Analyzing the French fuel tax to better target polluters

The debates surrounding the implementation of the carbon tax illustrate well the range of conflicting considerations influencing the taxation of fuel and other goods impacting the environment. Tax authorities often justify higher fuel taxes based on addressing global warming and pollution. Yet these taxes are also plausibly intended to generate additional government revenue and to contribute to overall redistribution by placing a burden on fuel consumers based on some polluter-pay principle. The case of the yellow vest movement in France in 2018 indeed points to high taxes on fuel as generating equity concerns by impacting the less economically advantaged segments of the population. In a recent paper, Stéphane Gauthier and Fanny Henriet explore into the extent to which the fuel tax actually reflects these different considerations.

Equity and efficiency of fuel taxation

Tax revenue considerations are tied to efficiency, which is achieved when the collected taxes impose minimal welfare costs on society as a whole. Efficiency typically recommends setting heavier taxes on goods with low price sensitivity, which is often the case with fuel. The argument proceeds as follows. Consumers suffer from fuel taxation, as it reduces their income by the amount of tax they have to pay. Nevertheless, this implies zero social welfare cost since this income loss coincides with the revenue collected by the government. Social losses occur because consumers attempt to minimize their tax burden by moving away from preferred, but more heavily taxed goods. This loss, which does not find any compensation from the government, results in a loss for the entire society. It is accordingly magnified when the demand for taxed goods is highly responsive to price changes.

It is likely that in the case of fuel considerations of efficiency may clash with considerations of equity. Indeed energy, being an essential commodity, tends to exhibit low price sensitivity, and should accordingly be subject to high taxes for efficiency reasons. However, it also constitutes a significant portion of the budget for vulnerable populations. The conventional approach to balancing efficiency and equity is summarized by the so-called Many-Person Ramsey rule. The recommendation from this rule is highly intuitive: taxes should discourage the consumption of goods by individuals to whom society assigns less importance. If the society aims to support the less affluent segment of the population, then one should not discourage fuel consumption excessively, and perhaps even encouraging it.

Environmental concerns call for personalized fuel taxes

A reduced fuel tax in line with the Many-Person Ramsey rule would be concerning for environmental reasons. Most damages caused by fuel consumption are externalities, as consumers typically do not fully account for the environmental impact when consuming fuel. A traditional approach to addressing externalities consists in using a Pigovian taxes, which are taxes set at the level of the damage caused by fuel consumption. Nevertheless, the implementation of such taxes is plausibly difficult in the case of fuel, as fuel involves both global and local types of external damages. Global externalities relate to damages from one liter of fuel that are identical regardless of the consumer. Global warming serves as a typical example since it is mostly tied to total fuel consumption; every consumer burning a liter of fuel contributes equally to global warming through the release of carbon dioxide into the atmosphere. As far as an accurate estimate of the damage can be made, implementation is possible through a single uniform Pigovian tax on each liter of fuel.

Implementation issues come from the second type of externalities from fuel consumption. They involve local rather than global effects, meaning that the damages resulting from one liter of fuel now vary among consumers depending on where emissions occur. In the case of pollution, for instance, it is more likely that emitted fine particulate matter from fuel burning will be inhaled in densely populated urban areas compared to sparsely populated rural regions. Consequently, urban drivers imply higher damages than rural ones, which call for Pigovian taxes differentiated across consumers.

Achieving differentiation through anonymous fuel taxes

The feasibility of differentiated fuel taxes is questionable. One may think as plausible obstacles to violations of some horizontal equity principle of equality before the tax, lobbying activities or the mere possibility of identifying precisely the type of consumers; indeed, there is no guarantee that fuel would be burned in the neighbourhood of the station where it is bought and taxed. In this respect, other tools than taxation are probably more relevant, e.g., urban tolls and other spatial-based congestion charges.

In fact, in France, fuel taxation is about uniform across the entire country. Fuel is subject to the standard (high) rate of VAT, supplemented by a TICPE (*Taxe Intérieure sur la Consommation de Produits Énergétiques*). In principle, the TICPE component could be adjusted regionally, albeit to a very limited extent. However, most regions choose no adjustment, resulting in spatial uniformity. One might assume that uniformity precludes consideration of local externalities, but this is not the case. There are two ways through which local

externalities can be embodied into the tax system, though a single uniform tax on fuel is used. First, local considerations can affect taxes on goods other than fuel. Second, they may be incorporated into the fuel tax itself, making its level different from the uniform Pigovian correction that addresses the global externality aspects of fuel consumption.

In the first option, the government exploits complementarity and substitution between fuel and other goods, all subject to anonymous taxation, in order to reproduce the impact of a tax system with personalized fuel taxes. As an example, if there exists a category of goods only consumed by the greatest polluters and complementary to fuel, then a tax on such a category effectively operates as a tax on fuel designed for these heavy polluters specifically, without directly affecting other consumers. Similarly, in cases of substitution, lower taxes or even subsidies could be applied. Suppose that urban drivers prefer compact cars for their ability to navigate tight spaces and find parking in crowded urban environments, while rural drivers favor larger cars. Then one should impose a higher tax on small cars and/or a lower tax on larger cars. This recommendation comes as a limit for the common argument that larger cars should face heavier taxation due to their higher fuel consumption and environmental impact for a given amount of transportation service. A similar rationale applies to public transportation. It should be subject to lower taxes, not only due to its potential environmental benefits but also because it is predominantly accessible in urban areas. This policy encourages urban residents, specifically, to reduce their individual fuel consumption.

The complementarity/substitution argument shows that environmental damages resulting from fuel consumption should fall on goods other than fuel when such taxes enable the tax authority to specifically target the greatest polluters. Whether such a tax contamination beyond fuel is of practical relevance requires estimating demand for consumption goods. Reliable cross-price elasticities are difficult to obtain with narrowly defined commodities. Gauthier and Henriet (2023) use the 2010 *Budget de Famille* expenditure survey compiled by INSEE in France to estimate demand for broad categories of goods obeying the international COICOP classification. In this classification the Transportation category encompasses all means of transportation, both public and private. Additionally, expenditures on durable goods, including cars, are treated as fixed expenses due to the less frequent purchase frequency. Their findings suggest that the environmental impacts of fuel consumption are primarily reflected in the tax on the fuel category, in line with the so-called targeting principle. This surprizing result may relate to the level of aggregation of consumption goods categories. Also, it holds given the remaining tools to encourage the adoption of greener transportation options, particularly the large direct public transfers that do not rely on taxation. It may be that these tools are set to reduce the potential for exploiting complementarity and substitution with fuel through taxes.

How much environment shape fuel taxation in France?

This finding should not be thought of as implying that French taxes disregard local damages caused by fuel; rather, these damages can be incorporated into the fuel tax itself. In France, the average fuel tax was 131% in 2010. Gauthier and Henriet (2023) provide a quantitative assessment of the factors contributing to this 131% magnitude of the fuel tax, which is decomposed into three parts. The first part reflects Ramsey-like considerations related to equity and efficiency. The two other parts are Pigovian, dealing with externality concerns.

The second part represents the average damage resulting from fuel consumption across the population. The last part constitutes a correction aimed at accounting for the fact that the average damage may serve as an imperfect summary statistic for the heterogeneity in damages caused by the various types of consumers.

To calculate the Ramsey contribution, which is contingent upon the societal importance of different consumer categories, Gauthier and Henriet (2023) make a distinction between only two types of households: those residing in urban and rural areas. Their analysis suggests that consumption taxes align with a redistribution strategy that predominantly benefits rural households at the expense of their urban counterparts. Specifically, the French society would place a higher value on transferring 1 euro to a rural household, estimating it to be worth 1.20 euros, resulting in a net gain of 20 cents for society on each euro transferred to rural households. Conversely, if the same euro is directed to an urban household, society incurs a loss of 20 cents. The Ramsey component eventually constitutes approximately 16 percentage points of the fuel tax, a level close to the standard VAT rate.

They also quantify the damages inflicted by the two types of households when consuming fuel, as entering the Pigovian part. Urban households should ideally be subject to a personalized corrective Pigovian tax of approximately 160%, while the personalized tax rate for rural households should hover around 80%. These figures indicate that the environmental damages caused by fuel consumption are perceived by tax authorities as very high. In addition, as expected, urban areas should support a much larger burden, even though the tax rate has to remain uniform for all households. The calculated (population weighted) average damage stands at 115 percentage points.

When we sum of the 16 and 115 points, we get 131 percentage points, which fully accounts for the existing fuel tax rate. This implies that the average damage serves as a suitable proxy for summarizing the environmental costs embedded within the fuel tax. The absence of differentiation benefits urban drivers, though they have the lowest social importance and are found to be the greatest polluters; in theory they should bear a much heavier tax burden. That is, in a system with personalized taxes, urban drivers would be subjected to a significantly higher tax rate on fuel, far surpassing the current 131% applied to fuel uniformly.

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