaging in abuse—than in a well-regulated competitive market, where reputational risk could be a more important determinant of market share.

How market structure affects monitoring

Enforcing fuel quality standards requires a credible monitoring system (box 1). And just as the market structure has implications for the benefit side of firms' incentive equations, so does it

Box

How some developing countries are maintaining fuel quality

1

Kenya

Since June 1999 the government of Kenya has been adding a biocoded marker to fuels as a tracer, to designate fuel for local consumption (taxed) or for export (untaxed). The aim is to prevent fuel traders from selling fuels designated for export on the domestic market as a way to avoid taxes. Thanks to the biocoded marker, random testing can now identify tax-free fuels sold illegally in Kenya. The system is said to have reduced illicit trade, recovering US\$30 million in taxes for the government and US\$50 million in sales for oil companies (Chang 2001).

Russian Federation

To give retail outlets an incentive to maintain high standards, the Moscow Fuel Association has started awarding blue quality signs to those meeting its quality standards. By March 2001 the fuel association had checked 12 firms and issued the special signs to 133 retail outlets, and had another 80 applications pending. The retailers applying to the association sign a code of honor binding them to sell fuels meeting the standards. Any caught violating the standards are denied the quality sign (Nicholson 2001).

Pakistan

Shell Pakistan has upgraded about 200 new retail outlets. In an environment of widespread fuel adulteration and short-weighting, its marketing strategy is to compete on the basis of superior product and service quality. To demonstrate its commitment to product quality, Shell has been dispatching chemists in white laboratory coats to its retail outlets, where they test samples publicly. Consumers have responded enthusiastically to this public "monitoring." In fact, the practice has been so well received by the public that Shell's main competitor has adopted the same strategy (Ashworth 2000).

have implications for the cost side—the structure of the testing regime. The monitoring facilities needed depend not only on the number of firms in the market, but also on the vertical structure of the industry, since there may be opportunities for abuse at more than one point in the supply chain.

Although monitoring is always required at the retail level, the vertical structure of the market determines the extent to which monitoring

is required in other parts of the supply chain. A fully vertically integrated business may not require upstream testing, because the cost of any penalties affects the firm no matter where the abuse occurs. In a vertically separated market monitoring in all parts of the chain will be more important, because the enforcement regime may otherwise unfairly affect only the retail component (particularly where the retail business is not in a position to enforce its own minimum standards contractually).

In general, the frequency of testing (and thus the cost of monitoring) is likely to increase with the number of competitors in the market, the degree of vertical separation, and the number of potential importation points.

Once regular monitoring begins and the “market” for monitoring grows, regulators might consider introducing competition in monitoring. In a large city or country two or more bodies could be selected to monitor fuels. They should be paid not on the basis of results (which would give an incentive to bias the results), but on the basis of the number of tests carried out.

It is also important to “monitor the monitors.” An independent body should inspect the monitors to ensure that they adhere to testing protocols, and apply sanctions to those found issuing “false” passes. Without such inspection and sanctions, monitors could be bribed. The number of monitors should be optimal for the volume of business: If there are too few, not enough samples will be tested. And if there are too many, some might be tempted to give false passes in order to gain market share. In the right environment competition among monitors could enhance the efficiency of testing and the quality of test results and enable the authorities to benchmark the monitors against one another.

Conclusion

Firms have a strong incentive to engage in abuses in the sale of automotive fuels because of consumers’ difficulty in detecting the abuses and because of the potential for substantial profit. Besides imposing direct costs on the buyers, many of these practices have external costs. Controlling the abuses requires an enforcement regime designed so that the costs of stricter enforcement

do not exceed the benefits of the reduction in abuses that it would bring about.

Most developing country governments have not yet established a monitoring regime and system of fines that together act as a strong deterrent to such practices. There are a number of reasons for this, including poor governance, a lack of political will, a lack of public awareness, weak regulatory agencies, and a shortage or even an absence of technical staff and equipment for designing and conducting monitoring. Given these limitations, identifying and dealing with abuse will require addressing problems on multiple fronts. In doing so, it is especially important to distinguish between functions that are the proper role of government (regulation) and functions that can be outsourced. The private sector could carry out the monitoring, provided that the state carries out enforcement and an independent body “monitors the monitors.”

References

Ashworth, James (managing director, Shell Bangladesh Marketing). 2000. Comment made at seminar on lubricating oil and gasoline quality for air quality improvement in Bangladesh, Energy Sector Management Assistance Program (ESMAP), Dhaka, 21 November.

Chang, Thi. 2001. “Journally Speaking: Encoded Fuels.” *Oil and Gas Journal* 99(17): 15.

Nicholson, Alex. 2001. “Swerving to Avoid Hazardous Gasoline Stations.” *Moscow Times*, 6 March.

Masami Kojima (mkojima@worldbank.org) and Robert Bacon (rbacon@worldbank.org).

viewpoint

is an open forum to encourage dissemination of public policy innovations for private sector-led and market-based solutions for development. The views published are those of the authors and should not be attributed to the World Bank or any other affiliated organizations. Nor do any of the conclusions represent official policy of the World Bank or of its Executive Directors or the countries they represent.

To order additional copies contact Suzanne Smith, managing editor, Room I9-017, The World Bank, 1818 H Street, NW, Washington, DC 20433.

Telephone:
001 202 458 7281
Fax:
001 202 522 3181
Email:
ssmith7@worldbank.org

Printed on recycled paper