**Diesel – Northern Ireland: Paper Skeleton**

**Introduction**

* There are many who argue transformation in the car fleet is required to meet climate change targets
* & This will involve transitioning to low carbon propulsion systems (powertrains) such as Electric Vehicles
* Our paper is not to dicsuss the voracity / virtue / validity of this argument. But because it is part of a prominent and on-going policy dfebate it is relevant to dicuss

Over the course of the next twenty-five years, the car fleets of economically developed nations will undergo a substantial transformation in their powertrains, shifting away from the current paradigm of internal combustion engines fuelled by oil-derived fossil fuels to low-carbon propulsion systems such as Electric Vehicles. This transformation is being motivated by the requirement for the transport system to contribute to the achievement of national and international climate change targets, such as the recent Paris agreement which aims to limit global temperate rises to well below 2 degrees Celsius.

* Policies are being implemented to facilitate/guide this transition
* These policies are contingent on the government being able to exert control over the car stock
* However, there are situations where the sovereignty of this control is diminished – for instance the EU setting corporate average emission factor targets
* A different situation is where the domestic policy of one nation inadvertently extends into another

The transformation of the car fleet is being facilitated by set of government policies which cover such issues as stimulating research and development activity in order to advance the state of low-carbon powertrain technology and encouraging the adoption of low-carbon cars through favourable taxation structures and purchase incentives. The efficacy of these strategic activities is contingent on the ability of the government to exert control over the structure of the car stock. However, there are situations where the sovereignty of this control is diminished due to the policies being deployed by agents that also affect how the structure of the car stock. An example of such a situation is where the domestic policy of one nation inadvertently extends into another, which may generate effects that are not aligned to the priorities of the host nation.

* This paper examines this situation through a case study of Ireland, investigating how the fiscal policy in effect in the Northern Ireland and the Republic of Ireland create a spatial arbitrage opportunity which in turn effects the structure of the car fleet in the North.
* This is conducted through a spatial analysis of the (private?) car fleet registered in Northern Ireland

This paper presents a case study of such a situation by examining how the fuel duty policy enacted in the Republic of Ireland may have affected the structure of the car fleet in Northern Ireland. Historically, the fuel duty on road diesel in the Republic has been lower than that in effect in the North, which combined with favourable exchange rates, meant that diesel in the Republic has been as much as XXp per litre cheaper. This price differential represents a spatial arbitrage opportunity, where drivers in one area (i.e. the North) can derive an advantage (i.e. lowering their costs) from purchasing a commodity in a nearby area (i.e. in the Republic). The specific hypothesis examined in this research is that the effect of this price differential in diesel fuel diminishes as distance from the border between the Republic and the North increases (i.e. a distance decay effect). This is pursued through a spatial analysis of the car fleet registered in the North which focuses on the proportion of diesel cars present in local car stocks.

This examination brings to light how the ability of a nation to manage the composition of their car fleet is not only dependent on the set of domestic polices which are deployed within a nation but also on the domestic policies in effect in adjacent nations. This paper proceeds by providing an overview of spatial arbitrage and how this phenomenon has been investigated in transport studies to date. Following this, the methodology followed in order to test the research hypothesis is detailed and the results of the analysis are presented. To conclude the paper, a number of policy relevant interpretations are proposed from the evidence that is presented.

**Background**

Spatial Arbitrage

Define the concept

Policies can differ between countries which are neighbours – leading to strategic economic activity

Tobacco and alcohol are obvious examples

How the nearness to the border is important – if you’re in a border town saving XX per unit is more important to you than if you’re 100 miles away

Friction of distance generates this for physical commodities

Transport System

The transport system often crosses borders, facilitating the transfer of goods and people

Price differentials in fuel leading to fuel tourism – filling up over the border

To date, little research on how this might extend to the types of cars being registered (i.e. if the occurrence of cheap fuel in a neighbouring region effects the composition of the car fleet in the region of interest)

This represents the focal point and original contribution of this research

Situation in Northern Ireland

Common Travel Area – creating a porous border

Fuel duty difference

Promoting legal and illegal activity (bringing the market directly into the North)

House of commons report – state the facts of the problem in terms of magnitude of the difference and the lost tax revenue

**Methods**

Data Sources and Preparation

Nearness to the Border

Euclidean distance (to nearest crossing point)

Network distance

To nearest crossing point

To nearest fuel station in the Republic

Limitations

Cross sectional analysis

Temporal drift in dataset

More qualitative factors cannot be controlled for – e.g. the Republic is the bigger market which could itself have an effect – might not pick up fuel smuggling – but we can assume this is more prevalent in the sparsely population border region

Statistical Analysis

Mapping – choropleth and LISA

Association with Border – bivariate analysis (scatterplots)

Correlation analysis with other area characteristics

Regression analysis – OLS – Spatial Econ - GWR

**Results**

Presented in the same sequence as described in the statistical analysis section

**Discussion and Conclusions**

The policy of the Republic is extending into the North – projection of power

These two markets are inherently coupled

Has implications for authority – can the UK control the car fleet in Northern Ireland?

Take back control narrative – UK’s exit from the EU – I bet Northern Ireland’s residents didn’t like the UK taking back control in this situation

Such a situation could also be transferring to other areas which have similar circumstances

As long as reducing % diesel is part of the policy debate, then studies such as this will be needed to provide insights into the spatial variation of the effects of nationally applied policies.

This is a case study but it is a phenomena likely to be occurring in other areas: Most EU countries have different fuel tax but porous borders, as do US States. In all these locations this should be further investigated

**TRB Paper Work Limit**

Introduction – 750

Background – 1500

Methods – 750

Results – 1500

Conclusions - 1000