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Are "flexible" taxation mechanisms effective in stabilizing fuel prices? An evaluation considering wholesale fuel markets

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ABSTRACT

This paper analyses the incidence of specific taxes in fuel markets, and exploits the findings to simulate the effects of government interventions aimed at mitigating oil price fluctuations. Several reduced-form model specifications are estimated to study tax incidence, using wholesale equilibrium prices for both gasoline and motor diesel in the Italian fuel industry over the period 1996–2007 as dependent variables. We then assess the impact on fuel prices stemming from the creation of an automatic fiscal mechanism consisting of reductions in specific taxes matching the rise in oil prices. Our evidence supports the idea that "flexible" taxation mechanisms focused only on excise taxes could not be a viable policy for stabilizing the price level in fuel markets and more complex policies (based also on *ad valorem* taxes) are needed. Alternative interventions to control prices can be designed focusing on the market structure of these industries, where Antitrust Authority could play a significant role.

1. Introduction

As a reaction to the oil price boom recorded in recent years, consumers' associations have suggested (and policy makers have experimented) the introduction of "flexible" taxation mechanisms on fuels. First experiences of these policies can be found in different countries: in the U.S., a temporary tax moratorium – i.e., a suspension of the 5% sales tax – was introduced by the Indiana and Illinois Governors as a reaction to the gasoline price peaks during summer 2000 (Doyle and Samphantharak, 2008). In France, the government modified the TIPP, the French specific tax on petroleum products, by introducing in 2000 the "TIPP flottante", i.e., a fiscal mechanism able to change the tax in accordance with crude oil price trends. The basic idea of the French socialist government in power at that time was to return consumers the excess VAT revenues caused by oil price increases by reducing the TIPP. In particular, when the reference price of crude oil (North Sea Brent) increased by more than 10% on international markets, the TIPP was automatically decreased, while it was restored when oil prices decreased. The main reason why the mechanism failed was the small number of cases when oil prices decreased, which made the "TIPP flottante" a very expensive fiscal measure. Indeed, the mechanism was abandoned in 2002 because of the large losses to government revenues.

In Italy, a policy intervention similar to the French "TIPP flottante" was included in the 2008 State Budget Law (Legge Finanziaria n. 244/2007), but it was never actually implemented as the center-left government fell after a few months. The intervention envisaged some form of flexibility in the taxation mechanisms for fuels as a response to oil price peaks: it consisted of a quarterly revision of the specific tax on fuels when the oil price was larger than the reference oil price by more than 2%. The reduction of the specific tax had to be determined by the Minister of the Economy on a case-by-case basis, and – similarly to the French solution – it aimed at compensating consumers for the larger VAT revenues. This mechanism has recently come back in the policy debate because of the surge of fuel prices caused by the civil war in Libya, the effects of which are particularly relevant in Italy because of the strong dependence of the country on the Libyan supply.

The idea of "flexible" taxation behind all these examples is very simple and easy-to-understand for consumers: in order to keep (gross) prices at a long-run equilibrium level, specific taxes should react one-to-one to observed variations in input prices. Indeed, among the various available measures, this *sterilization* of the increase in oil prices by a

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reduction in specific taxes on fuels seems to be one of the most popular actions (as the example of the "TIPP flottante" suggests). However, such a sterilization policy should be carefully evaluated, as for the likely impact on consumers, producers, and tax revenues. On one side, if fuel prices are (effectively) kept constant, there is a welfare enhancement for drivers and fuel consumers with respect to a situation of volatile prices. On the other side, the government needs to find different sources of tax revenues, or to correspondingly reduce public expenditures, at least in the short-run when the fiscal policy may not break even. These concerns are particularly stringent in the European fuel markets, as fuel taxes account both for a large share of the retail price in many countries (particularly in Italy, where taxes represent more than 50% of the final consumer retail price) and for a nontrivial share of government's budget revenues (about 4–5% of total revenues), and finance both Central government and Local governments expenditures.

Concerns on the impact of sterilization policies (aimed at keeping prices at a constant level) are likely to arise also because of the concentrated industrial structure of these markets, a particularly acute problem in Italy. The price of fuels has been traditionally regulated by public bodies. However, since 1994 a complete liberalization of prices for gasoline and motor diesel allowed suppliers operating in the Italian market to freely set their prices according to the international crude oil price and their operating costs (including distribution costs, retailers' margins, etc.). The final consumers' price for fuels is set by retailers, while distributors often suggest a "recommended" retail price for gasoline and motor diesel. According to data provided by the Observatory on Prices and Tariffs of the Italian Ministry for Economic Development, the "recommended" retail price follows one-to-one changes in wholesale prices.[1] On several occasions, the Italian Antitrust Authority investigated the structure and the conduct of the companies operating in this industry (see AGCM, Autorità Garante della Concorrenza e del Mercato, 1996, 2000, 2001, 2006, 2007), and – in a couple of instances – it established the presence of collusive conduct by the major companies in the industry aimed at controlling final consumer' prices.[2]

The purpose of this paper is to contribute to the current policy debate on sterilization mechanisms, by providing some insights on the possible effects of government interventions aimed at mitigating the impact of oil price peaks. Given the absence of any data on fuel prices for consumers, in order to argue about the likely impacts on retail markets, we concentrate on wholesale markets: in particular, we consider the role of fuel specific taxes and estimate several reduced-form model specifications, which use as dependent variables the equilibrium wholesale prices for gasoline and motor diesel markets in Italy. Depending on the adopted specification and on the sub-period being considered, our results show that a 1% increase in oil price implies an increase of wholesale gasoline and diesel prices ranging between 0.1% and 0.5%. We also evaluate the incidence of specific taxes. Again depending on the chosen specification, we estimate that a 1% increase in the specific tax on gasoline and motor diesel is found to reduce wholesale fuel prices by 0.5%–2%.

We finally simulate the impact on wholesale prices of a sterilization policy that makes specific taxes react to oil price increase. In particular, we assess both the effects of a one-to-one reduction of specific taxes in response to oil price increase, and a sterilization policy that considers the equivalence ratio between crude oil and refined fuels. Fiscal policy simulations suggest that the sterilization mechanism leads to increased fuel prices: in response to an increase in oil price, no government intervention based uniquely on specific tax reduction would guarantee constant prices for gasoline and motor diesel. Moreover, given the interplay between VAT and excise tax, our simulations point to a more rapid convergence of price variations to zero when the government does not alter much specific taxes.

The remainder of the paper is organized as follows. Next section provides a conceptual framework and reviews the relevant literature on fuel taxes and oil prices. Section 3 describes the empirical strategy, present the data, and the main results from model estimation. We then discuss in Section 4 the incidence of specific taxes on gasoline and motor diesel wholesale prices, and the implications of fiscal policies aimed at offsetting the impact of oil price increases. Section 5 concludes.

2. Understanding the impact of fuel taxes on prices

While a large empirical literature studies the determinants of gasoline prices and the way they react to changes in oil price (e.g., among others, Borenstein and Shepard, 2002; Borenstein et al., 1997; Galeotti et al., 2003; Wlazlowski et al., 2009), only a scant number of papers considers the effects of fuel price taxation and almost all contributions focus on the U.S. gasoline market. Our study adds to the literature by considering the impact of specific taxes on both gasoline and motor diesel markets in a European country. To understand how fuel taxation can influence equilibrium prices in fuel markets and interpret available results in the literature, it is useful to sketch a conceptual framework of a tax incidence model under imperfect competition. We borrow in particular from Stern (1987) and Delipalla and Keen (1992); for a comprehensive review of theoretical issues on tax incidence, see Fullerton and Metcalf (2002).

2.1. The theory

We consider an oligopolistic setting, where $m \geq 1$ identical wholesale distributors compete *à la* Cournot. The product is homogeneous (gasoline, or motor diesel), and it is produced at constant marginal (and average) costs $c(p^O)$, where p^O is the price of crude oil and $dc/dp^O > 0$. Each firm j maximizes the following profit function Π_j, by choosing the optimal quantity q_j:

$$\Pi_j = \left(p^N - c\left(p^O\right)\right) q_j \tag{1}$$

where p^N is the net wholesale price of gasoline (or motor diesel). Let p^G be the gross wholesale price, s the excise tax, and v the tax rate of the Value Added Tax (VAT); it follows that:

$$p^G = \left(p^N + s\right)(1+v) \rightarrow p^N = \frac{p^G}{1+v} - s \tag{2}$$

Substituting the definition of p^N into Eq. (1), we obtain:

$$\Pi_j = \left(\frac{p^G(Q)}{1+v} - s - c\left(p^O\right)\right) q_j \tag{3}$$

where $p^G(Q)$ is the (inverse) market demand function and $Q = \sum_{j=1}^{m} q_j$ is the aggregate production.

By differentiating Eq. (3) with respect to q_j, we get the necessary first-order condition for profit maximization for firm j:

$$p^G(Q) + q_j \frac{\partial p^G}{\partial Q}\frac{\partial Q}{\partial q_j} = \left(s + c\left(p^O\right)\right)(1+v) \tag{4}$$

where $\partial Q/\partial q_j$ represents each firm's conjecture about the effect of its own output change on total industry output Q. In a Cournot setting this effect is equal to one, as each firm believes the other firms' choices are independent from its own (e.g., Colangelo and Galmarini, 2001). By summing Eq. (4) over the m identical producers,

[1] This is not surprising given that the Italian Antitrust Authority established that the "recommended" price is defined starting from the wholesale price, adding a constant mark-up. See AGCM, Autorità Garante della Concorrenza e del Mercato (1996, 2000).

[2] The fines levied on refiners by the Italian Antitrust Authority in 2000 were finally removed after the appeal to the Administrative Court by the sanctioned companies.