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Road freight transport decoupling: A comparative analysis between the United Kingdom and Spain

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ABSTRACT

Economic growth has traditionally been linked to road freight transport demand, leading to a steady rise in social and environmental impacts. Concern about this problem has caused the EU to promote a decoupling strategy aimed at boosting sustainable development in European countries by improving the efficiency of transport systems without curbing economic growth. Over the last few years empirical evidence in some countries such as the United Kingdom has shown an increase in GDP while the volume of road freight traffic has remained stable or even decreased. This paper compares recent decoupling trends by analyzing the evolution of road tonne-kms/GDP relationship in the United Kingdom and Spain from 1999 to 2007. This comparison seeks to identify the main differences and key drivers of decoupling in both countries. We first provide an overview of the divergences between both economic structures and levels of road transport intensity. Then we conduct a decomposition analysis in order to identify the variables that explain the evolution of truck traffic per unit of GDP in each country. The results show that the increasing share of services in GDP has substantially contributed to decreasing road transport demand in both cases. Changes in road transport intensity due to improvements in logistic and supply chain management have been more successful in the UK than in Spain.

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1. Introduction

In most industrialized countries there has been a strong positive relationship between economic and transport growth, and specifically road transport. The growth of road transport activity has been the cause of a number of environmental and social problems. Greenhouse gas emissions from human activity, particularly road transport, produce global warming which is likely to cause an increase in natural disasters and negative consequences for property, infrastructure and the natural environment. In addition, transport congestion has increased in many countries, affecting urban areas and leading to high social costs.

The current trend in numerous European countries towards enhancing sustainability, supported by the European Union (EU) as a means of tackling these environmental and social problems, promotes the decoupling of road transport growth from the economic development.

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The subject of ‘decoupling’ has been widely treated by policy reports. For instance, it was the focus of the Standing Advisory Committee on Trunk Road Assessment (SACTRA) report in the United Kingdom in 1999, and has also been discussed in political documents such as the European White Paper on transport policy in 2001 (European Commission, 2001b). In this paper, the EU promoted a decoupling strategy as a key means to reduce the external costs of road transport by promoting GDP growth without increasing transport volumes. The EU also supported a research project which proposed the ultimate prioritization of policy measures based on their likely effectiveness in reducing road freight transport-related externalities (European Commission, 2003). EU Member States were encouraged to meet this challenge, for instance, by establishing higher costs for road freight transport, in a bid to stimulate improvements in logistics management and transfer some traffic volumes from road to more competitive and efficient modes. All these measures have the main goal of increasing transport efficiency through the internalization of the negative side-effects of transport (European Commission, 2001a).

Several researchers have studied decoupling by means of an approach that evaluates changes in road transport intensity. This ratio – road tonne-kms per unit of GDP – measures the link between the economy and road transport activity. Breaking or weakening this link, by applying actions or policies designed to

meet the objectives of the EU's sustainable development strategy, may change the historical values that have remained stable over a considerable period in each country. Furthermore, some countries have been undergoing a transition to more service-oriented economies, and as a consequence their economic growth has become progressively detached from transport demand, thus contributing to decoupling.

The aim of this paper is to review the trends for road transport and GDP growth in two case studies: the United Kingdom (UK) and Spain, and to analyze the reasons for their divergences. Specifically, the research focuses on determining the level of decoupling and on identifying the key drivers underlying its evolution over the years in each country through a decomposition analysis. We chose these two countries for several reasons. The UK is one of the European countries in which decoupling has been most notable, whereas Spain has followed a very different trend. Finally both the UK and Spain are large countries with limited borders for the entry of freight by road, and thus cross-country traffic and major ports have a little effect on freight transport.

The paper is organized as follows. After the introduction, Section 2 reviews the existing literature on decoupling, and explains the main contributions of this research to the state of the art. Section 3 provides a comparison of the level of decoupling in both case studies, identifies the key drivers of decoupling and analyzes their trends throughout the period of analysis. This section also highlights the contributions of each economic sector to the global trends. Finally, Section 4 points out the main conclusions of this research.

2. Links between road freight transport and economy

It is widely accepted that transport accounts for a significant share of the GDP in industrialized countries. For this reason, the correlation between tonne-kms and GDP, known as “coupling”, has traditionally been applied to forecast trends in freight transport demand, although some authors, such as McKinnon and Woodburn (1996), NEI (1997) and Kveiborg and Fosgerau (2007), claim that the factor to be taken into account is industrial sector production rather than GDP.

Despite the linearity assumptions in the relationship between GDP and transport demand – measured in tonne-kms – supported by authors such as Bennathan et al. (1992), at present, transport demand is rising more slowly than economic growth. Recent research has developed various empirical studies analyzing the historical evidence for decoupling and its future potential (i.e. Banister and Stead (2002) and Gilbert and Nadeau (2002)). Possibly one of the most significant contributions is the European ‘REDEFINE’ project (NEI, 1997), which examined road freight transport trends in five European countries between 1985 and 1995 and concluded that rather than a decoupling there had been a “recoupling” of road freight transport growth and GDP in most countries, and that these trends were likely to continue.

In contrast, the analysis of transport trends in several research works led to clear evidence of decoupling in countries such as Japan, the United States (OECD, 2003) and the United Kingdom (McKinnon, 2007). For instance, in the UK, GDP rose by 21% between 1997 and 2005 while total tonne-kms grew by only 8%, being the divergence of road tonne-kms and GDP trends over this period even more notable.

According to McKinnon (2007), the different decoupling rates among countries depend on the share of “intensive industrial sectors” in the whole economy. This implies that some sectors such as agriculture or mining demand more tonne-kms in their

production processes than service sectors. As services expand their share of total GDP, this leads to a higher economic growth than transport growth (Åhman, 2004). Supply chain management may also change the “transport intensity” of industrial sectors by taking advantage of economies of scale or improving technology and logistics systems (Lehtonen, 2008).

The concept of “transport intensity” is defined as the ratio of freight transport to economic growth, i.e., tonne-kms per unit of GDP. Thus a decrease in this ratio points to a lower demand for freight transport services relative to GDP. The concept of “decoupling” refers to a change in the historically constant intensity (Åhman, 2004).

Empirical studies have shown that transport intensities substantially diverge among countries. Between 1975 and 1990, differences were found in patterns of transport intensity in European countries, and these figures were compared with the European Union average (Stead, 2001). The main conclusion of this study was that the stage of economic and social development influences the value of transport intensity and this measurement depends on economic structure, topography, geography, size, land uses, socio-economic factors and transport infrastructure. The World Bank conducted a cross-sector study, using 1989 data, of a sample of 33 countries at different stages of development in order to analyze decoupling by evaluating the evolution of transport intensity (Bennathan et al., 1992). The study demonstrated that, although the relationship between GDP and road tonne-kms was extremely close, there were differences between rich and less developed countries. This gap is even more notable for road freight transport intensities (SACTRA, 1999).

As can be seen, freight transport demand is influenced by a wide set of factors. A detailed comparison of two countries such as the United Kingdom and Spain with a different economic structure and different trends in road freight transport intensity could shed some light on understanding different transport decoupling trends. In view of the fact that some of the previous studies on decoupling mentioned in this section were conducted on an aggregate level, this paper contributes to the literature by developing a more detailed analysis sorted by commodity groups. In addition, at present, no decomposition analysis has been developed to explain the main divergences in road transport between two different countries.

3. Decoupling economic activity and transport growth: the state of play in the United Kingdom and Spain

In recent decades the relationship between GDP and road tonne-kms has changed. This contrast is particularly notable in countries such as the UK and Spain, where different levels of decoupling can be observed, as shown graphically in Fig. 1. While the growth of real GDP in the period 1999–2007 led to a 95% rise in road freight transport in Spain, the volume of tonne-kms decreased by 19% in the United Kingdom, where economic growth was 87% measured in current U.S. dollars.

From the literature review, we have identified two key factors that should be considered to explain the evolution of decoupling: (1) the evolution of the structure of the economy caused by changes in the share of productive sectors in the total GDP; and (2) the rates of road transport intensity by sector.

Let RFT_C be the total road freight transport in the country measured in tonne-kms, GDP_C the Gross Domestic Product of the country C , $RFT_{i,C}$ the road freight transport demand of each industry i and $GDP_{i,C}$ the Gross Domestic Product given by each sector. So, being $GDP_{i,C}/GDP_C$ the sectorial share of GDP of each industry and $RFT_{i,C}/GDP_{i,C}$ its road freight transport intensity, it leads to define the relationship between road transport volume and GDP in a country through the following

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