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Scrapping subsidies during the financial crisis — Evidence from Europe☆

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ABSTRACT

We study the effects of car scrapping subsidies in Europe during the financial crisis. We make use of a rich data set of all car models sold in eight European countries, observed at a monthly level during 1998–2011. We employ a difference-in-differences approach, exploiting the fact that different countries adopted their programs at different points in time. We find that the scrapping schemes played a strong role in stabilizing total car sales in 2009: they prevented a total car sales reduction of 30.5% in countries with schemes targeted to low emission vehicles, and a 29.0% sales reduction in countries with non-targeted schemes. We find evidence of crowding out due to substitution from non-eligible to eligible cars in France and Spain. Because eligible cars tend to be more fuel efficient, targeted scrapping schemes had significant environmental benefits in the form of improved fuel consumption: without the schemes, the average fuel consumption of new purchased cars would have been 3.6% higher. Those benefits did not materialize under non-targeted schemes, in which the fuel consumption would have been only 0.7% higher absent the scheme. Finally, we find some evidence that domestically produced cars benefited at the expense of foreign competitors especially in countries where the schemes were not targeted.

1. Introduction

The European automotive sector has been particularly and significantly affected by the most recent financial turmoil and the severe economic downturn. The sector has been hit by a sharp and uniform drop in demand for passenger cars. From 2000 until the first half of 2008, new passenger car registrations in Western Europe ranged from 14.2 to 14.8 million units on a yearly basis. In the second half of 2008 car registrations dropped dramatically, which led to a number of temporary plant closures and layoffs, and to a low rate of capacity utilization. While car registrations temporarily stabilized at 13.7 million units in 2009, they dropped further to 13.0 million units in 2010.[1] At the same time, many automotive companies have reported problems with access to credit financing, in particular in getting loans on reasonable terms.

In response to the financial and economic crisis, many European countries have introduced scrapping programs to foster car purchases, and thus cushion the impact of the sharp downturn on their domestic car production industry (see e.g. Car Communication (2009)[2], (IHS Global Insight, 2010a), (IHS Global Insight, 2010b), (ACEA, 2010) for an overview). The schemes were most active in 2009, and they were also introduced in other parts of the world, e.g. the US Car Allowance Rebate System (CARS) of 2009 or so called "Cash for Clunkers" Program, or Japanese Eco-Friendly Vehicle Purchase Program of 2009.

The concept of car scrapping schemes is simple: vehicle owners receive state money to trade in their old vehicles for new, usually more fuel-efficient ones. The schemes' underlying rationale is also straightforward: for countries with significant car production, a fall in demand for vehicles would raise the risk of bankruptcies and unemployment, thereby triggering severe consequences for workers in the car industry and for the industry's suppliers and distributors. Hence, for the major car-producing countries, the scrapping programs serve to promote car purchases to adjust strong pro-cyclical demand behavior, and consequently to save production and jobs.

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[1] The figures are based on the statistics for new car registrations in Western Europe, published by the European Automobile Manufacturers' Association (ACEA) in its EU Economic Report in July 2011.

[2] Commission Communication "Responding to the Crisis in the European Automotive Industry" COM (2009) 104 ("Car Communication" thereafter).

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However, scrapping schemes are not new for the past crisis. They have also been widely used before the crisis, mainly to reduce carbon dioxide (CO_2) and other emissions by taking older, more polluting cars off the road, or to improve road safety by reducing the age of the car fleet on the roads and by selling new cars with better equipment (such as ABS, ESC, airbags and navigation systems). These environmental motives can especially be strong in countries that have little or no domestic car production.

In this paper we study the impact of the scrapping schemes that were adopted during the recent economic crisis. Our first main question deals with the incentive effects of the scrapping schemes. To which extent did the schemes stimulate total demand for cars, or at least did they serve to temporarily stabilize demand? And to which extent did the scrapping schemes also stimulate the demand for fuel-efficient cars and subsequently yield environmental benefits in the form of fuel consumption savings on new purchased vehicles? Our second question is on crowding our effects: was there substitution from non-eligible to eligible cars, or intertemporal substitution? Our third question is whether the scrapping schemes affected production and the characteristics of newly sold cars: did domestic firms benefit more than their foreign competitors, and did volume brands win at the expense of premium brands?

To address these questions we collected a unique dataset that enables us to combine the specific features of the European scrapping schemes with detailed data on car sales and product characteristics. We use monthly data for the period 1998–2011, and focus on eight European countries: Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain and the United Kingdom. These countries make up for 90% of the car sales in the European Union. To estimate the impact of the scrapping schemes we follow a difference-in-differences approach, exploiting the fact that the specific timing of the scrapping schemes differed between countries. We also account for heterogeneity in the effects of scrapping programs across countries and identify country-specific effects of the scrapping schemes by focusing the estimation on one treatment country at the time while using the same control country, Belgium, in which scrapping policies were not implemented. We distinguish between targeted and non-targeted schemes. Targeted schemes provide a subsidy if the new car satisfies certain environmental eligibility criteria (mainly based on CO_2 emissions), and were adopted in France, Italy, Portugal and Spain. Non-targeted schemes provide a subsidy regardless of the new car that is purchased. These were introduced in Germany, the Netherlands and the United Kingdom.

Our empirical findings can be summarized as follows. First, scrapping schemes had a strong stabilizing impact on total car sales, especially in countries with targeted schemes: if there had been no schemes in 2009, total sales would have been 30.5% lower in the countries with targeted schemes, and 29.0% lower in countries with non-targeted schemes. Although scrapping policies stabilized sales in all countries, their individual performance varies considerably: a 1% increase in the subsidy raises sales of cars in Germany (implementing a non-targeted scheme) by 3.8%, while in other countries with non-targeted schemes the effect is lower: 2.9% in the Netherlands and 1.3% in the UK. The heterogeneity is evident also in countries with targeted schemes: for example, a 1% increase in subsidy raises sales by 9.1% in France and 5.3% in Italy. Crowding out effects due to substitution from non-eligible to eligible cars (with better fuel efficiency) are sizeable in France and Spain where, during the targeted schemes, sales of non-eligible cars were negatively affected during the period when the scheme is effective. As a result, the targeted scrapping schemes had significant environmental benefits in the form of improved fuel consumption of new purchased cars: absent the schemes, average fuel consumption would have been 3.6% higher in countries with targeted schemes. Those benefits did not materialize under non-targeted schemes, in which fuel consumption would have been only 0.7% higher absent the scheme. That is, the main effect of European scrapping schemes in the financial crisis was to temporarily stabilize total car sales, and their impact on the demand for fuel-efficient cars and related environmental benefits in the form of improved fuel consumption was significant only under targeted schemes that were explicitly designed to encourage the adoption of low-emission vehicles.

Second, intertemporal substitution effects are generally small, apart from Germany, in which sales would have been 30.4% higher during the first three months of 2010, after the end of the scrapping scheme. Third, the scrapping schemes had various effects on production. Scrapping schemes benefited domestic production: domestic producers gained proportionally more than foreign ones from scrapping subsidies when the programs were non-targeted (as in Germany and the United Kingdom). We find only some limited evidence that the schemes caused severe production imbalances and saturated plant capacity with the need to increase imports to satisfy the increased domestic demand for cars, not produced locally. Finally, premium brands lost market share in favor of volume brands only in the case of targeted schemes.

Our study is timely for two major reasons: (i) most empirical work on the incentive effects of scrapping schemes has focused on non-crisis times, and has not compared the effects on total car sales with benefits on fuel consumption; (ii) no work has considered the effects on competition and production. We discuss both contributions in turn.

First, despite a number of theoretical and policy studies related to scrapping subsidies, there are just a few studies that empirically investigate the economic effects of scrapping schemes.[3] Some authors apply a dynamic structural framework that enables them to differentiate between the short-term and long-term effects of scrapping schemes on sales of new cars and to analyze the effects of schemes on the used car market, for instance Adda and Cooper (2000) for French scrapping subsidies between 1994 and 1996, or Schiraldi (2011) for Italian scrapping subsidies in 1997 and 1998.[4] While these papers focus on scrapping schemes in non-crisis times, only a few studies estimated the car demand effects of schemes during the last financial and economic crisis. Mian and Sufi (2012) and Li et al. (2013) apply a difference-in-differences approach to quantify the sales effects of the US CARS program: Mian and Sufi (2012) use variation across the US cities in ex-ante exposure to the program (based on the number of available clunkers), while Li et al. (2013) choose Canada as a control group for identification. These US studies find positive short-term effects of the program on car sales, but this effect erodes if a longer time horizon is considered.[5]

With our study, we aim to contribute to this empirical literature on the economic effects of scrapping programs, using a panel data approach and exploiting country-by-country program variation to identify the impact of scrapping policies (i.e. a country difference-in-differences approach). For this purpose, we exploit a unique monthly car model-level dataset, enriched with detailed data on the timing and design of the scrapping schemes and information on the location of production, for a rich sample of eight European countries. This enables us to systematically compare the total sales effects with the fuel

[3] Theoretical papers on the design of "cash-for-scrappage" subsidies are, for instance, Hahn (1995), Alberini et al. (1995), Esteban (2007). Policy papers include the automotive consultancy IHS Global Insight (IHS Global Insight, 2010a, 2010b), which has analyzed economic, environmental and road safety effects of European scrapping schemes introduced in response to the last financial and economic crisis in the study for the European Commission. Several other policy studies concentrate on the environmental or safety impacts of scrapping schemes (e.g. OECD, 1999; OECD/ITF, 2011).

[4] The authors find that the scrapping policies stimulate car sales in the short run, followed by a sales contraction in the long run. Licandro and Sampayo (2006), using a hazard function approach and ignoring the second-hand market, find a high positive effect of 1997 Spanish scrapping subsidy on sales in the short run, but small in the long run.

[5] Cooper et al. (2010) and Copeland and Kahn (2011) estimate a time-series forecasting model to predict counterfactual sales. Busse et al. (2012) study the price effects of the US CARS Program and find evidence for considerable consumer benefits due to three reasons: 1) consumers benefited fully from the scrapping rebates, 2) consumers gained even more since the program stimulated car producers to increase their own rebates, 3) the program had little effect on the prices in the used car market.