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Demand for road-fuel in a small developing economy: The case of Sri Lanka

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Abstract

This paper estimates the demand for road fuel (petrol and auto-diesel) in the context of a small developing economy—Sri Lanka. The data set covers a period of 39 years from 1964 to 2002 representing both close economy and open economy policy regimes. The estimation procedure is based on seemingly unrelated regression equation (SURE) methodology mainly to capture substitutability of petrol and diesel in road transportation. The effect of auto-fuel prices on vehicle demand is also analyzed as a part of the analysis. In addition to confirming existing evidence on road-fuel demand, the findings reveal some interesting evidence with respect to own-price elasticity, cross-price elasticity, lag effects, income and vehicle mix variables.

Keywords: Own-price; Cross-price; Substitutability

1. Introduction

Sri Lanka is a small open economy with a population of 19 million and land area of 65 610 km^2. Its per capita GNP in 2003 at market prices is estimated to have been at US$935. In the World Bank classification of the worlds developing economies into low-income and middle-income countries, Sri Lanka is considered to belong to lower middle-income group (US$ 736–2935). It has transformed from traditional-type export–import economy to an outward-looking export-oriented economy with the introduction of liberalized policy reforms in 1977. During this period, openness and liberalization has become a bipartisan policy in Sri Lanka. Prior to 1977, Sri Lanka had a mix of policy regimes with pro-capitalist and pro-socialist orientation. For example, the policy regimes of 1965–1965 and 1970–1977 were more socialist oriented as against the more private sector-oriented policy regime of 1964–1970. The main characteristic of pro-socialist regimes of the pre-1977 period was stringent exchange controls and pervasive state interventions in all areas of economic activity. In addition, these governments imposed high taxes on the ownership and use of private vehicles. The pro-market policy reforms of post-1977 period, however, led to major structural changes of the national economy including the road transport sector.

The demand for road-fuel in Sri Lanka, particularly auto-diesel, has increased significantly over the past 25 years (Fig. 1).[1] Of the total road-fuel consumption, petrol accounted for about 60% up to the mid-1980s and since then the relative share of auto-diesel consumption increased significantly accounting for about 80% of the total road-fuel consumption in 2002. Between 1960 and 2002, the per capita diesel consumption increased from 22 to 81.41 per annum representing an annual growth rate of 8.8% per annum. In contrast, per capita consumption of petrol decreased from 21.11 per annum in 1960 to 9.71 in 1975 and then increased up to 20.81 in 2002. The rapid increase in auto-diesel consumption has been attributed to three main

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[1]Of the total diesel consumption, road-transport sector (auto-diesel) accounts for about 96% while the rest is shared by industrial, commercial and power-generation sub-sectors.

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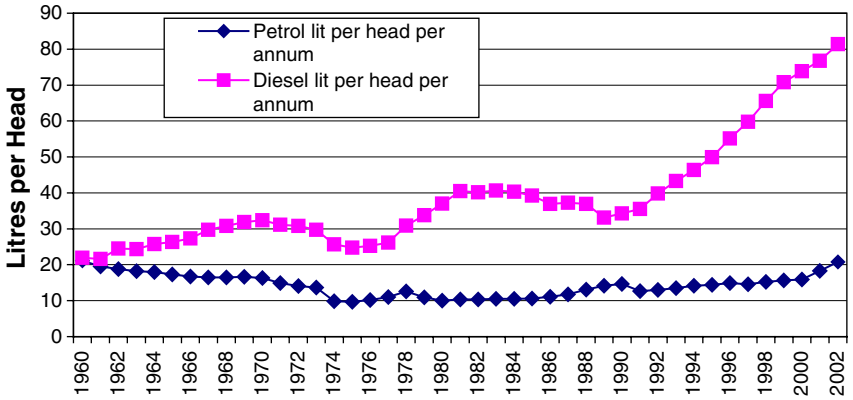

Fig. 1. Road Fuel Consumption.

contributory factors: (a) road-fuel pricing policy, (b) fiscal policies on vehicle imports (ARMC, 2003; Chandrasiri, 1999), and (c) the vehicle kilometers traveled (VKT) of buses, lorries and dual-purpose vehicles (DPs).[2] More conclusive evidence on the demand for road-fuel is of vital importance to policy makers, administrators, environmentalists and others interested in road-transport. This paper is aimed at examining the key determinants of road-fuel demand based on existing empirical work and factors specific to small open economy of Sri Lanka.

The paper is organized into four main sections. Section 2 deals with growth of vehicle population and changes of road-fuel consumption over the past four decades. Section 3 presents an analysis of auto-fuel demand using both OLS and the seemingly unrelated regression equation (SURE) methods, while the concluding section examines policy implications of the analysis.

2. Demand for vehicles in Sri Lanka

The demand for road-fuel is derived from the demand for vehicles. Existing studies on vehicle demand can be summarized into two broad groups: (a) macro-studies, and (b) micro-studies. Most of these studies are case specific and, hence, general applicability is very low especially in the context of developing economies. By and large, existing macro-studies confirm the significance of vehicle price, fuel price, user charges, cost of capital, income, economic growth, the level of urbanization and the degree of industrialization as key determinants of vehicle demand (Button et al., 1993). The evidence from micro-studies, however, reveals the significance of other factors such as vehicle safety, net horsepower, vehicle attributes and perceived quality and manufacturer as key determinants of vehicle demand (McCarthy, 1995).

The structural changes of vehicle population in Sri Lanka over the past four decades are analyzed in Fig. 2. It reveals that the total stock of vehicle population has marked a significant growth during the post-1977 period. At present, petrol- and diesel-powered vehicles account for about 71% and 29% of the total vehicle population, respectively. In terms of growth, petrol and diesel vehicles have marked an annual increase of 33% as against 24% increase by petrol-powered vehicles during the post-liberalization period. It is worth noting, however, that motorcycles (MCs) have recorded an explosive growth rate of 97% per annum as against negative growth of petrol-powered buses, lorries, DPs and land vehicles. On relative terms, MCs account for about 66% of total petrol-powered vehicles and 47% of the total vehicle population. Among diesel-powered vehicles, DPs (294% p.a.), lorries (21% p.a.) and buses (13% p.a.) have recorded the highest growth rates. These three categories of vehicles jointly account for about 70% of total diesel vehicle population confirming heavy dieselization of the fleet during the post-liberalization period.

The high growth of vehicle population and its structural changes are well in line with major structural changes of the national economy during the post-liberalization period. For example, the relative contribution of the service sector to the national economy increased from 45% to 62% between 1975 and 2002, while the share of the agricultural sector decreased from 39% to 20% during the same period. In terms of openness, the share of foreign trade (total exports and imports as a percentage of GDP) increased from 42% in 1975 to 74% in 2002. In terms of growth performance, the average annual economic growth in real terms increased up to 5% between 1978 and 2002 as against 2.9% during the close economy period (1970–1977).

Existing estimates on fuel consumption further confirm this evidence. For example, road-fuel consumption

[2]Refers to light duty vehicles such as small vans, pickups, jeeps, pajeros, etc.