The impact of road pricing on green commercial vehicles usage: evidence from Milan

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Road pricing is increasingly adopted by local governments to curb congestion and pollution in cities all around the world. The London Congestion Charge, introduced in 2003 and then modified to extend the treated area, is probably the most well-known and studied example (Banister, 2003; Givoni, 2012; Ison and Rye, 2005; Prud’homme and Bocarejo, 2005; Quddus et al., 2007; Santos and Bhakar, 2006; Santos and Fraser, 2004; Santos and Shaffer, 2004). However, the literature has not reached a consensus on the socio-economic advantages of such measures since costs seem to exceed benefits in terms of a reduction in external costs (Mackie, 2005; Prud’homme and Bocarejo, 2005; Raux, 2005).

The rationale for the introduction of road pricing is related to the theory of Pigouvian taxation for which a tax equal to the external marginal cost in equilibrium will decrease the equilibrium quantity of transport consumption and corresponding externalities. According to this view, it is essential that transport demand react to an increase in transport cost. Although this claim is reasonable from a theoretical point of view, the effective contraction is an empirical matter and depends on the benefits from private transport for road users.

In principle, under inelastic demand, all road users may be willing to pay the charge and in this case no charge in the equilibrium quantity of services will be observed. To shed light on how traffic flows react to the introduction of road pricing, in this paper the case of Milan is analyzed.

Milan has one of the highest rates of car ownership in Europe. More than half of the population use private cars and motorcycles, ranking Milan second only to Rome, and among the highest in the world (Percoco, 2010). In January 2008 the Ecopass programme was launched within a designated restricted traffic zone corresponding to the central “Cerchia dei Bastioni” area of 8.2 km². The amount of the charge depended on the vehicle’s engine emissions standard and fees varied from C2 to C10 from 7:30 a.m. to 7:30 p.m. on weekdays. Free access to the zone was granted to motorbikes, to several types of alternative fuel vehicles and to conventional fuel vehicles compliant with the European emission standards Euro3 and Euro4 or better.

An estimated 98,000 vehicles a month were entering the restricted area before the Ecopass came
into force (AMMA, 2008a). According to an evaluation conducted by the Milanese Agency of Mobility and the Environment (AMMA) in December 2008, during the first month traffic inside the ZTL fell to 82,200 vehicles, and for the first eleven months the average traffic flow was 87,700 vehicles. This represents 12.3% fewer vehicles entering the ZTL, while outside of the Ecopass area, traffic decreased by 3.6%.

In a public consultation on June 13 2011, the vast majority of voters (79%) approved the introduction of the Ecopass, which was re-established on January 16 2012 under the name Area C, consisting in a sizable enforcing of the scheme as 10 types of previously uncharged vehicles went under the charging scheme and other 10 types of cars and vans were forbidden to enter the city center. In this paper, we study the effect of this enforcement on vehicle shift, i.e. on the usage of GPL and methanol commercial vehicles.

In particular, a novel data set consisting in 75 types of vehicles with average daily traffic counts at monthly level observed between January 2008 and December 2012 is used to estimate the impact of the change in the scheme occurred in January 2012. To this end, a synthetic control approach (Percoco, 2015) is proposed, consisting in estimating a counterfactual time series by weighting the time series of control vehicles for GPL and methanol commercial vehicles. This approach allows to estimate the effect of road pricing across types of vehicle and across time. Results point at a sizable effect on both GPL (+240 vehicles, corresponding to +45%) and methanol (+433 corresponding to +47%) vehicles. No effect is detected for hybrid and electric commercial vehicles.