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Household transport consumption inequalities and redistributive effects of taxes: A repeated cross-sectional evaluation for France, Denmark and Cyprus

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ABSTRACT

We evaluate household transport consumption inequalities in France, Denmark and Cyprus, investigate their temporal dynamics, and estimate the redistributive effects of taxes on different commodity categories. Using household-level data from repeated cross-sections of expenditure surveys spanning long periods, the paper applies a decomposition of the Gini index by expenditure component. The results highlight the effect of the social diffusion of the car. The relative contribution of vehicle use items (e.g. fuels, maintenance and repair, parking, and registration) to total expenditure inequality has decreased over time, thus reflecting the increasingly widespread use of cars. Moreover, fuel taxes have become regressive, while the progressive character of taxes on the remaining car use commodities has weakened with time. Taxes on transport goods and services as a whole are progressive. However, this result is principally due to the progressivity of taxes on car purchases, a progressivity stronger by far in Denmark where these taxes are so high that car purchase costs can be afforded only by those with high incomes. These findings underline the necessity of taking into account equity issues when designing policies to attenuate the environmental impact of cars. Increasing car use costs, notably fuel prices, through an increase of uniform taxes would be particularly inequitable.

1. Introduction

Car ownership development, favoured by the growth of incomes and the improvements in the quality of road infrastructures, has given a large impulse to personal mobility. By improving accessibility to almost every place in terms of money costs and time, the car made possible the lengthening of the distance between the home and the places of diverse activities, and thus encouraged residential locations remote from city centres. In its turn urban sprawl, combined with the dynamics of the labour market (e.g. the increasing share of women at work), increased the need for additional vehicles in a household. This evolution resulted in a steady growth of national car fleets and in the dominant share of the car in personal mobility. This is reflected by a substantial growth of household expenditures on transport. For instance, the average transport budget of French households, which was 2.5 times less than that of food in 1960, became the largest budget item after that of housing (Arthaut, 2005). This transport budget is for the most part devoted to the car.

The increasing car traffic and the aggravation of the problems it generates, particularly pollution and congestion, impose adopting policies to reduce car use. Choosing a measure raises the question of not only its efficiency, but also of its fairness. Indeed, in situations where alternatives to the car are lacking welfare losses may result (e.g. because some mobility needs are sacrificed, or by making inescapable trips by car more costly at the risk of forced cuts in the consumption of other goods and services), thus undermining the public acceptability of the measure.

Car taxes are a source of public revenues[1] as well as a policy tool for reducing the adverse impacts of road traffic. Most

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[1] For instance, in France taxes represented 31.1% of expenditures made during 2005 on acquisition and utilization of passenger cars (95% of which were owned by households): €40.8 billion out of a total of €131.2 billion. Total taxation per car amounted to €1360 (CCFA, 2007).

of them were instituted at a time when the car was a luxury good (e.g. the 1924 Danish registration tax and the 1956 French *vignette*, an annual tax on vehicles owned). The large social diffusion of this good over the past six decades has most likely lessened the progressivity of these taxes. The protests in several European countries against the rapid increase in fuel prices in the autumn of 2000 highlighted households' sensitivity to the burden of fuel costs, and particularly the households who live in rural and suburban areas and who are more car-dependent (Lyons and Chatterjee, 2002). As argued by Goodwin (2002), making specific reference to the UK context but with wider relevance, the 'sensitivity' of fuel price may have been underestimated both as an influence on travel behaviour and as a political issue. Underlying this 'sensitivity' is a '*tendency for car use to have become more of a necessity*' (p. 93). Over the years, spreading car ownership favoured changes in land use and the provision of services (location of dwellings, jobs, shopping centres, etc.) which make using a car more necessary. At the individual level, there is a tendency to rely more on one's car and pay less and less attention to other available modes. Car owners are encouraged to gradually build their lifestyles and activities around a regular use of their car. Over time, alternatives to the car (when feasible ones actually exist) appear less attractive. Car dependence, the intensity of which varies according to people's circumstances and types of trips, tends to grow over time (Goodwin, 1995; Lucas and Jones, 2009).

By putting access to virtually all places within the reach of larger and larger segments of the population, car diffusion has doubtless reduced social inequalities with regard to transport. On the other hand, this has been accompanied by an increasing share of people being captive to the car. Which means an inability for those users to adjust their behaviour (and thus a financial vulnerability of the least wealthy of them) to increases in the costs of running a car. Also, with the progression of car ownership among lower income groups, car use expenditures take out a larger proportion of their budget than is the case for the well-off (Berri, 2007). Thus, over time the burden of taxes imposed on car use items would tend to affect lower income households more than richer ones.

Using individual-level data from repeated cross-sectional surveys spanning long periods, this paper evaluates inequalities between households in the consumption of transport goods and services in France, Denmark and Cyprus, investigates their temporal dynamics, and estimates the redistributive effects of taxes on various commodity categories. These three countries constitute an interesting field for comparison, as Cyprus has very poorly developed public transport, Denmark has highly developed public transport, with heavy car-related taxes, and France produces cars and therefore has an investment in the car as a means of transport. The paper carries out a comparative analysis in light of the differences between these countries, most notably those of car taxation systems and car ownership levels. Consumption is measured in terms of expenditures collected through budget surveys. As underlined by Deaton (1997), by revealing who buys each good or service and the amounts spent, expenditure surveys show who bears most of the corresponding tax burden (especially by income level) and thus who are the potential losers and gainers from possible taxation changes.

Our analysis applies a decomposition of the Gini inequality indicator by expenditure component. Each component appears through its proper Gini coefficient, its budget share and its degree of association with total expenditure. This method provides a good understanding of the inequality mechanisms, in particular their temporal evolution. Moreover, it allows us to evaluate the redistributive effect of (a change in) a tax on a good or a service, i.e. its impact in terms of inequality increase or reduction.[2] This is important because distributional concerns are often central to policy discussions. In particular, the distributional effects of two policy instruments related to car taxation have received great attention in the literature, namely fuel taxation (e.g. Bento et al., 2009; Poterba, 1991) and road pricing (e.g. Karlström and Franklin, 2009). Finally, the analysis provides estimates of elasticities with respect to total expenditure (or income) without specifying a functional form for the Engel curves.

The data are from repeated cross-sections of household expenditure surveys, and include households from urban as well as peripheral and rural areas. For each country, a few distant survey periods (about 10 years apart) are selected among the accessible data sets: two for Cyprus (1991 and 2003), two for Denmark (1997 and 2005), and three for France (1978–79, 1989 and 2000–01). The number of surveyed Cypriot households is 2708 in 1991 and 2990 households in 2003; the number of surveyed Danish households is 881 in 1997 and 725 in 2005; and the number of surveyed French households is 10,645 in 1978–79, 9038 in 1989 and 10,305 in 2000–01.

The results show the effect of the growing social diffusion of the car. Thus, apart from vehicle purchases for which there is no regular temporal pattern (probably owing to the fact that they are not made frequently), transport consumption inequalities have generally decreased in all the countries under study. In particular, there has been a steady decrease in the case of fuels and other vehicle use items. Also, the relative contribution of vehicle use items (e.g. fuels, maintenance and repair, parking, and registration) to total expenditure inequality has decreased over time. Moreover, fuel taxes have become regressive (i.e. they affect the poor more than the rich), while the progressive character of taxes on the remaining car use commodities has weakened with time. Taxes on transport goods and services as a whole are progressive. But, this is chiefly due to the progressivity of taxes on car purchases, a progressivity stronger by far in Denmark where these taxes are so high that car purchase costs can be afforded only by those with high incomes. The income elasticities obtained for fuels and other vehicle use items show consistent decreases over time, reflecting a gradual change of car use from a luxury towards a necessity.

After an exposition of the methodology of Gini decomposition by expenditure component in Section 2, Section 3 presents some of the characteristics of the car taxation systems in the three countries and examines the budget shares allocated to different expenditure groups according to household's standard of living. Section 4 presents the results of the analyses of inequality and redistributive effects of taxes on the different categories of goods and services considered. Section 5 summarizes the findings and concludes.

2. Decomposition of the Gini coefficient by component and redistributive effects of marginal changes in components

2.1. The Gini inequality index

The Gini coefficient is one of the more widely used indicators for evaluating inequalities (e.g. in income, wealth, consumption). A graphic visualization of this index is based on the Lorenz curve, shown in Fig. 1.

[2] We focus on the partial equilibrium incidence of the marginal variations in expenditures. A full evaluation would ideally involve a general equilibrium framework. However, this type of analysis requires detailed information on prices in all markets of interest, information about the markets mechanisms, and distribution of market and non-market benefits between income groups. This is beyond the scope of the paper.