Assessment of the Effectiveness of Scrapping Schemes for Vehicles

Economic, Environmental, and Safety Impacts

GLOBAL INSIGHT

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List of Abbreviations

ABS	Anti-lock Brake Systems.
ACEA	European Automobile Manufacturers Association.
Bargain Price Downsizing	This is the consumer psychology where purchases are swayed by attempting to achieve the highest percentage discount. At the point of purchase, the satisfaction of this can be higher than the expected utility of the good itself. In car scrapping schemes, this leads to consumers choosing vehicles cheaper and smaller than they may have under non-incentive conditions. The downsizing effect is a pure side-effect of bargain price maximization.
CNG	Compressed Natural Gas.
CO_{2^2}	Carbon Dioxide.
Downsizing	Most commonly refers to a switch of consumer preference to smaller segment vehicles or engine options. In fact, the term downsizing can be slightly misleading or exaggerate the true effect because vehicles have been getting larger and heavier over time even within the same segment.
DPF	Diesel Particulate Filter.
ECWVTA	EC Whole Vehicle Type Approval.
ESC	Electronic Stability Control.
EU	European Union.
Fallback	'Fallback' is a term used to describe the falling back of sales to trend or equilibrium levels after a scheme has ended. The effective increase (i.e. return to normal) in net transactions price, once the scrapping incentives have been removed, will cause demand levels to fall back.
GDP	Gross Domestic Product.
GHG	Greenhouse Gas.
GVW	Gross Vehicle Weight.
Incremental Demand/Sales	This refers to the net increase in vehicle sales over and above what would have occurred without the scheme. Since many vehicles would have been purchased in any case, it is important to realise that this is not the same as the total number of vehicles funded under each scheme.
Light Vehicles	This refers to a combined volume of Passenger Cars and Light Commercial Vehicles (M1 and N1).
LCV	Light Commercial Vehicle, of the N1 category.
LPG	Liquid Petroleum Gas.
Mandatory Funding	The term 'mandatory' is used to include all publicly funded incentives PLUS all (usually matching) OEM contributions required under the conditions of the scheme.
Marginal Scrapping Rate	The incremental change in scrapping between vehicles of different age expressed as a percentage (or between the same vehicle vintage as it ages).
MPV	Multi Purpose Vehicle.

MS	Member States.
MV	Motor Vehicle, using the ISIC rev 3 Classification, hence passenger cars, light commercial vehicles, and trailers.
NIVS	Net Incremental Vehicle Sales.
NMS	New Member States.
NOx	Nitrogen Oxide.
OE	Original Equipment.
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer—usually used to refer to the vehicle manufacturers themselves.
Parc	Total vehicles on the road, also called 'units in operation'.
Payback	'Payback' is the amount, in units, that vehicle sales fall below 'trend' or equilibrium in the period immediately after the ending of the scrapping scheme. This is likely to be equivalent to the amount of pull-forward.
Payback Rate	'Payback Rate' is the total payback in units expressed as a percentage of the net incremental demand created while the scrapping scheme was in force.
PC	Private Consumption.
PM	Particulate Matter.
Pull-Forward	'Pull-forward' is the number of vehicle transactions that occur during the incentive period that would otherwise have naturally taken place in an immediate future period.
PUP	Car-derived Pick-up.
R&D	Research and Development.
SAAR	Seasonal adjusted annualized running rate of vehicle sales.
Spillover	'Spillover' refers to vehicles funded, or ordered, during 2009 but which will be registered in 2010. This can result because the scheme was originally designed to run into 2010 or because the scheme allows for new registrations (and delivery) to occur after the scheme order books are closed.
SS	Scrapping Scheme.
SUV	Sport Utility Vehicle.
UNECE	United Nations Economic Commission for Europe.
U.S.	United States.
VA	Value Added.
W/SS	With Scrapping Scheme.
Whole Market Elasticity	The term 'whole market' means the new sales volume generated is gauged in relation to the total car market and not just the part of the market included in the scheme terms.
Wo/SS	Without Scrapping Scheme.

Automotive Glossary

Automotive Segment	
A	Utility/city class: entry level small passenger car.
B	Supermini class: small passenger car.
C	Lower (C1) and medium class: medium-sized passenger car.
D	Upper medium and executive class.
E	Large and luxury class.
F	Super luxury class.
MPV	Multi-purpose vehicle: compact car with higher aspect ratio (height length).
SUV	Sport Utility Vehicle: car-like ride/handling/ fuel efficiency.
PUP	Car-derived pick-up.
CDV	Car-derived van: small van model derived from B segment car.
LCV	Light commercial vehicle, of the N1 category.

IHS Global Insight Segmentation

Segment A : UTILITY/CITY CLASS

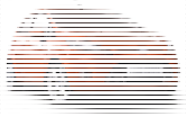
- **Entry level small passenger car**
- **Typically inexpensive "City Cars"**
- **Mostly 3dr hatch but 5dr increasingly commonplace**
- **Hatch/MPV definition can be difficult**

- **Size = up to 3800mm**
- **Price Band CHF <= 15,000**
  BUT size really the prime indicator

Recent Top Best Selling Segment A Models

Suzuki Alto/Maruti 800
Suzuki Wagon R
Daihatsu Move
Fiat 500
Hyundai i10

Segment B : SUPERMINI CLASS



- **Small passenger car**
- **Typically 3 or 5 door Hatchback**
- **Increasingly Estate variant offered also Cabrio popular in some markets**
- **Sedan variant increasingly offered especially for emerging markets**

- **Size = 3700-4200mm**
- **Price Band**
  CHF 15,001-22,000

Recent Top Best Selling Segment B Models

Toyota Vitz/Yaris
Ford Fiesta
Peugeot 207
Renault Clio
VW Polo

Segment C1 : LOWER MEDIUM CLASS

- Medium-sized passenger car
- Typically 5 door Hatchback
- Estate variant commonplace
- 4 door Sedan variants often available (especially popular in U.S. & Asia)

- Size = 4000-4500mm
- Price Band CHF 22,001-28,000

Recent Top Best Selling Segment C1 Models

Toyota Corolla
Ford Focus
Honda Civic
VW Golf
Mazda 3

Segment C2 : MEDIUM CLASS

- Medium-sized passenger car
- C2 status usually determined by brand and/or bodystyle (esp. Sedan)

- Size = 4000-4500mm
- Price Band CHF 28,001-33,000

Recent Top Best Selling Segment C2 Models

Toyota Prius
Hyundai Elantra
Skoda Octavia
BMW 1-Series
Audi A3

Segment D1 : UPPER MEDIUM CLASS

- Upper Medium-sized passenger car
- Traditionally the "Family Car" Segment
- Mostly Mainstream Brands
- Sedan & Estates favoured but some markets still opt for Hatches
- Hatch variant increasingly out of vogue e.g. Citroen C5 switched to Sedan & Avensis dropped hatch

- Size = 4400-4900mm
- Price Band CHF 33,001-41,000

Recent Top Best Selling Segment D1 Models

Toyota Camry
Honda Accord
VW Passat
Hyundai Sonata
Nissan Altima/Bluebird

Segment D2 : EXECUTIVE CLASS

- Executive passenger car
- Brand is vital in this segment
- Sedan dominates but Estate popular
- Cabrio & Coupe offered by big players

- Size = 4400-5000mm BUT also Sports models
- Price Band CHF 41,001-50,000

Recent Top Best Selling Segment D2 Models

BMW 3-Series
Mercedes-Benz C-Class
Audi A4
Chevrolet Impala
Pontiac G6

Foreword

The European Commission has a profound interest in member state vehicle scrapping schemes since they could contribute to both economic and environmental European Commission strategic goals.

In 2009, significant levels of public spending were devoted to scrapping schemes with the objective of providing demand-side stimulus to the economy (thereby cushioning the effects of the severe economic crisis) and promoting enhanced environmental and safety transportation through the replacement of older vehicles with newer, less polluting, and safer vehicles.

This report considers the short and medium term effectiveness of scrapping schemes for vehicles introduced in member states during 2009 in terms of economic, environmental, and safety impacts. It provides recommendations for scrapping schemes that would allow for their highest economic and environmental efficiency. It was produced within five months, the study period corresponding with the end date of several, but not all, of the schemes, and without the benefit of full data availability. It benefits from underlying IHS Global Insight proprietary automotive intelligence and methodologies.

IHS Global Insight would like to thank members of the automotive industry, expert witnesses, members of national government agencies and trade associations, and the European Commission who have assisted in the production of this report. For my part, I would like to thank Sarah Kingsbury, Project Manager; Nigel Griffiths, Thought Leader; Veronique Valla; and Arnaud Lieugaut who formed the project team and who were supported by automotive country analysts and other members of the IHS Global Insight Automotive team.

Dick Buttigieg

Project Director

IHS Global Insight

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Executive Summary

Introduction

The credit crunch of early 2008 had developed into a fully blown credit crisis by the fourth quarter of 2008.

With serious concerns about the stability of the global financial system, a collapse in consumer and business confidence, compounded by difficult access to consumer and corporate finance, car sales around the world crashed with a level of synchronisation that had never been seen previously. Before the end of that year, passenger sales had fallen across the EU by more than 25% with an annualised loss of over four million units. Car manufacturers were unable to react in time, inventory built up, and the scene was set, entering 2009, with radically deep cuts in vehicle assembly (-40% in the first quarter), plant shutdowns, and extensive lay-offs.

Against this background, 2009 brought by far the most extensive and highest density of market support measures (some might say 'interventionist' measures) ever seen in the automotive industry. Vehicle scrapping schemes have been the main tool of choice for market support. Scrapping incentives have been enacted in 13 member states of the EU during 2009. These scrappage programmes were in operation in markets that typically represent 85% of total vehicle sales in the EU.

The 'typical' scheme required the scrapping of a vehicle with a minimum age of 10 years, and provided an incentive of €1,500 for the purchase of a new car.

In total, scrapping schemes have cost European governments €7.9 billion in outlay plus the cost of administration.

This report was designed to provide a comprehensive review of the scrapping schemes launched during 2009. It studies the details of schemes in each member state, provides a report on actual results achieved, and attempts a consistent quantification of the key impact areas using a range of relevant metrics. An annexe with detailed data and analysis of each of the EU schemes, and some global schemes, is available separately. The aim of the report is to draw conclusions and suggest recommendations on the economic, environmental, and industrial aspects of scrapping schemes.

Of the 13 scrapping schemes covered, at least 10 had a primary objective of providing general economic stimulus and/or targeted support for the automotive industry at what was clearly a critical time.

Judged against these objectives, we find that scrapping schemes have been remarkably successful, although it is important to note, some of the impacts derived may have been uniquely beneficial to the specific situation of the global financial and economic crisis of 2008/9.

Scrapping schemes also provide a mechanism for accelerating the renewal of the European car parc, potentially generating environmental improvements and benefits for road safety. Against these metrics, we also find that the net change of both the environmental and safety quality of the European vehicle fleet has been universally positive and tangible.

Of course, this does not mean that scrapping schemes are necessarily efficient in terms of the financial cost of delivering these results, or in relation to other policy tools or mechanisms available. In addition, the

indirect effects of these schemes may generate unwanted distortions to the automotive market structure and even to the wider economy. These are considered in this report.

The study objectives were to provide an evaluation of the effectiveness of vehicle scrapping schemes on:

The Automotive Industry (Chapter 3);

The Wider Economy (Chapter 4);

Vehicle Emissions and the Environment (Chapter 5);

Vehicle Safety (Chapter 6).

Methodology

The key to understanding and analysing the impact of scrapping schemes is to focus on the marginal or incremental changes brought about by their introduction. In order to do this, we have to compare the actual observed results with an automotive world that would have developed if the schemes had not been enacted.

'What would have happened otherwise' brings in a whole range of uncertainties, alternative estimations, and different judgments. In order to assess the impact of scrapping schemes over the number of different dimensions required for this study, a series of stepped models were developed in modular form. The whole analysis is performed on the basis only of incremental change generated by the schemes. Only this incremental change in new vehicle sales, or of vehicle scrapping, is relevant to its impact on public finances, industry production, and changes to gross emissions.

This modular-stepped approach was designed in order to accommodate very different levels of available data that were available from member states as the schemes progressed throughout 2009. In order to provide early results, the study was constrained by collecting data on a moving basis during the last four months of 2009, and the majority of countries had not reported full calendar-year data for the schemes at the time of the completion of the project. Various estimation techniques were used in order to fill data gaps in order to create a consistent modelling approach to be applied to each scheme.

Scrapping schemes set in motion changes that flow into the future; by design, this study confines its attention to the expected impact over the three year period 2009 to the end of 2011. For the purpose of objective comparative analysis, it is assumed that all schemes end on schedule or on the exhaustion of funding, and do not include follow-on or the reintroduction of new schemes during 2010 or 2011.

The main conclusions are classified under each scheme objective.

Automotive Industry Support

The €7.9 billion of funding from the 2009 scrapping schemes would theoretically support a maximum of 4.44 million units over the schedule period. Of this, 4.1 million new passenger cars were actually incentivised during the 2009 calendar year, leaving a spill-over volume of 355,000 units for 2010.

Not all of this was net additional demand; the study methodology generates an estimated 2.16 million incremental new car sales generated during the year. This has helped to support activity in the retail dealer network and provides a much-needed cash-flow injection for a large number of vehicle manufacturers. Vehicle assembly volumes on aggregate responded to the stimulus (in the midst of the sharpest and largest contraction in output ever witnessed) to the extent that we believe their response potentially forestalled, if not eventually prevented, the loss of up to 120,000 direct jobs in the industry.

In the absence of European scrapping schemes, we predict that light vehicle production would have fallen by an additional two million units to little more than 13 million units, and thus would have recorded a collapse of 26% on 2008 vehicle output. There have been far less bankruptcies of component and parts manufacturers than was generally expected at the depth of the crisis.

Scrapping schemes meant that European plants saw capacity utilisation rates fall below the critical limit of 60% for a period of five months, before eventually reaching generally accepted break-even levels for the last two or three months of the year. Likely capacity utilisation rates in the absence of scrapping schemes would have prolonged this critical period of less than 60% utilisation to nearer to 10 months, without reaching break-even therefore in any month in 2009.

These conclusions will provide ammunition for both sides in the debate on industry restructuring:

- On the one hand, scrapping schemes were enormously effective in providing direct stimulus to the automotive industry, preventing an untold number of companies in the supply chain from facing bankruptcy. In addition, they probably reduced other forms of government financial support that would have been eventually offered as the financial condition of key industry players deteriorated still further. In terms of wider restructuring, they allowed a time for managed, and not enforced, rightsizing of industrial capacity.

- On the other hand, sufficient stimulus reached the car manufacturers early enough such that they did not take significant steps to reduce installed capacity. No manufacturer has actually exited the market during the crisis. The concern may be that with the most critical period past, even if they act at a later date, manufacturers may not take restructuring far enough for the longer term.

Market Distortions

We find that while the 'designed-in' discrimination elements are not very widespread (with the exception of CO_2 limits), scrapping schemes do pick winners and losers via the price and income constraint mechanism.

Some of the scheme conditions observed do prejudge, to some extent, which brands, models, or powertrains may gain the most, or lose out completely. For example, we have shown that larger cars, premium and luxury brands, and light commercial vehicles have been only marginal beneficiaries of these schemes. Some of the schemes specifically limit their scrapping scheme incentives to 'private individuals'. This means that significant parts of the European new vehicle market are officially excluded and have not benefited directly from the stimulus. Even where they are not excluded from the schemes, other conditions effectively bar them from participating: in particular, the typical minimum age condition means that virtually no company fleet or rental businesses would meet the scrapped vehicle age and ownership conditions—other than some small, private-owner businesses, for example.

Some of the most significant annual changes that have been seen in European market segmentation in recent times occurred during 2009. We use the term 'downsizing' as shorthand for these changes, although we want to be clear that the specific mechanism by which this occurs is more probably the change in the propensity to purchase lower-priced cars than the change in the propensity to purchase smaller cars. The physical downsizing is thought to be primarily a side-effect of the down-pricing.

Two-thirds of the 2.16 million units of estimated additional demand generated by scrapping schemes was in the lowest price segments (A and B segment cars, and Utility Vans). Only 4.7% of additional customers bought SUVs, compared with 6% buying MPVs, and 20% buying compact cars (C1). The other segments combined (including medium and large cars, and premium and luxury vehicles) only benefited from 1.4% of the incremental incentivized sales.

The incidental impact of certain scrapping schemes, via these market distortions, is to have disproportionately supported some of the (judged over the long term) weaker players in the European industry.

In fact, there is probably not much disagreement that scrapping schemes have provided a mechanism that impedes the prospects for wider industry restructuring.

Despite seeing the deepest crisis in the European automotive industry for decades, we have only seen the announced closure of three assembly plants—worth about 1.7% of EU capacity. In addition, there has been announced restructuring at several other plants worth another 1.8%, taking out a total of 3.5% of capacity. In fact, the structural changes to the long-term prospects for the European car market, initiated by the financial and economic crisis, are likely to have reduced trend volumes by more than this amount. As a result, there has been no net improvement in the problem of long-term excess installed capacity and the resulting long-term pressure on sustainable operating margins.

Economic Stimulus

Our aggregate calculation for 2009 is that vehicle scrapping schemes added a net 0.16–0.2% to EU-wide GDP.

In particular, there are unconfirmed estimations that this may have reached as high as 0.26% of GDP in the third quarter of 2009, implying that the stimulus for the scrapping schemes was one of the key drivers behind the Eurozone emerging from recession—with 0.4% growth in GDP—for the third quarter.

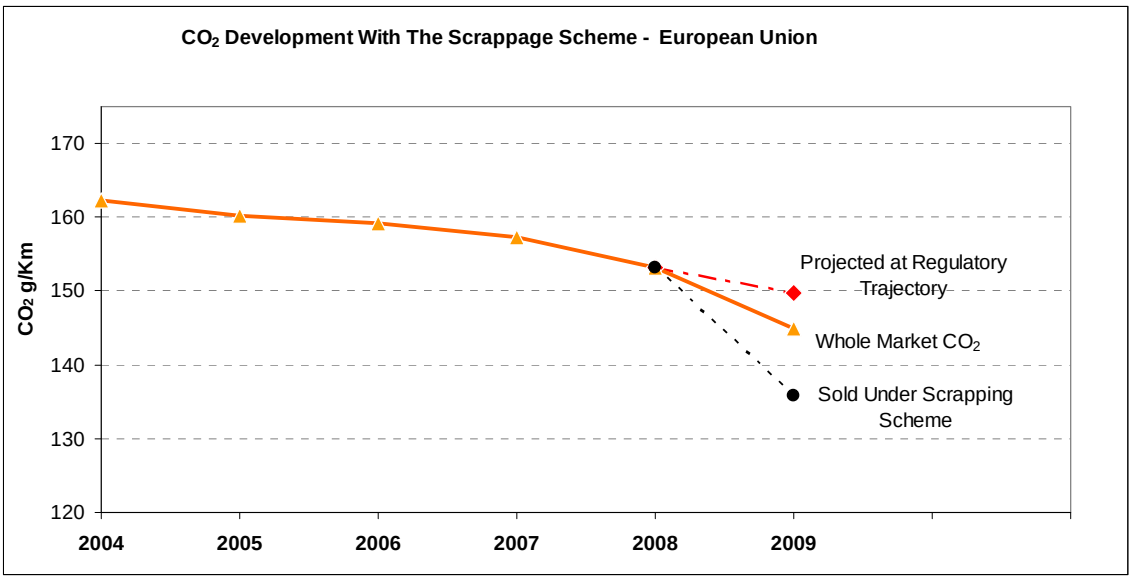
A detailed analysis of the 13 European scrapping schemes launched in 2009 leads us to the conclusion that concern about wider substitution effects of consumer spending on discounted new cars has generally been overstated, and that the economic impact will be stronger than expected particularly in the short run. Even where there is substitution away from other durable goods, many of these have higher import leakages than motor vehicles.

Reduction in Vehicle Emissions

The average car bought new as part of the scrapping schemes in 2009 is estimated to have a CO_2 output of just 135.9g/km, a very substantial 18g/km below the EU market average in 2008. Although based on very partial data available at the time of this report, we estimate that the scrapping schemes will have helped pull down the average emissions of the whole market to around 145g/km.

At the EU level, 1.05 million tonnes of CO_2 were saved during the year as a direct result of the scrapping schemes launched in 2009. This represents an average saving of 0.27 tonnes per car funded by governments, or 0.49 tonnes per incremental car sold.

CO_2 DEVELOPMENT WITH SCRAPPING SCHEMES, EU27 (PASSENGER CARS)



Source: IHS Global Insight.

Although the annual reduction of CO_2 from the scrapping schemes launched in 2009 decays after they end, it still delivers an improving cumulative reduction. By the end of 2010, a total of 1.79 million tonnes of CO_2 emissions will have been saved—rising to 2.3 million tonnes by the end of 2011.

The schemes retired over one million units of Euro-1 and pre-Euro-1 standard cars, and almost one million cars of Euro-2 compliance vehicles, replacing them with a mix of 84% Euro-4 and 16% Euro-5 cars. This, in turn, results in abatement of both NOx and PM.

In general, if the sole reason for scrapping schemes was emissions reduction then we would have to conclude (as do most other studies) that they are an expensive mechanism for emissions abatement—at least in terms of the general 2009 scheme design parameters.

We find that there are two specific mechanisms by which scrapping schemes help reduce emissions: the rejuvenation effect and the downsizing and mix effect.

Initially, the most important contribution to this overall reduction is the rejuvenation effect worth 0.66 million tonnes of the 1.05 million tonnes total (or 63%). The other 0.38 tonnes (37%) of reduction is due to the overall mix effect, 85% of which is attributable to the pure downsizing into A and B segment vehicles.

The impact of the 2009 scrapping schemes will still be positive during 2010 and 2011, although the annual abatement falls to 0.74 million and 0.52 million tonnes, respectively. The decay in the rejuvenation effect means that by the end of 2011 it contributes just less than 50% to the total annual CO_2 reduction. Over the same period, the relative importance of the downsizing effect increases. The surge in small car sales in 2009 will still represent an abnormal small car weighting in the parc of that vintage for many years—in fact, until they themselves are scrapped.

We find that the significance of this downsizing effect of scrapping schemes has been largely neglected in previous assessments of the emissions abatement potential of scrapping schemes.

Improvements in Safety

Scrapping schemes have unambiguously improved the normalized 'safety quality' of the European vehicle fleet.

They have directly increased the number of cars on European roads fitted with passenger airbags by 1.05 million during 2009, the number with ABS by over 1.4 million, and the number of cars fitted with ESC by around 1.38 million.

The net impact of this annual improvement will decay over time but even by the end of 2011, there will still be 700,000 more cars fitted with airbags; 930,000 with ABS; and 890,000 with ESC. Based on the incidence of road accidents and the reported reduction in serious injury attributable to these features, the 2009 scrapping schemes will undoubtedly continue to save lives for several years—even without factoring in the big improvements in design for pedestrian safety, and the reduction in fatalities as a result of these improvements. (An overall quantification of this was not attempted).

Recommendations

Scrapping schemes can be used as an effective tool for short-term economic stimulus (as an arm of fiscal policy) and for targeted industry support at critical times. At the same time, they can accelerate improvements in environmental and safety performance of the European vehicle parc. They have made a significant contribution to the largest single annual drop in average car CO_2 emissions estimated to have been over 8g/km in 2009.

The long-term legacy of the 2008/9 recession may be higher taxation, an increase in savings rates, and more selective access to credit. This may not only structurally lower long-term car sales but at the same time may result in higher consumer sensitivity to price increases—the latter resulting from loading new fuel efficiency technologies into new cars. The higher initial price relative to ownership costs also tends to result in cars being kept longer. In other words, the rate at which the European parc will be replaced with new, more fuel-efficient cars would slow. Even with strong improvements in new vehicle fuel efficiency, the reduction in churn has the potential to endanger European commitments to greenhouse gas reduction. In this longer term context, EU scrapping schemes may take on a complementary future role in environmental policy.

Given the fact that there are numerous reasons why member states may want to implement scrapping schemes in the future, this study concludes with a series of specific recommendations primarily aimed at future scheme design.

Against these suggested objectives:

- Minimising the market and competitive distortions likely to be generated by the schemes;
- Supporting 'the integrated approach' objective as part of the mandatory passenger car emissions framework;
- Increasing the efficiency of scheme emissions abatement (over the cycle).

It is suggested that scheme conditions on new car replacement should be forward-looking to minimise any loss as a result of the payback. This includes deliberate and advised introduction dates for scrapping schemes, in order to avoid the poorly timed implementation of schemes ahead of significant prospective improvements in emissions standards.

Alternatively, the inclusion of specific requirements such as pre-compliance of emission standards or specific key upcoming elements of such schemes should be considered. This also applies to the acceleration in the rate of expected reduction of CO_2. This can be done by setting CO_2 conditions for new replacement cars, in line with a target rate that is expected to be achieved in, say, two or three years in the future. Another approach could be to introduce a variable incentive discount for 'accelerated compliance' of vehicles to future standards or CO_2 outputs.

The European Commission (EC) may have an important role to play in the co-ordination of scrapping schemes. It has already provided guidance on scrapping scheme design with regard to responding to the automotive crisis in early 2009. This could be taken further. On the one hand, such guidelines could be promoted to improve the consistency across schemes of different member states. For example, schemes observed in 2009 variously introduced thresholds of 120g, 130g, 140g, 149g, or 160g or none at all. On the other hand, such guidelines could also apply to an attempt to assist the timing (or staggering) of phase-in or phase-out of schemes across member states.

The EU already has a mechanism in place that can be used to fulfil objectives of minimising distortions and avoiding pitfalls of single or multiple threshold setting. This study suggests examining the use of the mass-based limit value curve in order to determine eligible new car replacement vehicles under any scheme, and this could be applied consistently across member states. This has many benefits:

- *It will help remove 'designed in' distortion to market choice, which may also be counter to industrial policy;*
- *It will promote choice of best-in-class (mass) rather than vehicles that may be relatively inefficient for their size;*
- *It provides strong 'additional' incentives for manufacturers and consumers to make that choice, thus sending consistent signals to consumers and manufacturers;*
- *It supports the 'integrated approach' objective in support of the mandatory emissions framework.*

One way to reduce the clear bias of scrapping schemes in promoting cheaper cars and brands (which may not possess better environmental technology loading) could be the introduction of an incentive based on a percentage of the purchase price of the new car. A discount on the value-added tax (VAT) system could be used, for example. This has been tried in South Korea where the boost to sales has been seen across the market and not just in the smaller/lower price segments.

A comprehensive design solution may be possible, one that could incorporate both the limit value curve and either a variable incentive discount for 'accelerated compliance' of vehicles or the use of a VAT rebate.

1 Introduction—The Economic Context of the European Scrapping Schemes

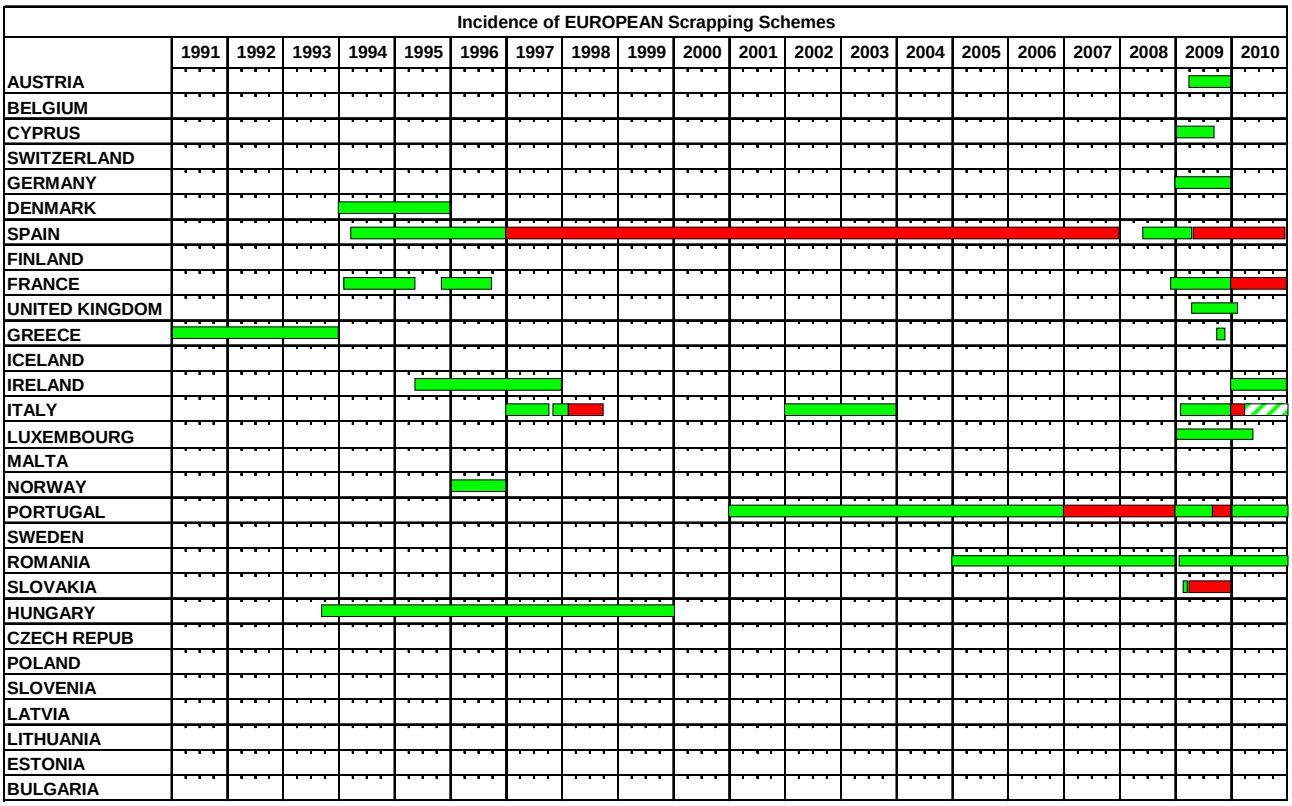
1.1 MACRO ECONOMIC SITUATION PREVIOUS EUROPEAN SCRAPPING SCHEMES

In order to be able to understand the scrapping scheme actions adopted in 2009, it is important to understand the context in which they were being formulated—specifically during the depth of the financial and economic crisis of late 2008 and early 2009.

On examination of the chart below, which we also feature later in this chapter under a short discussion of previous schemes, the widespread adoption of scrapping schemes at a simultaneous point in time is startlingly obvious in comparison to the occurrence of scrapping schemes since the 1990s. The scrapping schemes that occurred were a unified response by governments across Europe as they simultaneously realised that drastic action would be needed in order to assist what was becoming a critical situation for the automotive industry, and the wider economy in general.

The majority of the scrapping schemes announced in early 2009 were a direct response to the economic crisis. Three countries did not fit this situation, two were continuing ongoing renewal schemes that had been designed to rejuvenate the parc, and one was primarily aimed at environmental objectives.

Fig. 1



Source: IHS Global Insight.

As we have noted, to understand the depth of the recession, the impact of the financial crisis, and its severity, reference to a paper produced by IHS Global Insight for the European Parliament during early 2009 is useful. In this paper, from which we reproduce an extract below, we describe the financial and economic crisis impacting the automotive industry; as such, therefore, it provides a "snap shot" of the understanding at the time, which is useful to help our comprehension of the context in which scrappage schemes were evaluated and introduced by many EU countries.

THE AUTOMOTIVE INDUSTRY IN SUMMARY—IHS Global Insight View of the First Quarter of 2009

Extract from a paper produced for the European Parliament

The European automotive industry is an important keystone of the European economy. From vehicle manufacturing down the automotive supply chain, it represents an enormous one-third of all manufacturing jobs in the EU27, invests annually over €20 billion in R&D, and is the leading industrial contributor to net external EU trade. Its importance increases by including vehicle distribution and associated financing sector activity, which directly or indirectly supports 13 million jobs. Vehicle taxes contribute €360 billion to member-state revenue.

For more than a decade, sales in the EU have oscillated within a relatively narrow trading range (16.7 million to 17.7 million units). Starting in the summer of 2008, sales decisively dropped out of the floor of this range and then crashed further in the final quarter of the year. By January 2009, vehicle sales were running 3.5 million units lower than these trend rates. The shock of this, combined with a synchronised crash in key automotive export markets, means that the situation has already deteriorated beyond worst-case pre-crisis contingency planning of even the most cautious manufacturers

Consensus forecasts for the industry predict a 20% slump in vehicle production in the EU27 between the start of 2008 and the end of 2009. This approximates to a loss of over €60 billion of industry revenue. Capacity utilisation rates have already fallen to 65% in what is a high-fixed-cost industry.

The automotive industry is currently one of the hardest hit sectors of 'the real economy' in a recession triggered initially by the financial crisis. Since it has one of the largest multipliers from upstream resource input, through the supply chain down to distribution and financing, there will be lagged second-round effects that will prolong the wider EU economic recession and hamper the initial pace of its recovery.

The crash in domestic vehicle sales and in key export markets has been so sharp, deep, and synchronised globally that virtually every single vehicle manufacturer will see significant cash burn, estimated in aggregate at between €18 billion and €30 billion in 2009 in Europe alone. This requires access to willing and liquid capital markets. Given the tightness in the financial markets, many vehicle manufacturers in the industry, with its low margins, high fixed costs (which include labour), and high capital expenditure commitments for new (low emissions) technologies, will approach or breach technical bankruptcy. This has already led to a spate of demands for government-backed loans to cover the expected losses while sales are so low and with little forward visibility of an end to the crash in demand.

Providing such exceptional funding to the vehicle manufacturers clearly helps shore up their position but the collapse in volume feeds equally down the supply chain and to dealerships and includes a host of small and medium sized enterprises (SMEs). There will be hundreds if not thousands of enterprises that have similar needs but without the profile, visibility, and logistical ability to get similar aid. With unit vehicle assembly volumes falling by a quarter to a third, a wave of bankruptcies is predicted across the supply chain during 2009.

Given the most likely environment, where the vehicle manufacturers themselves are supported from failing, the so-called 'second best' policy response able to deal with this crisis may be to help provide incentives to

boost demand levels so that vehicle manufacturers' output does not fall so severely, lowering their need for 'gap' financing while at the same time increasing volume and utilisation rates across the supplier network. In this manner, all of the various levels of the supply chain from the major Tier 1 suppliers to the SMEs will benefit, effectively reducing the extent of gap financing requirements and helping boost overall levels of economic activity, reducing demands on state welfare and social programmes.

Structure: *The vehicle manufacturing business is highly complex. It is not limited to the assembly of vehicles and production of engines. The same manufacturers engage in testing, sales/marketing and distribution, maintenance, recycling, and disposal. Most also make components—although the degree of vertical integration varies. They also have separate finance arms. These finance companies provide finance to their dealer network, leasing activities, and to final customers (captive finance). In recent years, these non-automotive parts of a vehicle manufacturer's business have tended to generate more profits than their core manufacturing assembly operations and, in some years, may have been the only source of profits, thereby supporting the loss-making automotive manufacturing arm.*

Competition: *The European automotive industry benefits from the size of its domestic market, which is the largest single market in the world today, and from the partial adoption of European automotive standards in many export markets. This makes it attractive for new entrants and at the same time deters even marginal players from exiting the market. This results in a highly competitive environment with lower degrees of market concentration than in many other key global markets. For vehicle manufacturers, this, in turn, confines them to very modest operating margins, which the Union Bank of Switzerland(UBS) calculates were well below 3% per year averaged over the last five years. High fixed costs and low margins mean that a period of falling vehicle sales can push companies into loss and require high reserves and access to finance. The current crisis is unprecedented in that the collapse in sales has been so severe and synchronised that all, not just a few marginal players, will be put into this position at a time when global capital markets are virtually closed.*

Impact on Production: *Vehicle production lagged the collapse in sales by a few months of 2008 as everyone was taken by surprise at the speed at which demand had contracted. By November, drastic action was clearly needed and the majority of Europe's assembly plants were idled for two or three weeks during December. Estimates for January suggest that production will be cut back by virtually 40%. Excessive inventory levels caused by the speed of market collapse have to be worked off and this will make the contraction output during early 2009 even more severe. Annualised production rates have fallen sharply and are already at lower levels than recorded back in the 1992/3 recession (and are in fact at levels last seen in the mid-1980s). After a 6% decline in 2008, forecasts for EU-wide production in 2009 are for a further 14% drop during 2009, making a 20% slump over two years. (These forecasts already account for various market support measures that had been announced by 27 January).*

In fact, the annual figures mask a deeper and more immediate volume crisis for the industry. Fourth-quarter 2008 production fell by 25%; all indications are that it will contract by a sharper 30% during the first quarter of this year and probably by more than 20% during the second quarter. This means that manufacturers, suppliers, and dealers will have to survive through a sustained period of at least three consecutive quarters where, on average, one quarter of their business volumes will have disappeared.

Industry response observed in the first quarter of 2009: *In order to preserve cash, vehicle manufacturers have already begun delaying new model launches previously planned for 2009 and some projects have been cancelled or indefinitely postponed. Capital expenditure plans have been reduced. So far in this crisis, no announcements have been made of major assembly plant closures, although we see this changing in the coming months as part of company-specific restructuring. The most obvious, widespread, and visible reaction from the vehicle manufacturers so far has been to move to short-time working, to lay off temporary and contract workers, and to close down assembly plants for extended periods.*

The following table shows announcements of plant closures and numbers of equivalent plant days lost as at 10 February covering the period between October 2008 and March 2009.

Fig. 2 TABLE FROM EUROPEAN PAPER APRIL 2009

Temporary Shutdowns at Europe's major Vehicle Assembly Plants			
Announced Shutdowns in Plant Days or Day Equivalents During Q4 2008 and Q1 2009			
Manufacturer	**Country**	**Plant**	**Shutdown Period**
Renault	Spain	Palencia	15 days
		Valladolid	30 days
		Avila	30 days
	France	Mauberge	7 days
		Flins	20 days
		Sandouville	23 days
		Douai	11 days
	Romania	Pitesti	42 days
	Slovenia	Novo Mesto	9 days
BMW	Germany	Dingolfing	16 days
		Munich	8 days
		Regensburg	25 days
		Leipizig	12 days
	United Kingdom	Oxford	41 days
		Goodwood	22 days
Daimler	Germany	Bremen	34 days
		Sindelfingen	28 days
		Dusseldorf	26 days
		Rasttat	26 days
Fiat	Italy	Cassino	52 days
		Melfi	45 days
		Mirafiori	54 days
		Pomigliano	59 days
		Termini	67 days
	Spain	Valladolid (Iveco)	9 days
Ford	Belgium	Genk	23 days
	Germany	Saarlouis	6 days
		Cologne	5 days
	Spain	Valencia	10 days
	United Kingdom	Southampton	27 days
	Sweden	Torslanda	28 days

Source: IHS Global Insight.

Fig. 3 TABLE FROM EUROPEAN PARLIAMENT PAPER APRIL 2009

Temporary Shutdowns at Europe's major Vehicle Assembly Plants			
Announced Shutdowns in Plant Days or Day Equivalents During Q4 2008 and Q1 2009			
Manufacturer	**Country**	**Plant**	**Shutdown Period**
GM	Germany	Bochum	34 days
		Eisenach	42 days
	Spain	Zaragosa	24 days
	United Kingdom	Ellesmere Port	34 days
	Poland	Gliwice	40 days
	Sweden	Trollhatan	7 days
Honda	United Kingdom	Swindon	52 days
Hyundai	Czech Republic	Nosovice	13 days
Nissan	United Kingdom	Sunderland	39 days
PSA	Spain	Vilaverde	5 days
		Vigo	26 days
	France	Hordain	33 days
		Mulhouse	23 days
		Poissy	57 days
		Rennes	37 days
		Sochaux	48 days
Toyota	France	Valenciennes	34 days
	United Kingdom	Derby	19 days
VW	Czech Republic	Kvasiny	14 days
		Mlada Boleslav	20 days
		Vrchlabi	13 days
	Slovakia	Bratislava	3 days
	Germany	Ingolstat	14 days
		Neckarsulm	9 days
		Wolfsburg	19 days
	Spain	Martorell	15 days
		Pamplona	11 days
	United Kingdom	Crewe	40 days
	Hungary	Gyor	20 days
	Poland	Poznan	13 days
	Portugal	Autoeuropa	26 days
Source: *IHS Global Insight Plant Monitoring, Company Announcements*			

NB: The interesting point to note from the tables above is the extent of the shutdown suggested by the actions taken in early 2009, compared with the actual real impact felt by the end of 2009, which we examine in more detail in Chapter 3.

1.1.1 Global Economy 2008

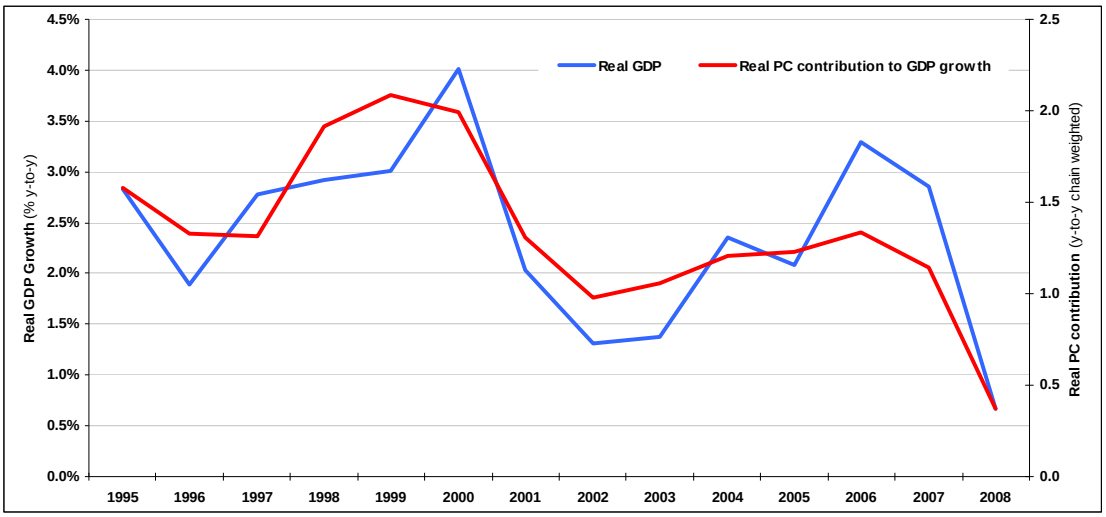
1.1.1.1 EU Level

The EU recession deepened substantially in the fourth quarter of 2008, such that the annual growth rate of real GDP for the EU-25 was limited to 0.7% in 2008 compared with 2.9% in 2007.

A combination of several factors caused a severe blow to economic activity across the EU. We witnessed a heightened level of turmoil in the financial sector (a number of European banks had to be rescued or helped by the authorities), very tight credit conditions, and a strong euro. These factors came in addition to relatively elevated oil, food, and commodity prices, far higher interest rates than in recent years, and much lower equity prices. Labour markets also weakened markedly, thereby countering the boost to purchasing power that came from sharply moderating inflation.

Consequently, consumer and business confidence stood at a record 24-year low in December 2008, undermining the prospects for investment, employment, and consumer spending. As Fig. 4 shows, a drastic reduction in Private Consumption (PC) growth (0.7% in 2008 instead of an average of 2.0% over the past four years) was the major cause of the economic slowdown in 2008: the contribution of real private consumption to GDP reduction reached 0.37 points in 2008, which accounted for more than half of the GDP decrease.

Fig. 4 EU-25 REAL GDP GROWTH AND CONSUMPTION CONTRIBUTION TREND 1994–2008



Source: IHS GLOBAL INSIGHT.

1.1.1.2 Member State Market Level Comparisons

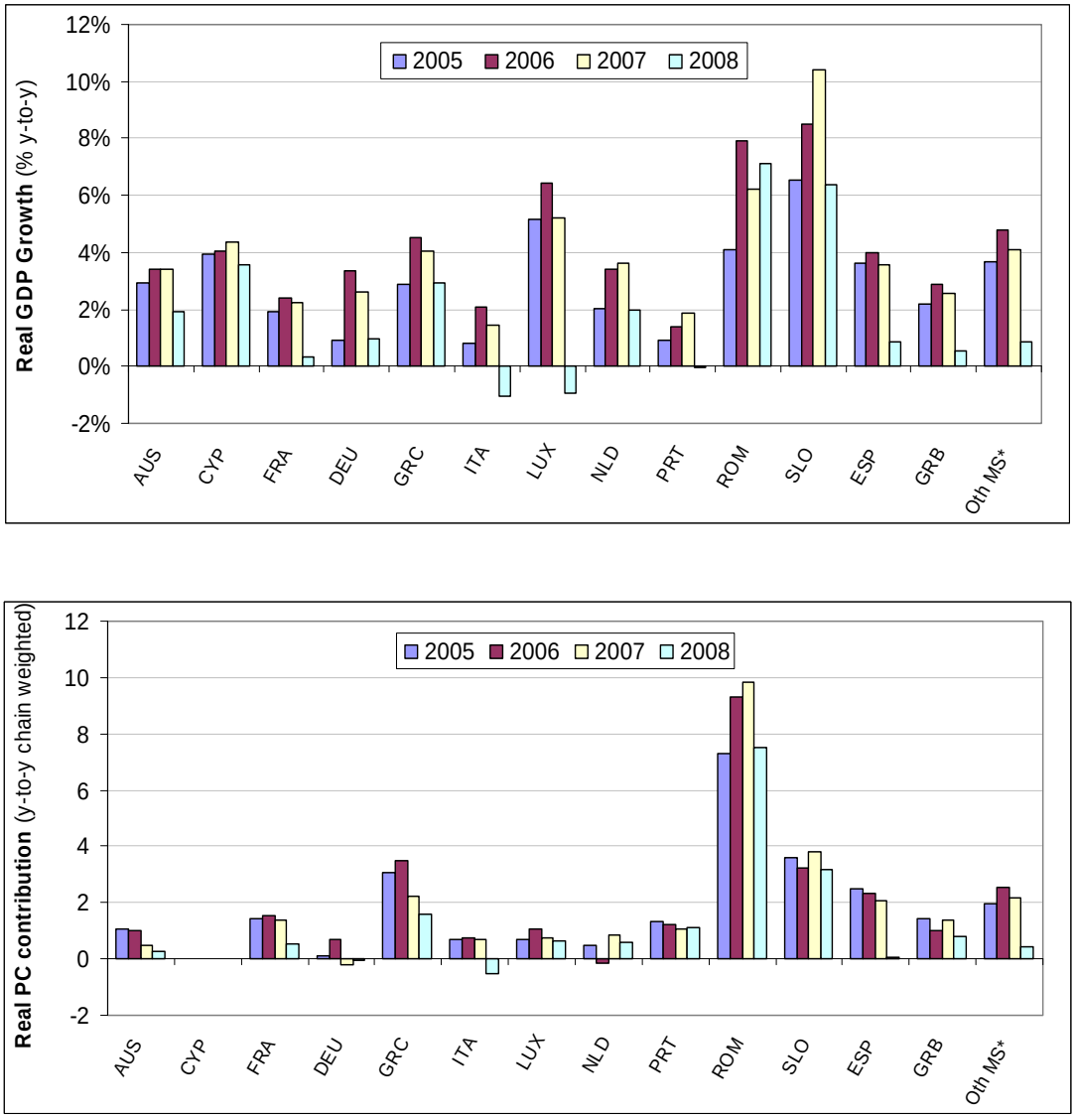
Several European economies (Germany, Italy, and France) suffered contraction in the third quarter of 2008, thus leading to recession.

The liquidity and credit outlook dramatically deteriorated at the end of 2008. Significant corrections in overvalued housing markets in Spain and Ireland hit the rest of the economy hard and this phenomenon also happened, to a lesser extent, in countries such as Denmark, Sweden, the Netherlands, and France.

The GDP for all EU countries (except for Romania) registered a strong slowdown in 2008 and for some (Italy and Luxembourg) a net decrease. In part, low private consumption contributed to this situation. In some

cases, for example in Germany and Italy, the reduction in private consumption impacted strongly on GDP growth.

Fig. 5 MEMBER STATES REAL GDP GROWTH AND PRIVATE CONSUMPTION CONTRIBUTION TREND 2005–08



** Belgium, Bulgaria, Denmark, Estonia, Finland, Latvia, Lithuania, Malta, Slovenia, Sweden.*

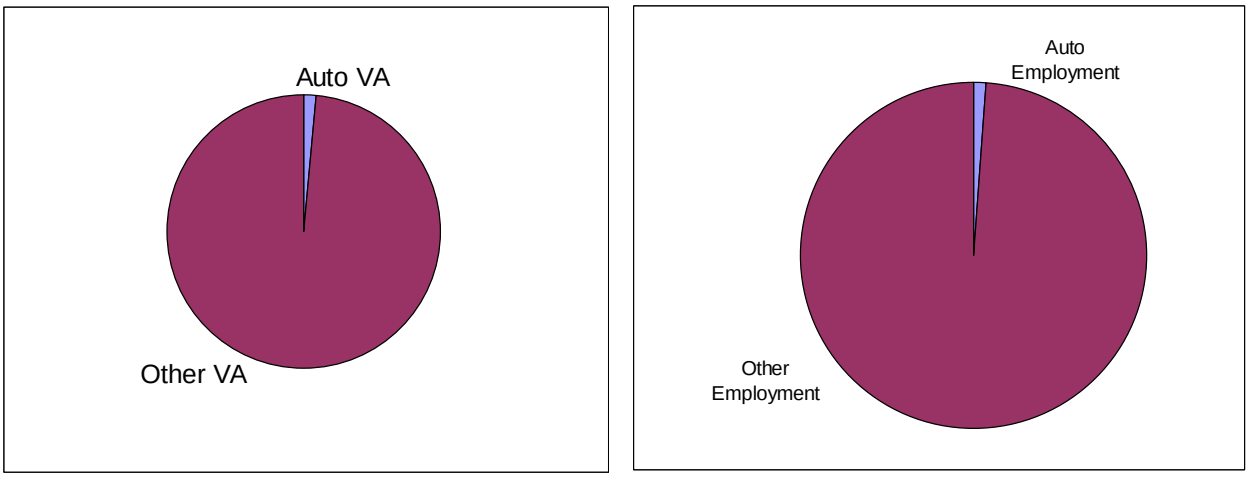
Source: IHS GLOBAL INSIGHT.

1.1.2 Automotive Industry

The data here refer to the ISIC rev 3 classifications and concentrate on the Motor Vehicles (MV) classification (D341: vehicles; D342: trailers) and parts and accessories (D343). The ISIC classification for D341 represents all vehicles, therefore encompassing passenger cars and light commercial vehicles. We define the automotive industry as the overall D34 classification. The values are expressed in 2005 real adjusted euro. Gross output is defined as the total revenue generated by a sector of an economy. It includes exports of the domestic production, but excludes imports.

If we look only at the weight of the European automotive industry on the total economy, its importance is relatively small, less than 1% for value added and for employment in 2008. These figures do not take into account, however, the automotive value chain. According to the Organisation for Economic Co-operation and Development (OECD), the multiplier effect from the automotive industry to the rest of the economy is estimated to be close to three times in G7 countries.

Fig. 6 VALUE ADDED AND EMPLOYMENT SHARE OF THE AUTOMOTIVE INDUSTRY IN 2008 (%; REAL M INFLATON-ADJUSTED EURO)



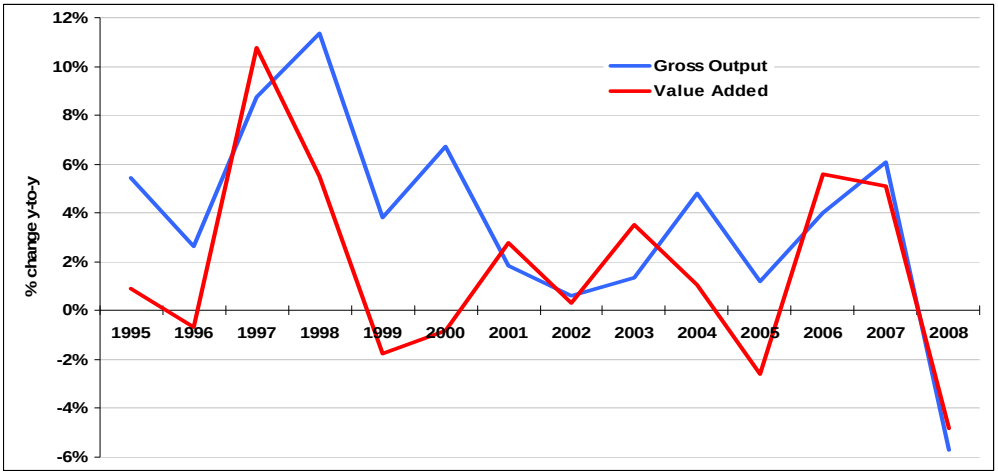
1.1.2.1 EU Level

VALUE ANALYSIS

The 2008 crisis had a deep impact upon the European automotive industry, plunging the industry into a turmoil that had not been seen since 1997. Motor vehicle gross output fell by 5.7% to €494 billion in 2008, inevitably impacting value added (-4.8%).

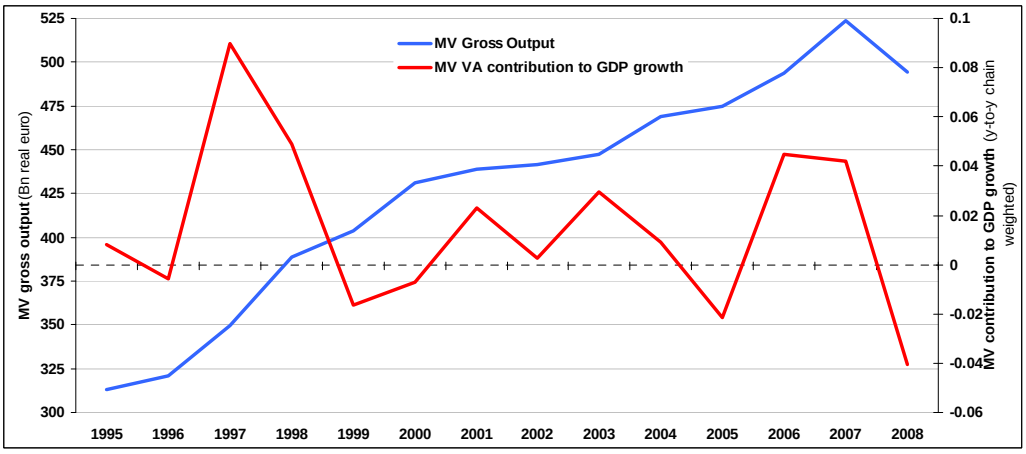
This decline, after a long trend of growth, also had a sharp impact on EU GDP growth during the last month of 2008, as the European MV value-added fall contributed -0.26 points to the GDP reduction, the most negative influence seen for 10 years (Fig. 8).

Fig. 7 MOTOR VEHICLE GROSS OUTPUT AND VALUE ADDED TREND 1995–2008



Source: IHS GLOBAL INSIGHT.

Fig. 8 MOTOR VEHICLES GROSS OUTPUT CONTRIBUTION TO GDP GROWTH TREND 1995–2008



Source: IHS GLOBAL INSIGHT.

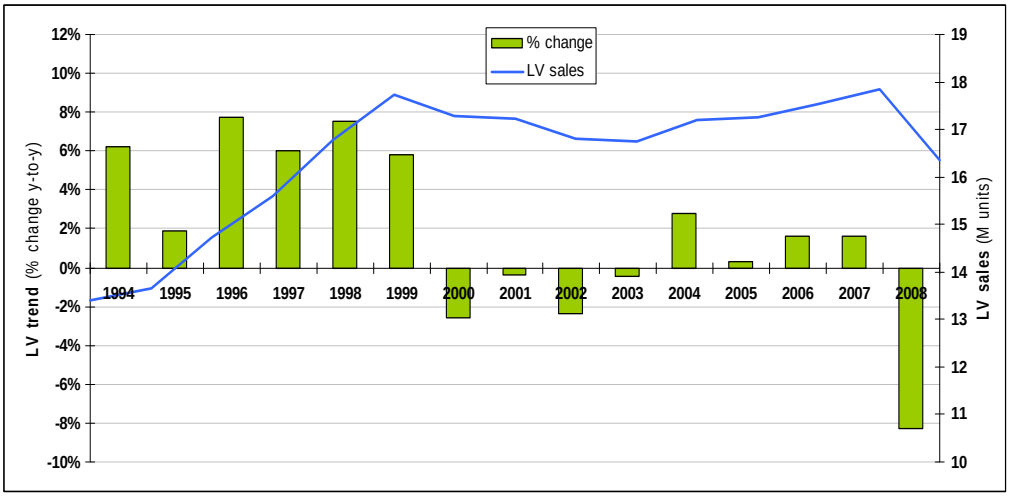
VOLUME ANALYSIS

During 2008, dramatic economic deceleration hit car demand hard and fast, affecting mature and emerging markets alike across the European car market. Many OEMs moved to cut back second-half 2008 production in order to avoid distress-selling vehicles into an ultra-soft European market.

The highly synchronised nature of the collapse in Europe was completely without precedent and the simultaneous crash in vehicle sales sent selling rates (SAAR) in many markets to lows not seen for two decades.

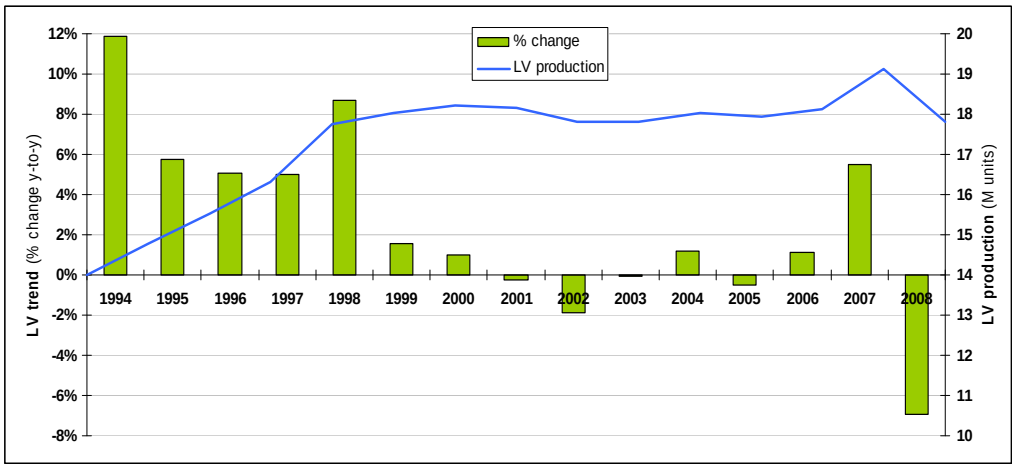
It is clear, however, that global sales slumped at an even faster rate and so it is no surprise that output was unable to fully adjust to lower sales, let alone adjust even further down to the far lower trajectory of sales of a recession.

Fig. 9 LIGHT VEHICLES SALES TREND 1994–2008



Source: IHS GLOBAL INSIGHT.

Fig. 10 LIGHT VEHICLES PRODUCTION TREND 1994–2008



Source: IHS GLOBAL INSIGHT.

Unemployment has risen sharply in the EU, since its low level in March 2008, as a result of the economic crisis. According to a report by the European Commission[1], the negative impact on labour markets touched initially Spain and the United Kingdom and then rose rapidly across all member states. Employment growth in the EU declined to 1% in 2008, compared with 1.8% in 2007; this still remained at a relatively high rate reflecting the fact that labour markets usually respond with some delay to economic downturn, and many industries, such as the automotive industry, use flexible work arrangements and temporary lay-offs including forced holidays in order to minimise permanent job losses. In 2008, the unemployment rate finished at 7%, the same as 2007, which stopped the decline in unemployment observed since 2004.

[1] European Commission, Employment in Europe 2009.

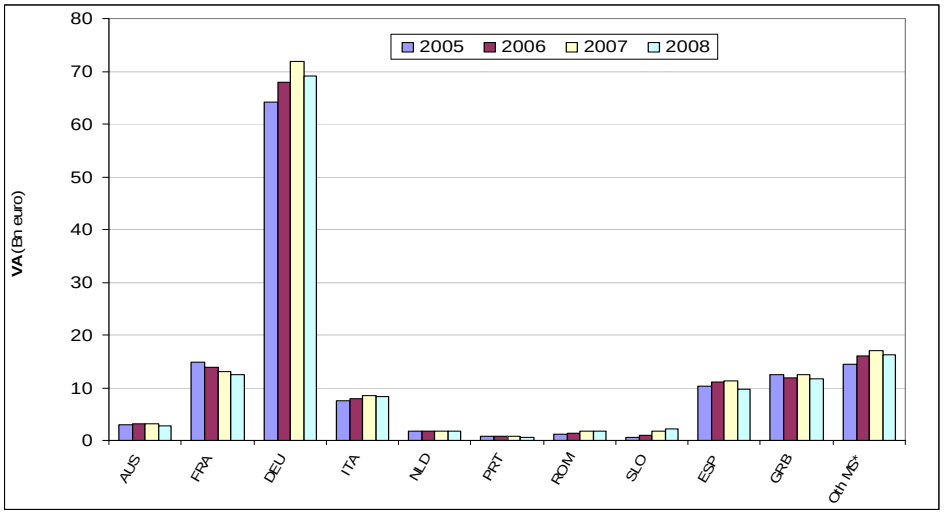
The impact of the crisis in terms of company restructuring has been severe in the automotive industry as Eurofound reported[2]: the car sector accounts for the largest share of restructuring job losses reported in the last quarter of 2008. In addition, short-term working, shift reductions, and temporary plant closures were endemic in the industry across Europe at the end of 2008.

1.1.2.2 Member State Market Level Comparisons

VALUE ANALYSIS

Germany is the main contributor to the value added of the European automotive industry with 50% of EU-27 in 2008. The share of the Big Five reduced by three points, however, from 2005 onwards, to reach 80% in 2008—these markets in particular were strongly impacted by the crisis—to the benefit of NMS such as Slovakia and Poland.

Fig. 11 EUROPEAN COUNTRY MOTOR VEHICLE PRODUCERS VALUE ADDED TREND 2005–08 (M REAL-INFLATION ADJUSTED EURO)



** Belgium, Bulgaria, Denmark, Estonia, Finland, Latvia, Lithuania, Malta, Slovenia, Sweden.*

Source: IHS GLOBAL INSIGHT.

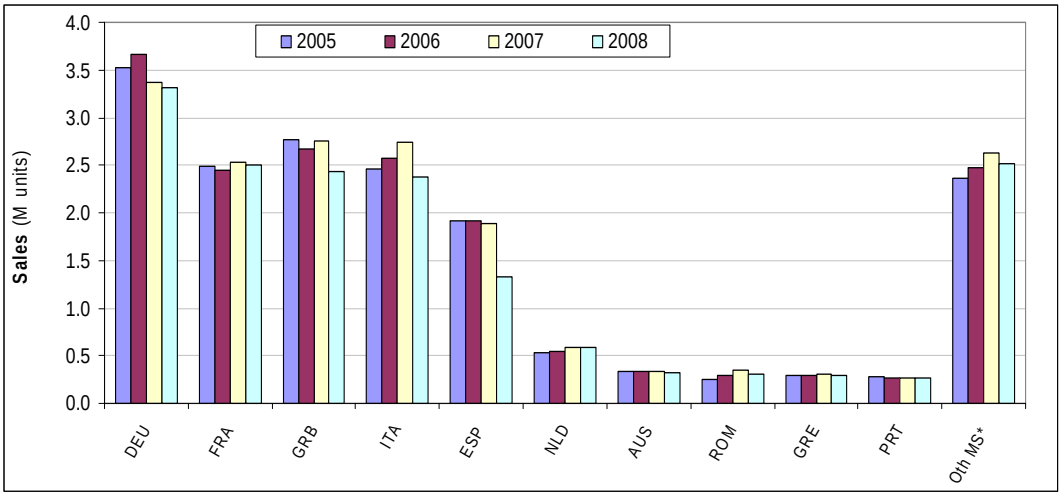
VOLUME ANALYSIS

As ever, the EU light vehicle demand picture remained diverse in terms of market performances, with France and Germany tending to absorb the crisis (with declines in growth rate of 0.7% and 1.7%, respectively, in 2008), while Spain, Italy, and the United Kingdom experienced significant demand slumps (declines of 29.8%, 13%, and 11.6%, respectively). As the Big Five markets accounted for around 74% of EU light vehicle sales and 75% of EU production, these trends carried substantial weight on the sales evolution in Europe.

Other smaller markets registered even greater falls (e.g. Ireland, Denmark, Sweden, and Romania). Only a few of the smaller markets saw a rise in new vehicle sales for 2008 (Poland and Finland with almost 9%).

[2] Eurofound, "Recent restructuring trends and policies in the automotive sector", 2009.

Fig. 12 LIGHT VEHICLE SALES BY EUROPEAN COUNTRY TREND 2005–08

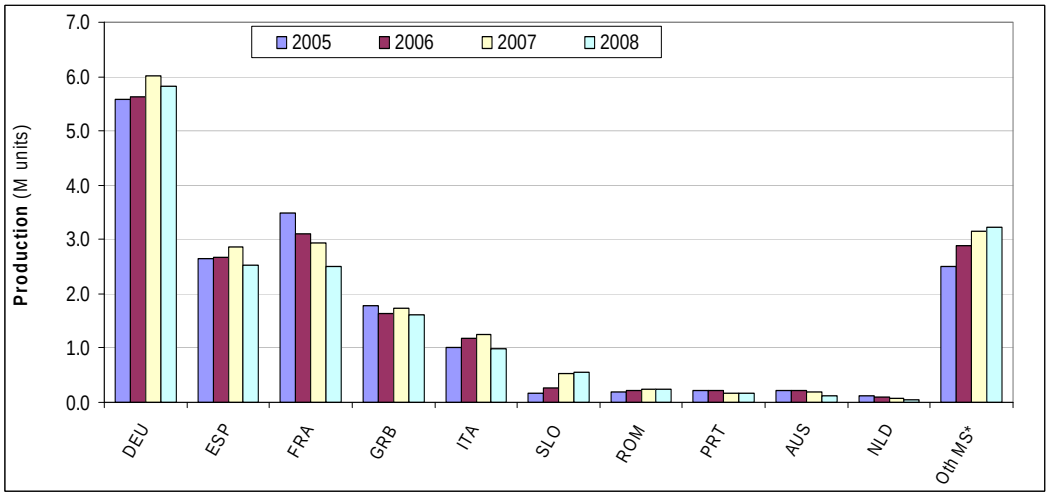


** Belgium, Bulgaria, Denmark, Estonia, Finland, Latvia, Lithuania, Malta, Slovenia, Sweden.*

Source: IHS GLOBAL INSIGHT

The light vehicle production of Big Five countries, which accounted for 77% of European production, decreased by 9% in 2008, with Italy, France, and Spain registering double digit declines of 20%, 15%, and 12%, respectively.

Fig. 13 LIGHT VEHICLE PRODUCTION BY EUROPEAN COUNTRY TREND 2000–08



** Belgium, Bulgaria, Denmark, Estonia, Finland, Latvia, Lithuania, Malta, Slovenia, Sweden*

Source: IHS GLOBAL INSIGHT

1.2 EUROPEAN ENVIRONMENT AND SAFETY SITUATION PREVIOUS SCRAPPING SCHEMES

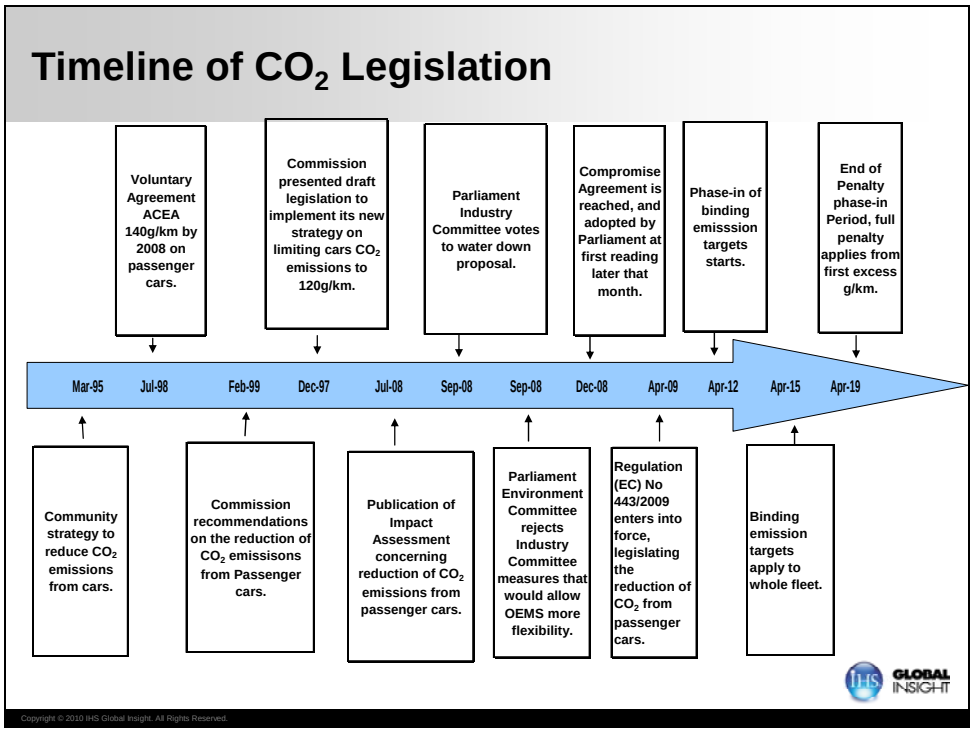
1.2.1 Environmental Legislation Context in Europe

The EU started taking a leading role in reducing the effects of car use on the environment, particularly in relation to global warming and CO_2 emissions, with the mandatory CO_2 framework in Regulation (EC) No 443/2009, which sets binding emission targets. According to the regulation, all new vehicles registered in the EU after 2012—whether produced domestically or imported—will have to respect a "limit value curve of

permitted CO_2 emissions", based on their weight. So this new regulation is effectively putting pressure on the OEMs to market light vehicles that have low CO_2 emission values and are fuel efficient.

Before these binding targets, the industry had committed itself in 1998 by means of a voluntary agreement through ACEA, the vehicle manufacturers association, to reduce CO_2 emissions caused by vehicles. This voluntary commitment had the following objective: average CO_2 emissions of 140g CO_2/km for new light vehicles sold in the EU by 2008. In other words, the fleet of new light vehicles put on the market in 2008 should consume on average about 5.8 litres gasoline (petrol)/100km or 5.25 litres diesel/100km. This voluntary agreement did not achieve the results, however, due to a variety of factors, and consequently the Commission pursued binding legislation, which was finalised in 2009. The mandatory CO_2 framework regulation will now firmly drive the market, as vehicle manufacturers that miss their allocated CO_2 compliance targets will be heavily fined.

Fig. 14 TIMELINE OF CO_2 AND FISCAL POLICY LEGISLATION



Source: IHS GLOBAL INSIGHT.

Penalties for missing the mandatory CO_2 framework targets were due to apply between the phase-in dates, 2012 to 2015, but the compromise agreement that was reached introduced a delayed phase-in period for the fines. Therefore, the manufacturers will now pay lower penalty payments for small excess emissions beyond the target from 2012 to 2018. From 2019, the manufacturer will pay the full penalty premium of €95 per gram per kilometre that exceeds the target.

Fig. 15 EU MANDATORY CO_2 FRAMEWORK REGULATION

Regulation	Date	Comments
Final Regulation EC and EP (LIMITE) agreed 3 Dec 2008, "Regulation (EC) No 443/2009" enters into force in April 2009.	2012–15	• Limit Value curve based on vehicle mass—130g for industry average. • Mass recalculated based on test weight not kerb weight. • Slope of curve set at 60% option (as assumed last year). • Fleet Phase to comply: o 2012: 65% of all new cars from each manufacturer; o 2013: 75%; o 2014: 80%; o 2015+: entire fleet. • Penalty Phase-in: o 2012–18: €5 for the first average g/km exceeded, €15 for the second, €25 for the third g/km, and €95 for each subsequent g/km. o From 2019 onwards, the premium will be €95 from the very first gram per kilometre exceeding the target. • Super-credits for vehicles under 50g/km until 2016. • Niche producers under 300,000 units have block 25% reduction target. • Specialist brands with own production and design centres under 10,000 units can have individual targets set. • Specific eco innovations are given itemised credits up to 7g. • Flex fuel E85 given special break of 5% until end-2015 under certain conditions of sustainability and pump availability. • Cross company 'Pooling' will be allowed
EU Mandatory Framework—Future Outlook	2016–20	• Long-term target of 95g/km from 2020 (105 g/km for OEM targets). • Limit value curve probably recalculated based on FOOTPRINT from 2020 (EU report on this due during 2014). • Possible change in European test cycle after 2016 to include innovative eco technologies. • Mass figure used to be recalculated for 2016.

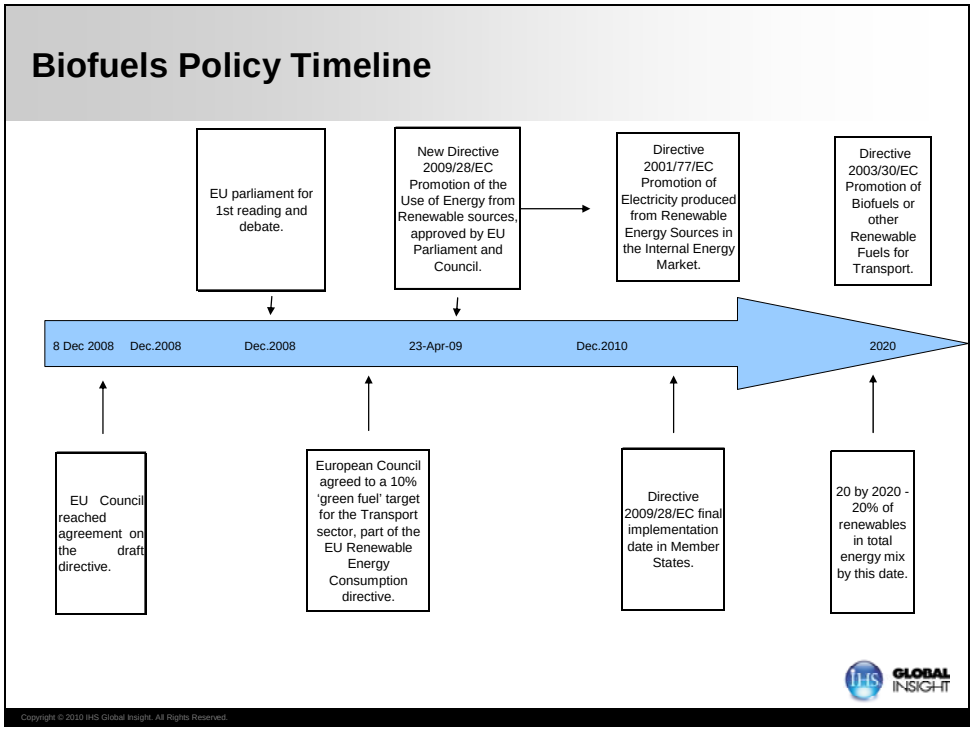
Source: IHS GLOBAL INSIGHT /European Commission.

BIOFUELS—EUROPEAN POLICY

Biofuels have come under fire due to concerns over sustainability criteria, land shift from food production to biofuels, and their "true" Greenhouse Gas (GHG) savings. The push to create targets just for biofuel market share has slowed, with the Commission instead pushing renewables targets e.g. '20 for 2020 commitment'—20% of renewables in the total energy mix for 2020. The EU Council reached an agreement on a new draft directive for biofuels in early December 2008. This directive was passed to the European Parliament for first reading and debate later the same month, and was approved by the European Parliament and Council on 23 April 2009, to be implemented in member states by December 2010.

In December 2008, the European Council agreed to a 10% 'green fuel' target for the transport sector, which formed part of the EU Renewable Energy Consumption directive. In this context, 'Green Fuel' means biofuels, hydrogen, and green electricity—not just 10% biofuels as was previously drafted. The biofuels element will have more stringent requirements such as offering a minimum 35% carbon emission savings compared with fossil fuels. This target rises to 45% in 2013, 50% in 2017, and, beyond 2017, the target rises to 60%. An important factor in the sustainable use of biofuels—land use criteria—has not yet been defined more clearly although a proposal has been called for in 2010.

Fig. 16 BIOFUELS LEGISLATION TIMELINE



Source: IHS Global Insight /European Commission.

1.2.2 History of CO_2 Average Emissions—Evolution 1995–2007

The table in Fig. 17 shows the evolution of average CO_2 emissions for the EU 15 and specifically the market states with scrapping schemes in operation in 2009. The second table below in Fig. 18 shows the average CO_2 emissions for the member states where a scrapping scheme was under discussion during 2009.

Fig. 17 AVERAGE CO_2 EMISSIONS EVOLUTION FOR MEMBER STATES WITH A SCRAPPING SCHEME

Gram CO_2/km (1)	EU15	PT	IT	FR	SK	ES	AT	IE	NL	UK	DE	RO	LU	CY	GR
1995 (2)	186	172	180	177		177	186	180	188	192	195		197		
2007 (3)	158	143	146	148	151	152	162	160	164	164	168	154	165	169	165

1) Weighted averages based on data for diesel and gasoline (petrol) vehicles.

2) For 1995, data as delivered by Associations; no data in 1995 for Greece, the EU 10, and the EU25.

3) For 2007, official EU data are displayed sourced from the official Report from the European Commission of monitoring data.

Source : Communication from the Commission to the Council and European Parliament monitoring the CO_2 emissions from cars in the EU, data for the years 2005, 2006, and 2007 Brussels 27.1.2009 COM(2009) 9 Final.

Fig. 18 AVERAGE CO_2 EMISSIONS FOR MEMBER STATES WITH A SCRAPPING SCHEME UNDER DISCUSSION

Gram CO_2/km (1)	EU15	CZ	HU	PL
1995 (2)	186			
2007 (3)	158	153	154	153

1) Weighted averages based on data for diesel and gasoline (petrol) vehicles.

2) For 1995, data as delivered by Associations; no data in 1995 for Greece, the EU 10, and the EU25.

3) For 2007, official EU data are displayed sourced from the official Report from the European Commission of monitoring data.

Source: Communication from the Commission to the Council and European Parliament monitoring the CO_2 emissions from cars in the EU, data for the years 2005, 2006, 2007 Brussels 27.1.2009 COM(2009) 9 Final.

1.2.3 Summary of CO_2 Situation in Europe at 2008

The table in Fig 19 below shows the average CO_2 emissions by member state for the EU26 for 2008 and 2007, displaying the year-on-year improvement and each state's ranking for 2008 (left-hand-side column) compared with the ranking the previous year. These data were initially published by the organisation Transport and Environment (T&E) in September 2009. The source data we have used for this table, however, are from the official European Commission CO_2 monitoring mechanism database, which was published in a report in January 2010.

It should be noted that the geographical coverage of the report covers the EU26, and excludes Bulgaria. The omission of Bulgaria, however, represents substantially less than 1% of total 2008 sales in the EU27.

Fig. 19 AVERAGE CO_2 EMISSIONS IN EU26

	Registrations 2008 (1,000)	Average CO_2 2008	Average CO_2 2007	Improvement 2007-2008	Rank 2007
1. Portugal	215	138.2	144.2	-4.2%	1
2. France	2.037	140.1	149.4	-6.2%	4
3. Italy	2,162	144.7	146.5	-1.2%	2
4. Denmark	146	146.4	159.8	-8.4%	13
5. Malta	5	146.9	147.8	-0.6%	3
6. Belgium	536	147.8	152.8	-3.3%	6
7. Spain	1,045	148.2	153.2	-3.3%	7
8. Slovakia	97	150.1	152.7	-1.7%	5
9. Poland	302	153.1	153.7	-0.4%	8
10. Hungary	163	153.4	155.0	-1.0%	11
11. Czech Republic	134	154.4	154.2	0.1%	9
12. Slovenia	71	155.9	156.3	-0.3%	12
13. Romania	285	156.0	154.8	0.8%	10
14. Ireland	151	156.8	161.6	-3.0%	14
15. The Netherlands	481	157.9	164.8	-4.2%	16
16. Austria	294	158.1	162.9	-2.9%	15
17. United Kingdom	2,084	158.2	164.7	-3.9%	17
18. Luxembourg	52	159.5	165.8	-3.8%	19
19. Greece	276	160.8	165.3	-2.7%	18
20. Finland	137	162.9	177.3	-8.1%	23
21. Germany	3,044	164.8	169.5	-2.8%	20
22. Cyprus	24	165.6	170.3	-2.8%	21
23. Lithuania	21	170.1	176.5	-3.6%	22
24. Sweden	248	173.9	181.4	-4.1%	24
25. Estonia	24	177.4	181.6	-2.3%	25
26. Latvia	19	180.6	183.5	-1.6%	26
Total / Average	13,957	93.1	95.8	-2.8%	

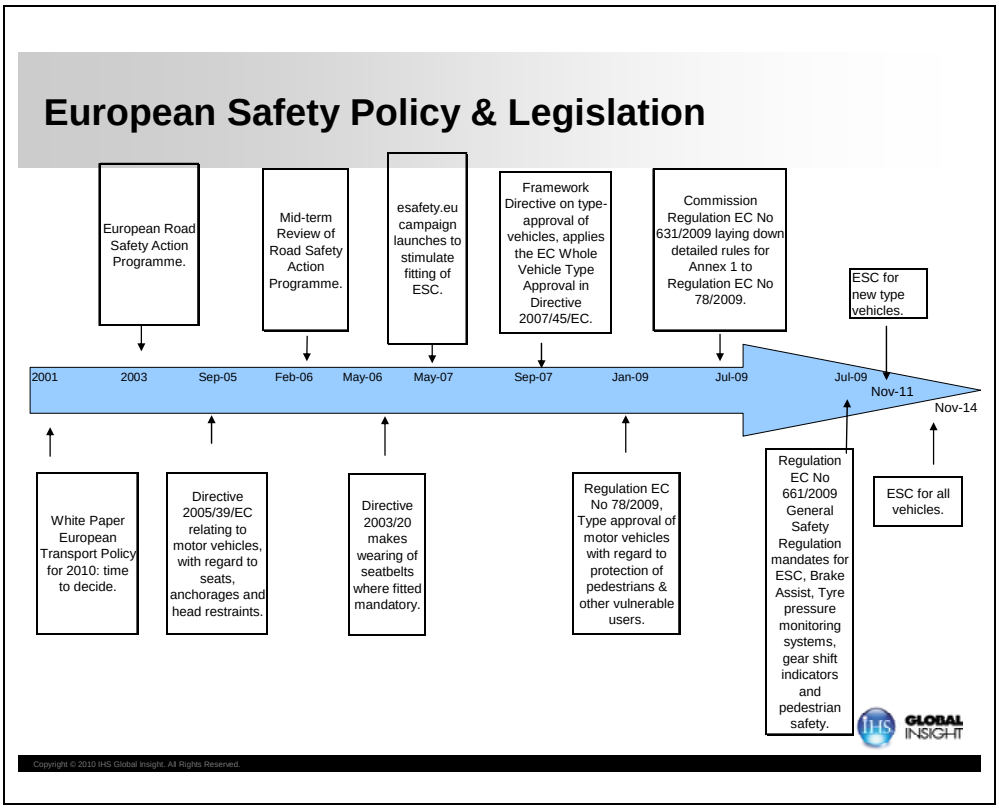
Source: European Commission Report to the European Parliament and Council, monitoring the CO_2 emissions from new passenger Cars in the EU, data for the year 2008, published January 2010.

1.2.4 Automotive Safety Context in Europe

1.2.4.1 European Legislation

On top of funding initiatives from the European Commission to support R&D in the area of road safety, especially towards passive and active safety technologies, the EU has also embraced policy and regulation as part of a wider road safety campaign. Legislation adopted in recent years has sought to enhance the safety standards of passenger cars, firstly through improvements to vehicle design that limit damage to pedestrians from vehicular impact in the event of a crash, and secondly, through the adoption, and mandatory fitting of certain technologies.

Fig. 20 TIMELINE OF EUROPEAN SAFETY POLICY AND LEGISLATION



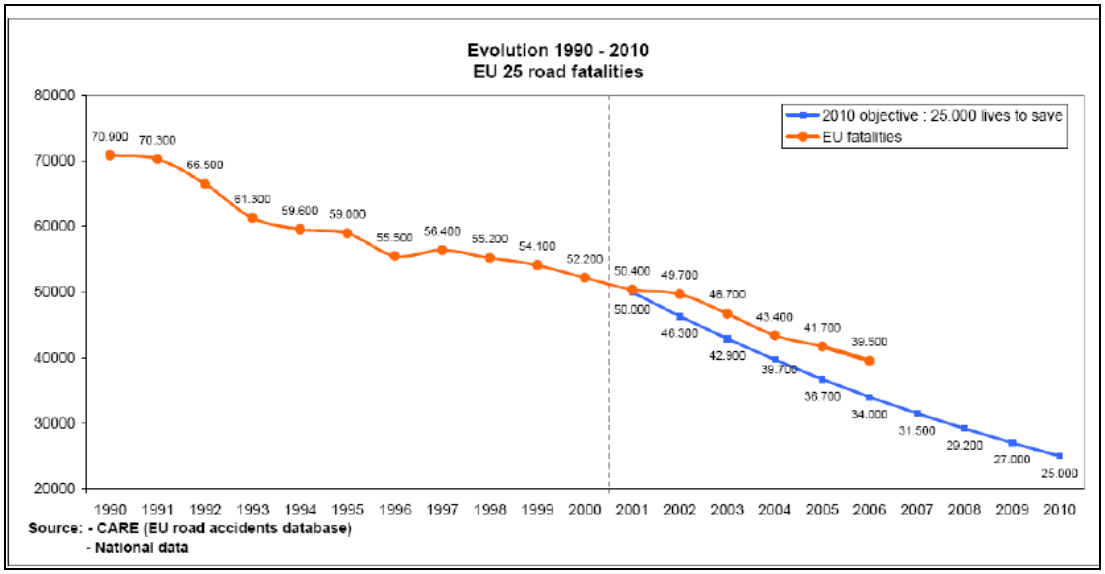
Source: IHS Global Insight /European Commission.

The EU Road Safety Policy, which started out as a White Paper on transport policy in 2001, featured a mid-term review published in February 2006 and adopted on 22 June 2006. According to this mid-term review of the Road Safety Action Programme, fatalities in the EU-25 were reduced by 21.8% between 2001 and 2006. The White Paper set the ambitious aim of halving the number of road traffic fatalities by 2010. The 2003 European Road Safety Action programme[3] underlines the fact that the 50% target is a 'shared responsibility' and can only be achieved with the joint effort of all stakeholders.

Despite the reduction seen by 2006, the target of halving the number of deaths on the road by 2010 is still some way off. According to the mid-term review in 2003 by the European Commission, if the trend continues at the same rate, 32,500 people will die from road accidents in 2010, thus missing the 2010 goal of 25,000 deaths.

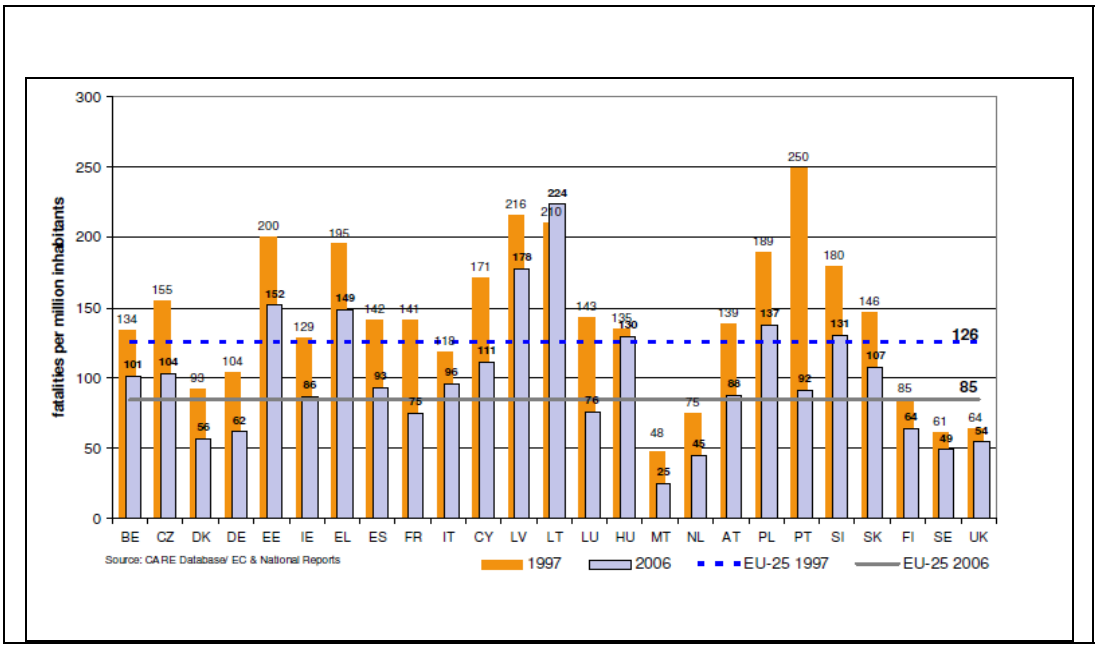
[3] COM(2003) 311 final - Not published in the Official Journal.

Fig. 21 EVOLUTION OF ROAD ACCIDENT FATALITIES IN THE EU-25 1990–2010



EU Legislation (Directive 2008/96) was adopted on 19 November 2008, and should be in force by 19 December 2010. A further commitment came in the shape of The European Road Safety Charter, a platform for good practices in road safety. The EU has invited member states to get European recognition for their road safety actions. Finally, during the course of 2009, the EU prepared the fourth European Road Safety Action Programme offering a longer term view from 2011–20.

Fig. 22 FATALITIES PER MILLION INHABITANTS BY MEMBER STATE, EU-25, 1997 V 2006



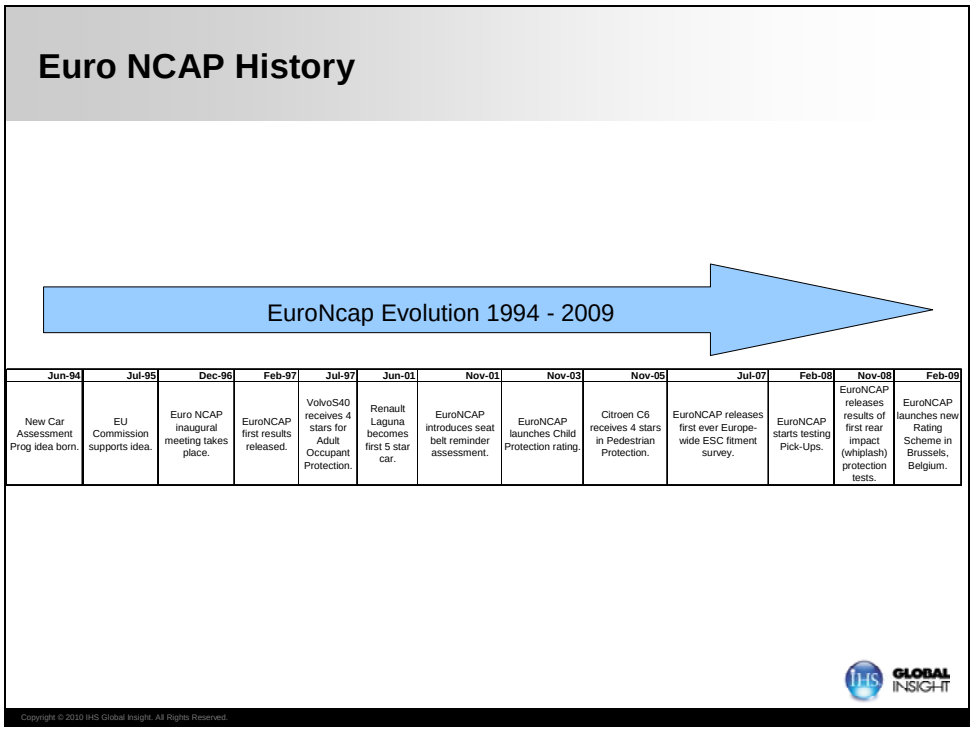
All of these policies and charters are part of a European commitment to reduce road accidents and improve road safety, to be able to reach the target of sustainable and safe road transport, envisioned by industry as well as the EU, for 2020.

Another, more recent driver with regards to road safety comes in the unlikely form of the insurance industry. The European insurance industry has now become an active stakeholder in researching the viability of automotive safety systems and co-operates closely with other stakeholders in an effort to provide incentives to insurance policy holders if they adopt automotive safety systems that could result in reduced risk and subsequent savings in insurance pay-outs.

1.2.4.2 The Role of the European New Car Assessment Programme (EuroNCAP)

EuroNCAP has played an important part in improving the penetration and fitting rates of safety equipment on the European vehicle fleet. The following chart shows the history of the EuroNCAP ratings together with key legislation developments on safety.

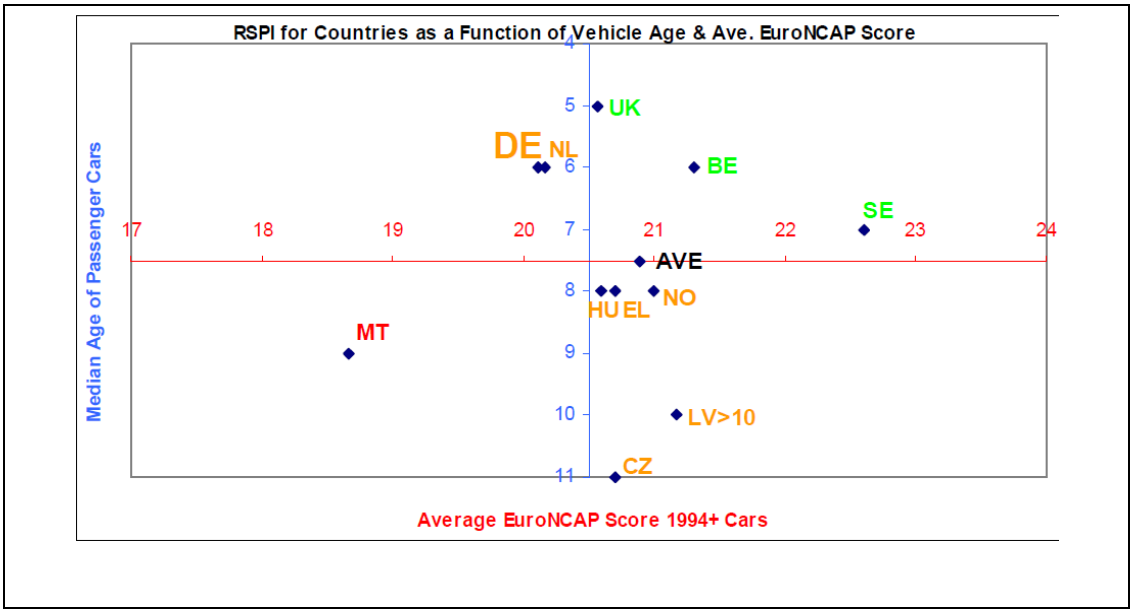
Fig. 23 HISTORY OF EURONCAP 1994–2009



Source: IHS Global Insight.

The following chart, from a project by SafetyNet detailing road safety performance indicators for country profiles, shows the average EuroNCAP score in a number of EU countries.

Fig. 24 AVERAGE EURONCAP SCORE—CARS 1994+



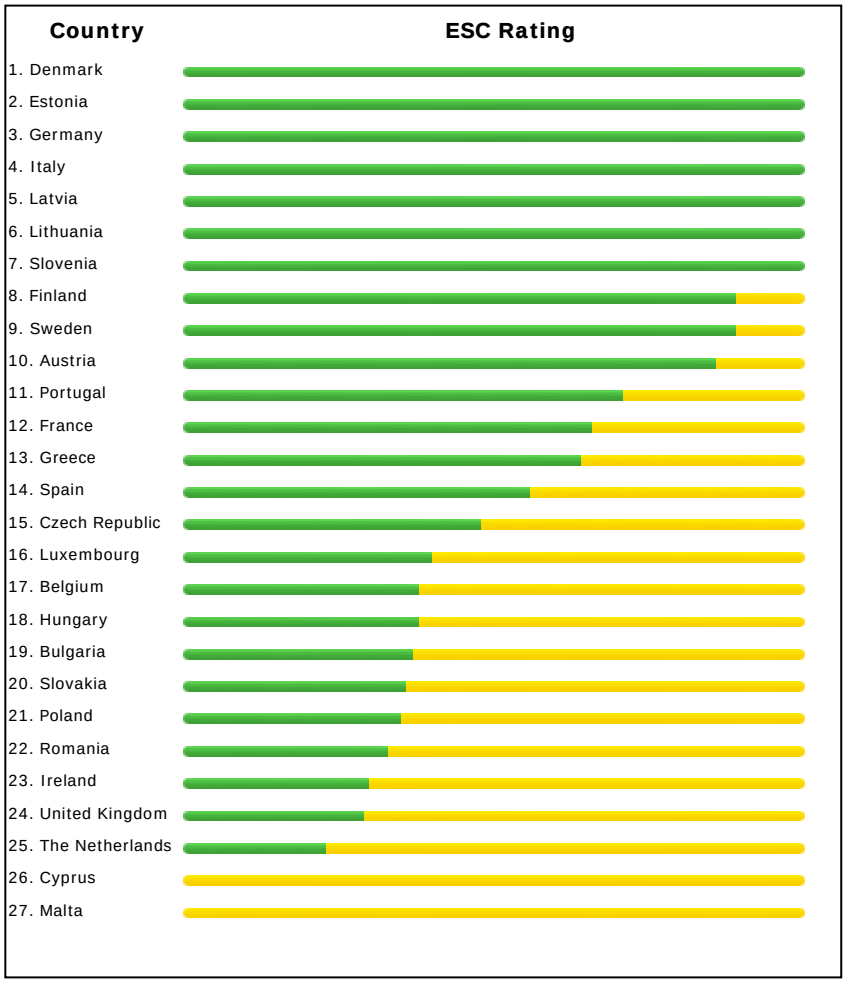
Source:SafetyNet D3.7b – Road Safety Performance Indicators, 2006.

Certainly, EuroNCAP has played a vital role in the introduction of ESC across Europe. In order to receive a 5-star safety rating from EuroNCAP, a vehicle must be equipped with ESC as standard.

Due to the effectiveness of ESC at reducing road accidents, the EU has mandated, in its regulation passed in March 2009[4], for ESC technology to be a compulsory fitment for all new light vehicles in the 2011–13 time frame, which will mean effectively 100% fitting of ESC from January 2014. As the EuroNCAP fitment rating chart below shows, there is some progress still to be made across Europe.

[4] *Regulation (EC) No 661/2009 General Safety Regulation.*

Fig. 25 ESC FITMENT RATING IN EUROPE (EU27) FROM EURONCAP



Source: IHS Global Insight.

Further data from Bosch provide a snapshot of the extent to which ESP (its ESC system) is fitted during the first half of 2009, for Europe and six major markets. Even in markets such as Germany and Italy, where ESC is available as standard, the installation rate by registration is 78% and 59%, respectively. Of course, much of this variation is linked to the segmentation of the market, and in a market such as Italy, where vehicles are typically in the A, B, and C segments, these vehicles would not necessarily be available yet with Bosch ESC.

Fig. 26 INSTALLATION RATE OF ESC, JAN–JUNE 2009

Source: Bosch.

EVOLUTION OF AVERAGE MILEAGE

Data collected by EuroNCAP indicates that, in 2009, drivers made three times more journeys per day than they did 20 years ago. Eurostat published data on distances covered by passenger cars between 1990 and 2004 for the EU25 and EU15, which support EuroNCAP's statement. Fig. 267 below shows the evolution of passenger kilometres by passenger cars over that period. It also shows the modal share of passenger cars as a % share of available means from passenger cars, buses and coaches, tram and metro, and railways. Passenger car modal share rises from 81% in 1995 to 83% in 2004.

Passenger kilometres by member state totalled around 4,458 billion passenger-kilometres (pkm) per year in the EU25 in 2004, led by Germany with a 19% share. Eurostat notes that for passenger car transport, any comparison between countries should be regarded as indicative due to the different data collection methods. Where car ownership has developed rapidly and where road networks have expanded quickly, we can see increased passenger kilometres travelled. See, for example, member states such as Lithuania (158%), Latvia (112%), and Greece (84%) against an EU25 average of 18%. Looking at the average number of kilometres per EU inhabitant is very interesting—by 2004, an estimated 9,748pkm was clocked up per person.

Fig. 27 COMPARISON OF PASSENGER KILOMETRES BY MEMBER STATE 1990—2004 (IN BILLION PASSENGER-KILOMETRES)

	1990	1995	2000	2003	2004	% change 1995-2004	pkm per person in 2004
EU-25	:	3 787	4 196	4 399	4 458	18%	9 748
EU-15	3 101	3 522	3 862	4 029	4 071	16%	10 624
BE	89	97	106	110	112	15%	10 737
BG	4.5	:	:	:	:	:	:
CZ	:	55	64	67	68	24%	6 617
DK	53	54	58	59	60	11%	11 167
DE	683	815	831	858	869	7%	10 528
EE	:	6	8	9	10	62%	7 105
IE	13	16	21	24	25	61%	6 207
EL	29	37	53	64	68	84%	6 159
ES	174	250	303	346	355	42%	8 380
FR	586	640	700	739	737	15%	12 212
IT	523	615	727	711	716	16%	12 370
CY	:	2	3	3	4	51%	4 792
LV	:	5	9	10	11	112%	4 571
LT	:	10	16	19	26	158%	7 487
LU	4	5	6	6	6	30%	13 508
HU	47	45	46	46	46	2%	4 591
MT	:	1	1	2	2	19%	3 876
NL	137	131	141	146	146	11%	9 004
AT	62	71	78	82	82	16%	10 092
PL	:	111	150	172	182	64%	4 752
PT	28	41	58	65	67	64%	6 396
RO	:	:	:	:	:	:	:
SI	10	12	15	16	16	31%	8 014
SK	:	18	24	25	24	35%	4 523
FI	51	50	56	60	61	22%	11 675
SE	86	87	92	96	97	12%	10 807
UK	588	618	640	673	678	10%	11 357
Modal share % *	:	81	82	83	83	-	-
IS	:	3.0	3.8	4.2	4.3	42%	14 802
NO	42.7	43.7	46.8	50.5	51.0	17%	11 133
CH	73.3	75.5	82.3	85.3	87.1	15%	11 831

Source: DG Energy and Transport

* Considered: passenger cars; buses and coaches; tram and metro; and railways.
Note: UK data refer to Great Britain only.

Source : Eurostat Panorama of Transport, 2006.

This average was exceeded in 10 member states, reaching as much as 13,500 passenger kilometres (pkm) in Luxembourg, followed by Italy and France with 12,400 pkm and 12,200 pkm per person respectively. This contrasts with other member states where car usage is clearly less vital, among which Malta ranks first with circa 3,900 pkm travelled per person. Interestingly, some other new member states such as Hungary, Slovakia, and Poland all display relatively low pkm per person in 2004, whereas if we took a measurement for 2008–09, we would likely see a large jump as their car ownership levels have increased. Additional data analysed by Eurostat in the Panorama of Transport indicate that in the EU25 in 2004, the average distance travelled per person on motorised transport was 36km per day, of which passenger car transport accounted for 27km. In our methodology to calculate the impact of the scrapping scheme on the environment, we used the assumptions featured in the Tremove model to ensure a consistency with other work done on this subject.

1.3 CONDITIONS FOR SCRAPPING SCHEMES APPLICATIONS

1.3.1 Drivers of Schemes

All government and industry sponsored car scrapping schemes implemented to date put improvement of the environmental performance of the car fleet among their main goals.

Two main types of scrapping schemes are used.

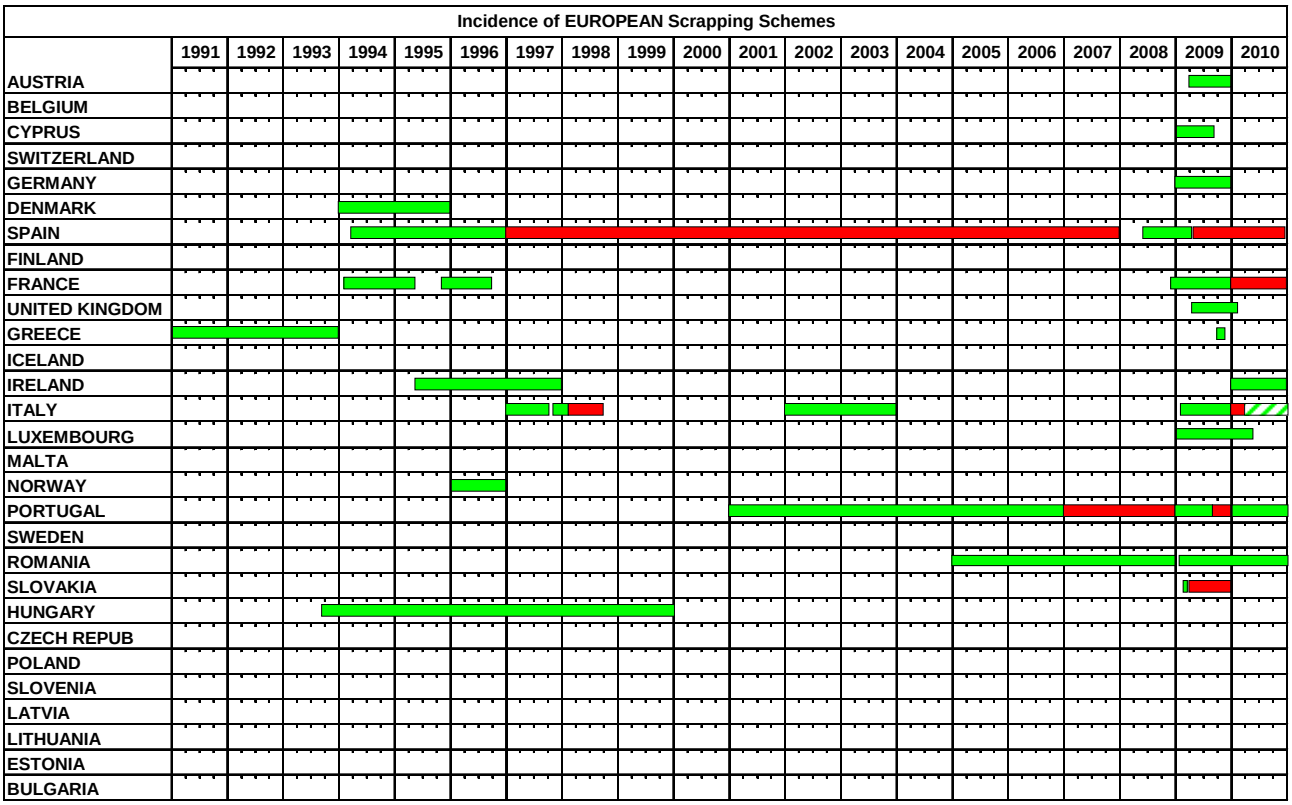
- Cash-for-replacement gives a bonus conditional upon a specific kind of replacement—typically, but not necessarily, a new model car.
- Cash-for-scrapping gives a certain reward for any scrapped car, whatever the subsequent replacement decision taken by the consumer. The bonus is awarded even if a replacement vehicle older than the scrapped one is purchased, or if no other cars are bought to replace the scrapped one.

In this study, we focus mainly on the first type of scheme 'cash-for-replacement', which operated in the majority of markets during 2009. There are two European markets that we report upon, Greece and the Netherlands, where the schemes could be considered in the 'cash-for-scrapping' category. In the case of Greece, during the short time the scheme operated, the purchaser was allowed to acquire a vehicle under both types of scheme.

1.3.2 Previous Scrapping Schemes

The tendency by governments to adopt scrapping schemes first started to gather momentum in the 1990s mainly in response to the economic downturn that took place then. First Greece adopted a scheme, followed by Hungary, then Spain, France, and Denmark. Spain is notable in its seemingly permanent adoption of a scrapping scheme from 1994 onwards, terminating in 2007, ahead of the renewal scheme that was launched in 2009 alongside the rest of its European neighbours. Portugal runs a close second in terms of adopting an ongoing renewal scheme, although its scheme has recently (2007) adapted itself to fall more in line with its contemporaries, by offering a sizeable purchase incentive and linking the new purchase to a specific requirement such as lower CO_2 emissions in the new vehicle.

Fig. 28 Timeline of Previous Schemes



Source: IHS Global Insight.

The context for scheme introduction has tended to vary by market. In some cases, the economic environment was a key reason, in others, the drivers were environmental, directed at improving emission reduction technology penetration in the vehicle parc. We briefly describe the varying scheme objectives below.

Fig. 29 Objectives of Previous Schemes

Country	Scheme Objectives
Greece	Environmental (increase use of catalytic converter, and improve air quality).
Hungary	Environmental (remove old 2-stroke cars, phase out leaded gasoline (petrol), improve air quality).
Denmark	Environmental (air quality and improved emissions).
Spain	Economic Stimulus (Renove) and Environmental.
France	Economic.
Ireland	Environmental (car parc renewal).
Norway	Environmental.
Italy	Economic Stimulus.
Romania	Environmental (car parc renewal).
Portugal	Environmental (End-of-Life Vehicle Directive).

Source : IHS Global Insight.

Previous scrapping schemes in Europe have numbered circa 18 campaigns across 13 countries between the early 1990s and the present day. The table below describes the scrapping schemes prior to 2008/9. As Fig. 29 has highlighted, the majority of schemes targeted vehicle renewal for environmental reasons. Where markets demonstrated a parc with a large proportion of old vehicles, the scrapping scheme helped to rejuvenate the parc. At the same time, this allowed the faster penetration of catalytic converters, for example, or helped to rid the market of vehicles with 2-stroke engines as was the case in Hungary.

Fig. 30 SUMMARY OF PREVIOUS SCHEMES

Country	Scheme Characteristics	Volume Scrapped
Greece	40–60% reduction in excise duty, if scrap car >10 years old, Athens and Rest of Greece.	>300,000
Hungary	100,000 forint incentive on a new purchase (choice of five models chosen by the State) or free travel on public transport for one year if scrap car with 2-stroke engine.	
Denmark	6,500 kroner incentive when scrap car > 10 years old, but next purchase independent of scrapping, new or used. Incentive decreased every six months during scheme period	100,000 scrapped in first 6 months (6% of total fleet)
Spain	Renove Plans 1994–96 gave 85,000–100,000 pesetas incentive when scrapping car >10 years old, and buying a new car. In Renove II period, scrapped car age reduced to >7 years. Prever scheme from 1997–2007 provided a purchase incentive when scrapping a car.	Renove I=180,000 units Renove II=140,000 units Renove III =100,000 units Prever Plan= 3.3 million units
France	5,000 francs incentive when scrapping car > 10 years old, and replaced with new model. 7,000 francs incentive when scrapping car > eight years old, or 5,000 francs incentive if buying a small new vehicle.	Approx 1.560 million
Ireland	1,000 Irish pounds rebate on the registration tax when scrapping a car > 10 years old and buying a new car.	1995 = 5,140 units 1996 = 19,400 units 1997 = 35,000 units
Norway	5,000 kroner scrapping a car >10 years old.	
Italy	1.5–2.0 million lire for scrapped car, depending on engine size of replacement car. Bonus was matched by equal car manufacturer discount. Oct '97 extended to alt fuel vehicles, LPG,CNG, for electrics incentive 3.5 million lire. 1.25–1.5 million lire incentive when scrapping, replacement car, must have fuel economy 7–9 litres/100km, or <7 litres/100km.	1997—1,148,000 scrapped
Romania	Scrap old car and replace with new.	2005–08 = 76,627 total
Portugal	Applied to car and LCV, if scrap a vehicle >10 years, €750 or scrap > 15 years €1,000, purchase a new vehicle. Must have owned vehicle >6 months. Values rose to €1,000 scrap vehicle > 10 years old, €1,250 scrap vehicle > 15 years old.	2001–08 = 85,277 total (5,260 LCV; 80,017 Car)

Source : IHS Global Insight.

2 Scrapping Schemes: Description and Results

2.1 CURRENT SCHEME PROFILES COMPARISONS—EU LEVEL

In Fig. 31, we present a top-level comparison of the 13 scrapping schemes that have taken place in 2009 in Europe. We have shown a short summary of the main characteristics of the scheme and the range of incentives offered by the market in question. For more detailed descriptions of the contents of each scrapping scheme, please see the Country Appendix.

The majority of the 13 markets implementing scrapping schemes chose a minimum age for the scrapped vehicle of 10 years. Against this choice, however, two markets, Germany and Italy, chose a nine year minimum threshold, while Portugal chose two thresholds of 10 years and 15 years, which were amended midway through 2009 to eight years and 13 years old, in line with their Budget revision. Cyprus chose the oldest minimum scrapping age for a vehicle of 15 years old. The value of the incentive ranged from €500 in Greece to up to €6,000 for the renewal of an LCV in Italy.

Fig. 31 EUROPEAN SCRAPPING SCHEME COMPARISON

Country	Main Characteristics	Incentives
Germany	Scrap car >9 years, purchase new car minimum Euro-4, and <1 year old.	€2,500, + tax rebate if Euro-5/6
France	Scrap car > 10 years, new car with CO_2 <160g/km, or LCV.	€1,000 plus + rebate up to €5,000, and bonus in new if low CO_2
Italy	Scrap car or LCV > 9 years, new car CO_2 max 130g/km—diesel or 140g/km—gasoline (petrol).	€1,500–€3,000 Cars €2,500–€6,000 LCVs
UK	Scrap car > 10 years, purchase new car.	£2,000
Spain	Vive plan, 0% loan to €10,000, new or used car < 5 years, max 140g/km, and LCV max 160g/km Scrap > 10 years, fitted with seat belt sensors and ESC. Plan2000e—scrap >10 years or >250,000km, and buy new car max CO_2 140g/km car, lower threshold of <120g/km or LCV max 160g/km.	€2,000 equivalent €2,000 purchase incentive
Portugal	Scrap a car >10 years old, or >15 years old and buy new car CO_2 <140g/km. From August 2009, scrap a car >8 years old, or >13 years old and buy new car CO_2 <140g/km.	€1,000–€1,250 purchase incentive €1,250–€1,500 purchase incentive
The Netherlands	Buying a new vehicle and scrapping gasoline (petrol) vehicle >13 years, or buying a new vehicle and scrapping a diesel vehicle >9 years old.	€750–€1,000 €1,000–€1,750
Austria	Purchase a new car minimum Euro-4 and scrapping a vehicle >13 years old.	€1,500
Romania	Scrapping a car >10 years old.	Approx €900
Slovakia	Purchase new car maximum €25,000 price, scrapping car >10 years old.	€1,000–€1,500 €2,000
Cyprus	Scrapping car >15 years old only, or scrap and purchase a new car with fuel economy max 7 litres/100km or max 5 litres/100km.	€675–€1,700
Luxembourg	Scrapping car >10 years old, and purchase new car CO_2 <120g/km, (diesel PM<5mg) or new car CO_2 <150g/km.	€1,500–€1,750
Greece	Scrapping a car registered pre-2005, not necessary to purchase new car. Or purchase new car or LCV, minimum Euro-4 or Euro-5.	€500–€3,200 Cars €500–€3,700 LCVs

Source: IHS Global Insight.

Fig. 32 shows the varying components that made up the criteria that member states incorporated into their scrapping schemes. It is interesting to note that under half of the scrapping scheme member states chose to include CO_2 criteria, although the five markets that chose this route included a range of thresholds in their schemes. The upper threshold featured was 160g/km, ranging down to 120g/km in three markets—Italy, Luxembourg, and Spain. Spain was the only member state to set a CO_2 threshold for LCVs, which is notable given the absence of this criterion in other EU states and given the current discussions under way at European Commission level regarding a mandatory CO_2 framework for LCVs. Four member states chose to include a criterion that required a minimum Euro-4 norm in the new vehicle purchased. Clearly, the majority of member states omitted to use the scrapping scheme as an opportunity to accelerate the renewal of vehicles with a Euro-5 emission standard. Spain was the only market to include a requirement for a safety measure in the new vehicle purchased, specifying the fitment as standard of front seat belt sensors, and ESC. Two other markets included an environmental component to their scheme, the Netherlands included a requirement for diesel vehicles to be fitted with a DPF, and Cyprus included a maximum fuel economy requirement of 7 litres/100km or 5 litres/100km.

Fig. 32 SUMMARY OF SCHEMES—MAIN CHARACTERISTICS AND SCHEME CRITERIA

Country	CO_2	CO_2 Threshold	Euro Norm	Other Environment/Safety Requirements
France	Yes	<160g/km for Car		
Italy	Yes	<120g/km (alt fuels) <130g/km—diesel or <140g—gasoline (petrol)/other fuels	Min Euro-4	No
Spain	Yes	<140g/km (car) <160g/km (LCV) <149g/km (car) <120g/km	No	Safety—seat belt sensor, ESC
Portugal	Yes	<140g/km	No	No
Luxembourg	Yes	<120g/km or <150g/km<5mg PM	No	No
Germany	No		Min Euro-4	No
UK	No		No	No
The Netherlands	No		No	DPF fitted
Austria	No		Min Euro-4	No
Romania	No		No	No
Slovakia	No		No	
Cyprus	No		No	Fuel economy 7 litres/100km or 5 litres/100km
Greece*	No		Min Euro-4/5	

*= incentive available for just scrapping, no purchase required.

Source: IHS Global Insight.

Of the 13 schemes in place, three member states chose to permit the purchase of used cars under the scrapping scheme as shown in Fig. 33. For the Netherlands and Spain, their schemes specified the eligibility of older used cars. Spain set a maximum age of five-years-old, while the Netherlands designated that used gasoline (petrol) cars and LCVs registered after 1 January 2001 were eligible. Used diesel cars and LCVs had to be fitted with a DPF. In Germany, the scheme was more restrictive regarding the eligibility of used cars, allowing the purchase of a replacement vehicle up to a maximum age of 14 months old (the so-called 'Jahreswagen'—a vehicle previously owned by the motor industry or distribution network, and carrying with it a strict definition). Please see the Country Appendix for more information on the 'Jahreswagen'.

For these three latter schemes, a used vehicle had to be scrapped, although Greece was the only market where the incentives for scrapping a car and buying a new vehicle were not interdependent.

Fig. 33 SUMMARY OF SCHEMES—MAIN CHARACTERISTICS AND SCHEME CRITERIA

Country	New	Used	Scrap
Germany	Y	Y	Y
Spain	Y	Y	Y
The Netherlands	Y	Y	Y
Italy	Y	N	Y
United Kingdom	Y	N	Y
Portugal	Y	N	Y
France	Y	N	Y
Austria	Y	N	Y
Romania	Y	N	Y
Slovakia	Y	N	Y
Cyprus	Y	N	Y
Luxembourg	Y	N	Y
Greece*	Y	N	Y

**= incentive available for just scrapping, no purchase required.*
Source: IHS Global Insight.

Moving on to examine the actual value of the scrapping incentive, it quickly becomes clear that the two key levers of all these scrapping schemes are the amount or value of the discount and the minimum age of vehicles eligible to be scrapped. We have shown the incentive value from the government and the mandatory contribution from the manufacturer, hence showing the public and private contribution received by the consumer. The majority of the markets featured purely a government contribution, with no obligatory funding from the manufacturers. Five markets in all provided a scrapping scheme where the manufacturer was bound with a mandatory contribution. This contribution varied in size, with Spain and the United Kingdom notable by the size of the mandatory OEM contribution, which matched the government funds.

The EU simple average total incentive provided in 2009 equalled €1,562. Germany offered the highest government incentive, which also became the most generous incentive provided by all the member states offering a scrapping incentive. The United Kingdom offered the second highest average incentive with €2,300, while Spain and Slovakia came close behind with an average incentive of €2,000. Based on our calculations, the average government incentive of €1,208 far outweighed that offered by the manufacturer of €355 by nearly four to one. A subject we take up further later in this chapter is the tendency by the consumer to be more attracted to an incentive where the government contributes a substantial amount.

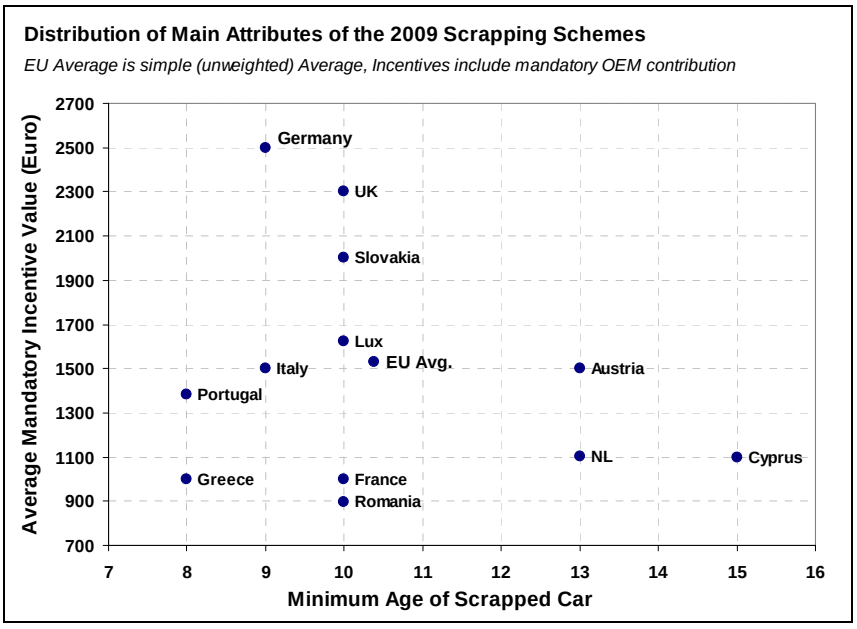
Fig. 34 PER VEHICLE SCRAPPING INCENTIVE—PUBLIC AND PRIVATE CONTRIBUTIONS

Country	Government Incentive *(€)	Mandatory OEM Contribution (€)	Total (€)
Germany	2,500	0	2,500
Italy	1,500	0	1,500
France	1,000	0	1,000
Romania	897	0	897
Greece	1,000	0	1,000
Portugal	1,385	0	1,385
Austria	750	750	1,500
The Netherlands	855	250	1,105
Slovakia	1,250	750	2,000
Spain	1,000	1,000	2,000
United Kingdom	1,150	1,150	2,300
EU (simple average)	**1,208**	**355**	**1,562**

**Typical or average incentive applied.*
Source: IHS Global Insight.

Fig. 35 demonstrates the relationship between the average mandatory incentive value in euro and the minimum age of the scrapped car. Displayed in this way, we can see that the average minimum age for scrapping a car is just under 10.5-years-old. The minimum incentive value is just over €1,500. While the majority of markets, as previously discussed, chose greater than 10-years-old as the minimum age for scrapping a vehicle, there were three markets that chose a threshold over 10-years-old, and four markets that decided to provide a minimum scrapping age less than 10-years-old.

Fig. 35 DISTRIBUTION OF KEY PARAMETERS OF THE 2009 EU SCRAPPING SCHEMES



Source: IHS Global Insight.

2.2 SCHEME SIZE AND SCOPE—EU MARKET LEVEL SUMMARY

Fig. 36 shows the total allocated funding to the 2009 scrapping schemes. The 11 member states have provided public funding worth a total of €7.9 billion. This does not include any compulsory incentive required by the vehicle manufacturers. The €5 billion allocated by Germany clearly stands out, making up 62% of the available EU-wide funding. The size of the German subsidy has the potential to dominate overall results and outcome trends. In some cases, we will use simple averages rather than weighted averages to summarise the EU level and in order to remove this bias.

The allocation of funds available just for 'new passenger cars' is estimated based on actual scheme results and is shown excluding the funding for LCVs and also used cars. In most schemes, this is 100% of the total budget available, but overall the funding is 85% allocated to new passenger cars.

Fig. 36 SUMMARY OF FUNDING BUDGETS FOR THE 2009 EU SCRAPPING SCHEMES (M EURO)

Total Scheme—Public Funding Value (M euro)					
		Over Scheduled Period		For 2009 CY Only	
Country	**Budget**	**Total**	**New 'Cars' Only**	**Total**	**New Cars Only**
Germany	Limited	5,000	3,900	5,000	3,900
Italy	Unlimited	1,284	1,284	1,074	1,074
United Kingdom	Limited	460	460	330	330
France	Unlimited	600	600	600	600
Spain	Limited	280	264	240	227
The Netherlands	Limited	85	23	49	13
Austria	Limited	23	23	23	23
Romania	Limited	45	45	29	29
Greece	Unlimited	70	18	60	15
Slovakia	Limited	55	55	55	55
Portugal	Limited	45	45	45	45
EU Countries with Scrapping Schemes		**7,947**	**6,716**	**7,505**	**6,311**

Source: IHS Global Insight.

Not all of the budgeted funds for the scrapping schemes were used up during the calendar year 2009. Based on actual scheme results, we have estimated the amount of funding that was allocated to vehicles ordered in 2009. At the total EU level, 95% of the budget (€6.7 billion) had been used up during 2009—although there will be some spill-over registrations of vehicles actually ordered. The term 'spill-over' refers to vehicles funded or ordered during 2009, but which still have to be registered in 2010. This can be because the scheme was originally designed to run into 2010, or because the scheme allows for new registrations (delivery) to occur even if the official scheme order books are closed. For example, in Italy, vehicles can still be registered up until March 2010.

Germany and Austria completely exhausted their schemes during 2009, while the Netherlands and the United Kingdom still have spill-over funding for vehicles during 2010 of 42% and 29% respectively.

Fig. 37 THEORETICAL NUMBERS OF VEHICLES FUNDED BY THE 2009 EU SCRAPPING SCHEMES (000S)

Theoretical Units Funded By Public Contribution (in 000s)					
		Over Scheduled Period		2009 CY Only	
Country	**Budget**	**Total**	**New Cars* Only**	**Total**	**New Cars* Only**
Germany	Limited	2,000	1,560	2,000	1,560
Italy	Unlimited	856	856	716	716
United Kingdom	Limited	400	400	287	287
France	Unlimited	600	600	600	600
Spain	Limited	280	264	240	227
The Netherlands	Limited	80	22	46	12
Austria	Limited	30	30	30	30
Romania	Limited	50	50	32	32
Greece	Unlimited	70	18	60	15
Slovakia	Limited	44	44	44	44
Portugal	Limited	33	33	33	33
EU Countries W/SS		**4,443**	**3,876**	**4,088**	**3,556**

Source: IHS Global Insight.

** Cars: New Passenger cars only.*

Fig. 38 translates the available funding for scrapping schemes into unit volumes using an average incentive value per vehicle calculated on a member state basis. The €7.9 billion of funding would support a maximum of 4.44 million units over the scheduled period, of which 4.1 million cars were incentivised during the 2009 calendar year, leaving a spill-over volume of 355,000 units for 2010.

The distinction between total funding (from the 2009 schemes) and the proportion allocated to 2009 and 2010 will be important for matching up against annual incremental volumes, parc changes, and tax revenues all of which are monitored on a calendar year basis. The same is true for the new passenger car component, where most of the scheme results outlined in this report are matched against calendar year impacts on passenger cars with regards to environment, safety, and funding metrics.

Fig. 38 INDICATION OF POTENTIAL MARKET IMPACT BASED ON RELATIVE SIZE OF SCHEME TO MARKET SIZE IN 2008 (000S)

Indication of Potential Market Impact (in 000s)						
	All Light Vehicles (M1, N1)			Passenger Cars (M1)		
	Potential Vehicles Funded	**Total Market 2008**	**Max Potential Impact**	**Potential Vehicles Funded**	**Total Market 2008**	**Max Potential Impact**
Germany	2,000	3,314	60.3%	1,560	3,090	50.5%
Italy	856	2,384	35.9%	856	2,174	39.4%
United Kingdom	400	2,430	16.5%	400	2,132	18.8%
France	600	2,510	23.9%	600	2,050	29.3%
Spain	280	1,328	21.1%	264	1,161	22.8%
The Netherlands	80	585	13.7%	22	500	4.3%
Austria	30	327	9.2%	30	294	10.2%
Romania	50	312	16.0%	50	271	18.4%
Greece	70	290	24.1%	18	267	6.5%
Slovakia	44	97	45.6%	44	70	63.2%
Portugal	33	270	12.0%	33	213	15.2%
EU with 2009 Schemes	4,443	13,848	32.1%	3,876	12,222	31.7%

Source: IHS Global Insight .

2.3 METHODOLOGY

In order to assess the impact of scrapping schemes over the number of different dimensions required for this study, a series of stepped models were developed in modular form. These modules include short-term seasonal adjustment models, modified autoregressive predictors, and demand-price equations; additional modules of parc survival and vehicle scrapping are based on proprietary modified Weibull functions, vehicle stock cascade equations, and exogenous elasticities for vehicle kilometres travelled. There are separate methodology sections for estimating the economic and financial impact and vehicle safety.

This modular-stepped approach was designed in order to accommodate very different levels of available data that were available from member states as the schemes progressed throughout 2009. Each country has the same basic set of modules. These have been calibrated with available data on new car sales, segmentation, scheme funding, number and age distribution of processed and scrapped vehicles under the schemes, and CO_2 for both market and replacement scheme vehicles.

Several commentators, and even some industry observers, have used the gross number of vehicle subsidies or vehicles funded under the schemes to make estimates of the impact on tax revenues for example or improvements in aggregate fuel consumption. One example provided during 2009 implied that the two million units of vehicles funded by the €5 billion German government incentives would more than pay for itself in terms of VAT returns on the two million units of new cars sold. This confuses the gross and the net sale impact, however, and ignores the level of sales that would have occurred without the incentive scheme in place.

The key to understanding and analysing the impact of scrapping schemes requires a focus on the marginal or incremental changes brought about by their introduction. In order to do this, we have to compare the actual observed results with an automotive world that would have developed if the schemes had not been enacted.

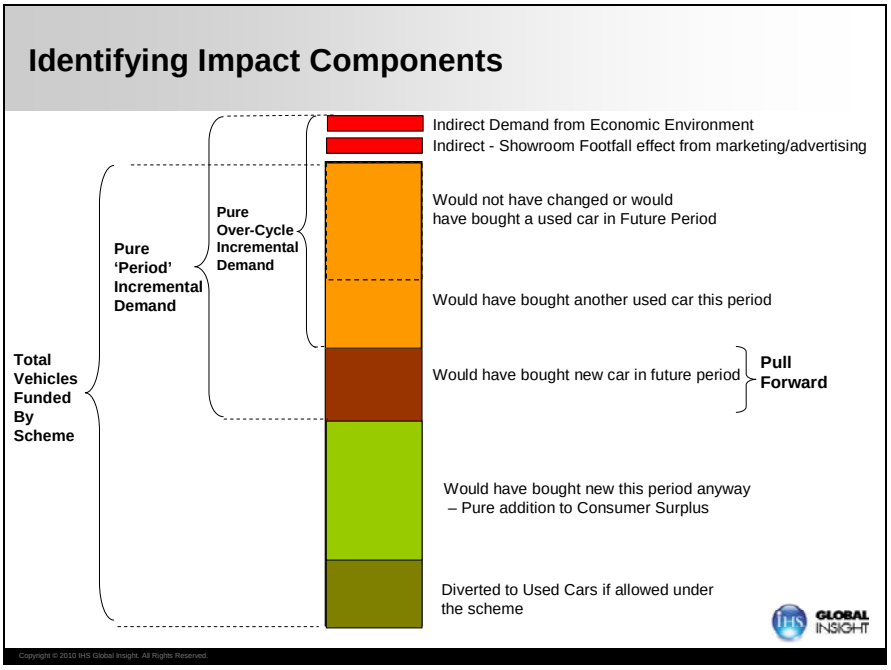
'What would have happened otherwise' brings in a whole range of uncertainties, alternative estimation, and different judgment. This was made apparent by the recent OECD economic outlook, No 86 Nov 19, where they noted "the short-term economic impacts of these (scrapping incentive) measures are difficult to assess given the lack of information on what would have happened in their absence".

The approach adapted by this study is to try to be as objective as possible and use techniques that minimise the reference risk.

The first stage in this process is to apply the principle of matching; this leads to an initial concentration of methodology only on the new passenger car market (M1). Some schemes include subsidies for LCVs (N1) and some offer replacement with used vehicles. In the case of LCVs, available data coming from member states schemes were extremely sparse. In the case of used vehicles, while they have a rejuvenation benefit for the emissions quality of the vehicle parc, they do not generate new tax revenue for example.

In order to proceed, we have to look at the mechanisms by which scrapping schemes work and attempt to measure individual components. Fig. 39 shows a conceptual scheme for this process.

Fig. 39 CONCEPT OF SCRAPPING A VEHICLE



Source: IHS Global Insight.

The starting point is the gross total of vehicles actually funded by the scrapping scheme. By definition, all of the vehicles processed under the scheme will or should have been scrapped. In almost all cases, these data were available from member states either because a fixed budget was set at the outset or from a census of scheme-processed cars at the end of 2009. Out of this total, some vehicles may have been diverted to the purchase of used cars—if allowed under the scheme. The next element is composed of people who applied for the incentive but would have bought a new car in any case. For these, the additional discount is a pure addition to their consumer surplus. (This particular point is almost always neglected in an assessment of wider substitution effects with the rest of the economy, and it suggests that estimates of crowding-out effects from scrapping schemes have been overstated). Clearly, all of these purchases have to be excluded from our calculations of incremental sales generated by the scrapping scheme.

The next possibility is that some people will bring forward the scrapping of their car from a future period in order to take advantage of the additional discount available while the scheme is in force. This element is commonly called 'pull-forward demand'. It generates incremental sales growth and scrapping during the incentive period, but not when measured over a longer cycle.

The next component comprises those people who would have bought a used car in this or in a near future period, but have scrapped their car under the scheme. The discount attached has persuaded them to buy a new car possibly for the first time. This has been an important element in several schemes and explains the strong response (high elasticity) to these schemes despite the deep recession. These sales are clearly new incremental demand to this period, with less tangible and more indirect payback implications for near future periods.

We also consider two additional collateral elements. The scrapping schemes themselves have been of sufficient size that they have stimulated overall economic growth, which in itself would boost car sales even if these were not actually attached to an incentive scheme (we estimate that under normal financing conditions this could be worth as much as 150,000 units across the EU). The scrapping schemes also

generate significant publicity and news coverage, which in turn increases and generates consumer interest in investigating the schemes, thus creating a collateral increase in dealer showroom traffic. There is anecdotal evidence from dealers that this was occurring during the operation of the 2009 schemes, and even customers not eligible to purchase under the scrapping scheme itself were persuaded to buy.

It will probably not be possible to actually quantify each of these individual components. By grouping them into the key elements, however, it is possible to make some progress. The first of these stages requires an analysis of total incremental demand generated by the scheme, the second stage is an 'ex ante' assessment of the payback effect on future time periods (in this case 2010 and 2011).

METHODOLOGY TO CALCULATE INCREMENTAL DEMAND

Several approaches were considered in order to provide an objective quantification of the impact of scrapping schemes on the net change in vehicle sales for 2009. These included use of a range of econometric models. These could produce a quantification of vehicle sales in the absence of special actions such as the scrapping schemes. The difference between the actual observed sales and the model prediction becomes an assessment of the net incremental demand generated by these schemes.

Several issues with the use of these models became apparent:

1) The lagged nature of economic data availability (such as GDP)—given the time period in which this research was completed, we would have had to rely on forecast fourth-quarter data rather than actual—bringing new sources of estimation error.

2) The unique nature of this particular and very deep economic crisis sent vehicle sales into freefall in most markets at a faster rate than predicted, based on the fundamental as defined by standard reduced form independent variables.

3) In particular, the financial crisis created a problem of access to, and availability of, credit and vehicle loan financing. The use of dummy variables or synthetic indices to simulate this issue is probably arbitrary over a very short term—a period of several months—the very period over which the scrapping schemes were in full force.

The combination of these three issues produces total equation correlations suggesting as much as 30–50% irregular or unexplained variation. Given that this is at least as large as the maximum potential impact size of the majority of the scrapping schemes in operation, it is unlikely that these models will provide a robust foundation for the calculation of net incremental demand.

The average scheme during 2009 was in operation for a period of 6–7 months, so models with strong very short-term predictive power are the most appropriate to use for this purpose. Industry experience suggests that most commonly used very short-term models are autoregressive. These work well for short periods outside turning points. In fact, we believe that turning points will have developed over the duration of several of the longer schemes. Therefore, we have used an augmented (dual vector) version of an autoregressive distributed lag model for these markets.

The first stage is to seasonally adjust all the raw sales data. This is done using industry accepted seasonal adjustment models such as 'X11'. The series is then annualised to obtain the seasonal adjusted annualised rate commonly referred to as the SAAR.

The starting point is the immediate three-month period before the introduction of the scrapping scheme. The SAAR is calculated and projected forward each month using the period autoregressive vector. This is maintained up until a point where a turning point may be reached. The turning points are correlated to the European consumer confidence series from Eurostat.

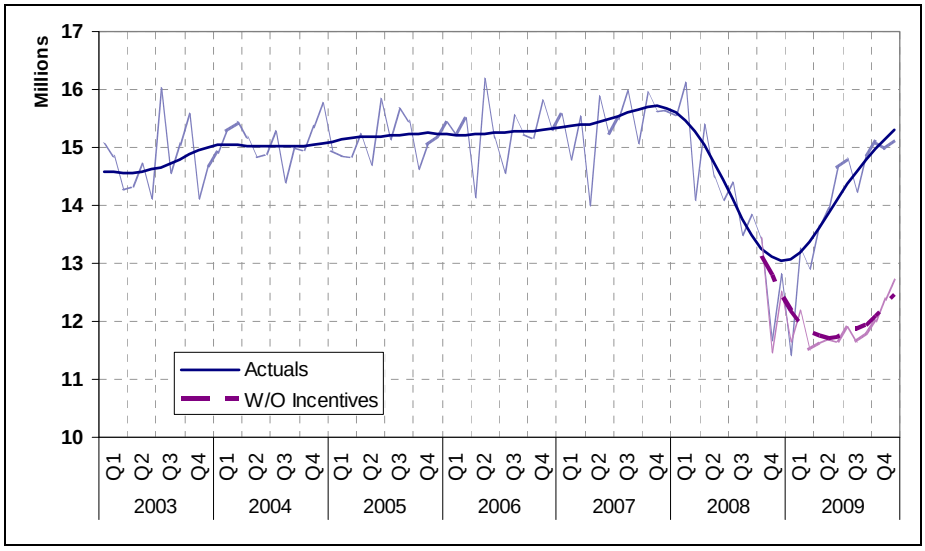
Experience from previous downturns suggests that the turning point in vehicle sales typically occurs three to four months after the turn in consumer confidence. Since consumer confidence data are more rapidly released, this gives useable predictive power over most of 2009. The SAAR trend vector after any turning point is adjusted using elasticities for country-specific special events (other than scrapping schemes) such as year-end changes to taxation (for example VAT or vehicle registration tax).

The final step is to convert the modelled SAAR (without scrapping schemes) to unit sales volumes. These are then compared with actual reported sales and the difference is assigned as the net incremental sales volume generated by the scrapping scheme.

INCREMENTAL DEMAND ASSESSMENT AT THE EU LEVEL

The methodology outlined above is applied to all member states with scrapping schemes.

Fig. 40 EU25 Passenger Car Sales Compared with Projected Development Without Scrapping Schemes (*Seasonally Adjusted Annualised Sales Rate*)



Source: IHS Global Insight.

Fig. 40 shows the seasonally adjusted car sales development and trend for passenger cars in the EU25. The series called 'actual' shows how car sales plummeted to below 12 million units in the last quarter of 2008 and the first few months of 2009. Individual monthly data then show a sharp and rapid recovery improving by an annualized rate of over two million units in a period of just four to five months, and by the final quarter of the year, the annualized rate was back running at 15 million units. The recovery in sales was so sharp (by the middle of 2009), that the chart trend fails to pick up the fact that for several months running actual sales were well over one million units lower than the fitted trend.

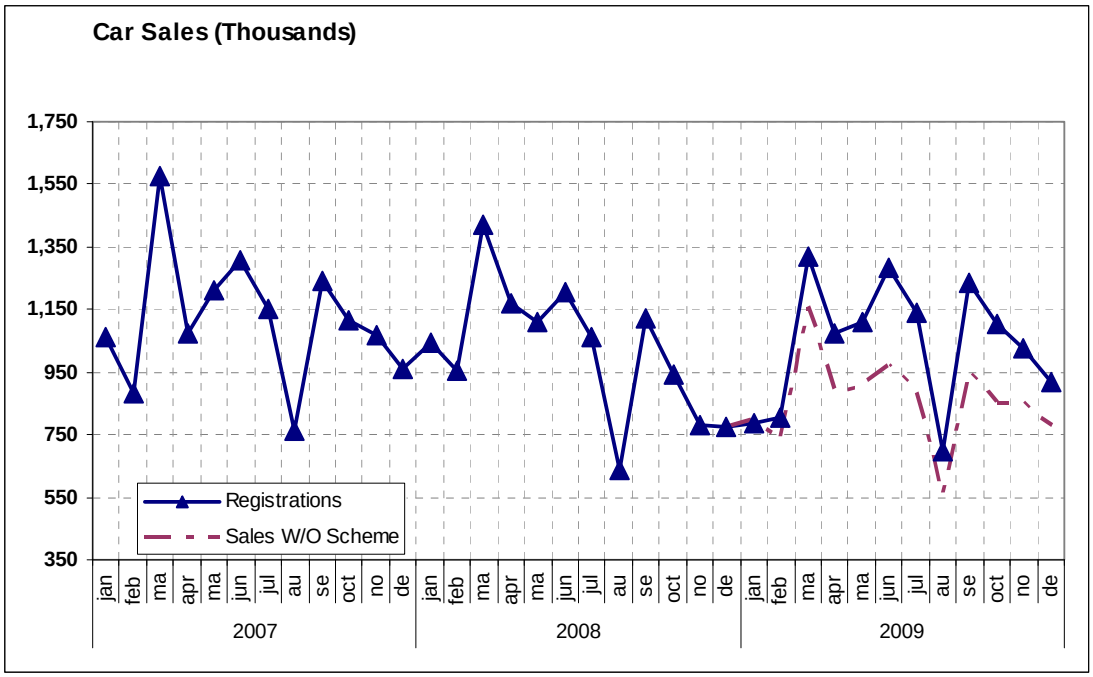
Clearly, the rapid recovery in sales was exceptional; it was not exhibited in other developed markets without a significant incentive programme of some description, and it was not exhibited in sectors of the European vehicle market that were effectively excluded from scrapping schemes. Moreover, scrapping scheme markets were substantially ahead (by three to four months) of the bottoming out of European consumer confidence and economic output.

If the scrapping schemes had not been enacted, it is most likely that vehicle sales would have stalled—moving sideways—at below 12 million units until July or August (see series without incentives). European consumer confidence (lagged by three to four months) had started to recover in the third quarter and

financial markets had already stabilised with the improved access to car financing. A tentative recovery in the SAAR would have started in the third quarter (with some countries leading this and some trailing). The improvement in the market would have accelerated in the final quarter of the year. It should be noticed that some of this accelerated improvement will have been driven by technical and not fundamental factors.

In summary, the difference between the annualized selling rate, with and without scrapping schemes, was more than two million units for the second quarter, third quarter, and fourth quarter of 2009.

Fig. 41 PASSENGER CAR SALES DEVELOPMENT AND WITHOUT SCRAPPING SCHEME—EU25 (000S)



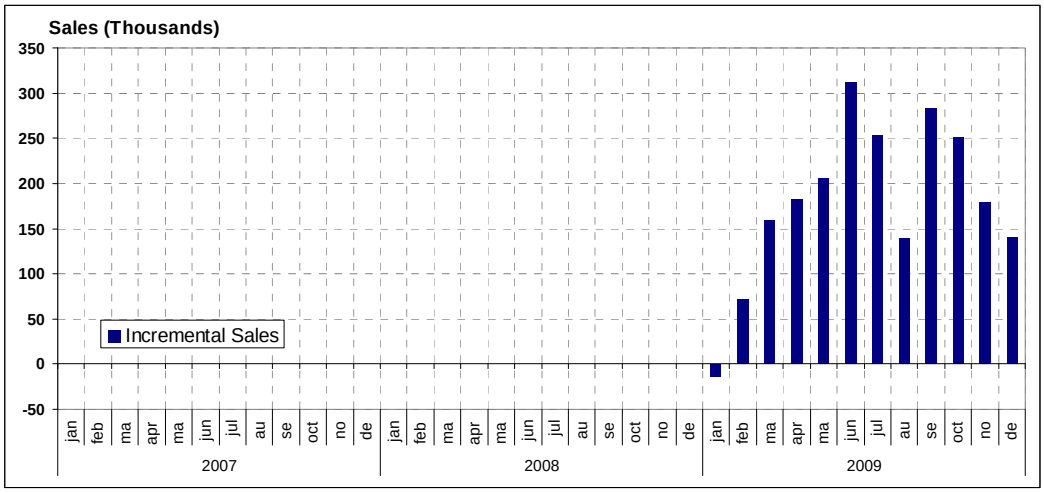
Source: IHS Global Insight.

Fig. 41 shows the actual unit sales of passenger cars across the EU25 compared with the volume calculated by the modelled projection of sales without these schemes. This translates into the net incremental sales estimate by month as shown in Fig. 42.

A small negative is derived in January 2009, this could be regarded as within confidence levels of the model or it could be picking up the fact that some customers were holding off from buying in anticipation of scrapping schemes announced but not yet fully operational. By March 2009, when Germany, Italy, and France were all fully operational, as many as 150,000 car sales are estimated to have been driven by the scrapping incentives alone. The distribution of incremental sales volumes is also determined by the seasonality as can be seen by the low unit sale result of August.

Grouped by quarter, incremental sales estimates totalled 216,000 units in the first quarter (7% of all sales), rising to 700,000 units in the second quarter (representing 20% of all sales); the third quarter registered a slightly smaller figure of 677,000 units (although this was a peak of 22% of all sales) and the year ended with the fourth quarter at 571,000 units (19% of all sales).

Fig. 42 NET NEW INCREMENTAL SALES GENERATED BY THE SCHEME PER MONTH—EU25 (000S)



Source: IHS Global Insight.

In summary, this analysis suggests that the total incremental demand generated during 2009 by the onslaught of European scrapping schemes was approximately 2.16 million units. This represents 17.3% of all cars sold in the markets with incentives—that is virtually one in every six cars sold.

The 2.16 million units of pure net incremental boost is 48% of the total gross number of vehicles that could have been funded by the member state schemes launched in 2009.

In simple terms, governments have had to incentivise two vehicles under the 2009 scrapping schemes for every one additional sale they helped generate in the short term. Of course, this ratio decays further in future time periods at a rate depending on the degree of payback to the schemes.

Fig. 43 ESTIMATED INCREMENTAL DEMAND GENERATED BY SCRAPPING SCHEMES IN 2009 (%)

	Q1	Q2	Q3	Q4	2009
EU	217	700	677	571	2,164
Total Increment	10%	32%	31%	26%	100%
Car Market*	7%	20%	22%	19%	17%

* Markets with scrapping schemes volume in 000s.

METHODOLOGY TO ESTIMATE PAYBACK

Estimating Payback

Given the complexities of modelling the vehicle transactions process (which includes decision tree analysis, vintage trade-up, trade-up decisions to new cars, residual value impacts, and so on) it is unlikely that an 'ex ante' analysis of the 2009 schemes will be able to generate very good estimates of the degree of payback that we can expect to see in the period 2010–11.

One 'ex ante' approach we can use is to compare the degree of skew in the distribution of scrapping scheme cars with that expected under non-scheme conditions.

Again, the definition of 'payback' is the amount (in units) that vehicle sales fall below 'trend' or equilibrium. The payback rate is the percentage of payback compared with the net incremental demand created by the scheme.

To help with this, we first have to review the evidence on payback from previous scrapping schemes ('ex post').

One possible approach considered was the use of dummy variables over historic data sets as a method of assessing the relative magnitude of incremental and payback effects displayed in previous European scrapping schemes. Without adjusting for transaction price changes observed anecdotally at the time, however, it was unlikely that this approach would be very fruitful. In fact the OECD[5] concluded that there was 'no clear evidence on the timing and magnitude of a payback effect when a scheme is terminated'.

In reviewing previous schemes in Europe and elsewhere in the world, we see a degree of variation in implied payback rates. These range from high payback in the case of France in 1994/96, to very low in the case of Italy 1997/98.

France 1994/96

The scheme in France was one of the earliest significant scrapping schemes. It started in April 1994 and ended in June 1995 (Balladurette). A second scheme followed on quickly from October 1995 to September 1996 (Juppette). In total, 1.5 million units were funded to be scrapped over the whole period. Estimates of incremental demand created range from 450,000 to 700,000 units. Immediately following the ending of the scheme, the French car market slumped by 20%, falling by over 400,000 units despite an improving economy.

The early experience with France had led to a general view in the industry that payback rates from scrapping schemes are actually quite high with some estimates close to 90% over the cycle. A study by the French statistical service SES (March 2003) actually put the incremental demand created by the scrapping schemes of the mid-1990s at just over 200,000 units, but with an extended payback rate of 87%.

After almost three years of scrapping schemes, the combined pull-forward did pull down car sales heavily in 1997 and even in 1998. We estimate that sales were below trend by 260,000 units in 1997. Assigning all of this to the payback effect generates a first year payback rate of between 40% and 57%. Unfortunately, data on the age distribution of the French car parc over this period are not sufficient to make a more detailed analysis of the dynamics of the accelerated replacement and payback cycle.

Spain 1994/95

Licandro and Sampayo (1997) [6] estimated the new incremental demand in 1994 was 199,000 units with a 23,000 unit payback in 1995. They estimated the first-year pull-forward rate to be approximately 12%. For consistency of interpretation, we need to adjust for the increase in manufacturers discount spending and general improvement in the economy (which mitigates the degree of market fall-back after the scheme

[5] OECD Economic Outlook, Nov 2009, No 86 Box 2.2

[6] Licandro, O. and Sampayo, A. (1997), "Los Efectos de los Planes Renove y Prever Sobre el Reemplazo de Turismos" in *Economia Industrial*, No 314, 1997.

ended). This probably increases the payback rate reported to closer to 20% in the case of Spain over this period.

Italy 1997/98

The scheme was first introduced in January 1997, originally to run for nine months but then extended by an additional four months. A second scheme was launched in February 1998 lasting until September 1998. The scheme was the most successful of those tried in the 1990s and created an immediate surge in vehicle sales with sales rising almost 40% in the first year of implementation—some 1.15 million units were funded under the scheme during 1997 alone.

An analysis of the payback rate is complicated by the immediate introduction of a follow-on scheme during 1998. In fact, Italian car sales fell back by just 1–2% per year over the periods 1998 and 1999 and even reached a record of 2.4 million units in the year 2000. On the face of it, payback rates were virtually zero.

On closer examination, and adjusting for the developments in the macro economy and OEM discounting, it is estimated that net incremental sales growth over the two year period totalled 840,000 units (540,000 units in 1997 alone) followed by a payback of around 52,000 units during the year 1999. This represents a very low initial payback rate of between 6% and 10% of the incremental demand generated under the schemes. (Note—additional incentives for alternative fuel vehicles were also in place after the expiry of the scrapping allowance and this causes some additional underestimation of the payback rate derived from the schemes themselves).

Italy 2002/03

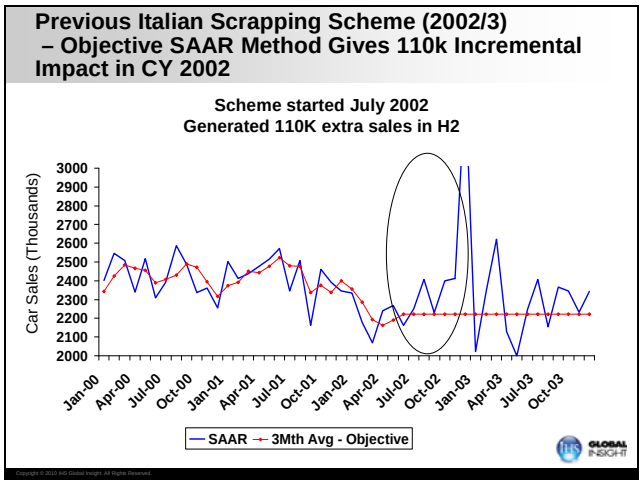
The more recent experience of the Italian scrapping scheme in 2002 may offer the best approximation of possible payback rates. This is because there is a consistent set of detailed Italian car parc data available immediately before and after the scrapping scheme.

The scrapping scheme started in July 2002, and was intended to run until 31 December 2002, but was eventually extended until March 2003. Using the same methodology outlined above, we estimate that the scheme generated 110,000 units of incremental sales in the calendar year 2002 and an additional 49,000 units in the first quarter of 2003. Detailed parc data show that marginal scrapping rates increased by about 2% for vehicles between 10 and 15 years of age. Translated into volume this implies an additional 103,000 units of vehicles being scrapped above normal levels.

Comparing marginal scrapping rates in Italy for the year immediately after the scrapping scheme with those when the scheme was in force shows that scrapping rates do fall back but not to a significant degree. Again, this implies that there was a relatively small degree of payback in the form of lower scrapping immediately following the ending of the scheme.

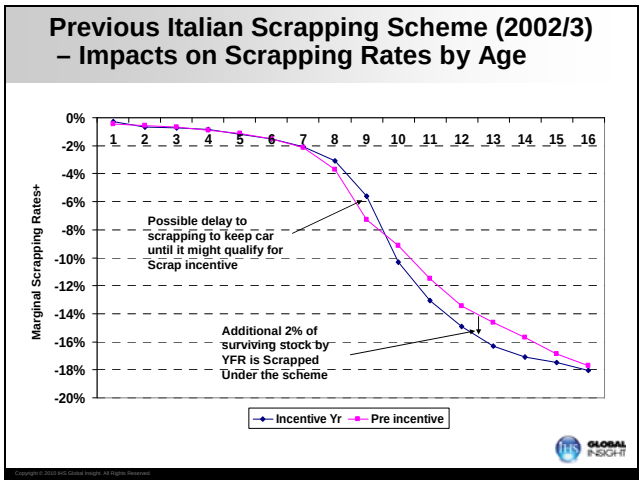
Italian car sales did fall back in 2003 by almost 60,000 units; however, this was not entirely due to the payback impact. In fact, the Italian economy was faltering at the time with GDP at just 0.1%, which would normally result in a slide in underlying car sales. An additional factor to account for is that OEMs boosted their own incentive spending to compensate for the ending of the schemes. Adjusting for both of these impacts, it is estimated that the residual payback during 2003 was 40,000 units, or a 25% payback rate of the scheme's induced incremental demand (July 2002/March 2003).

Fig. 44



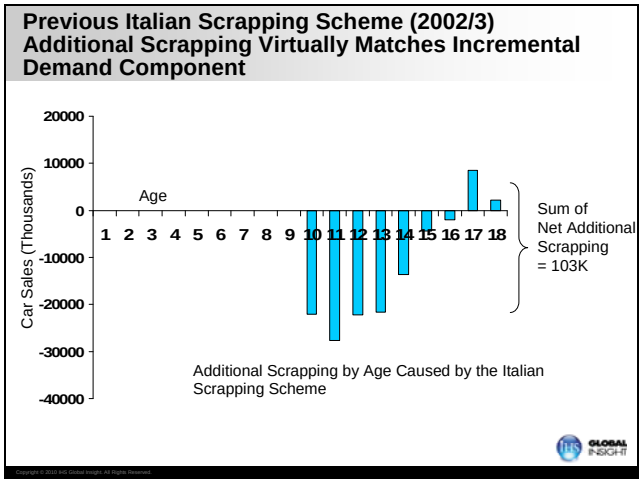
Source: IHS GLOBAL INSIGHT.

Fig. 45



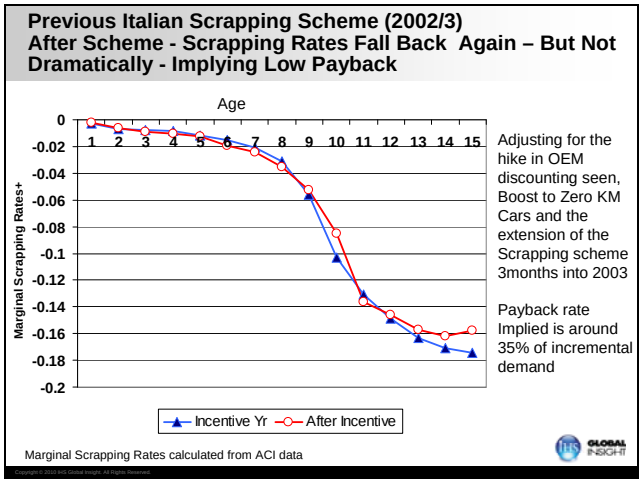
Source: IHS GLOBAL INSIGHT.

Fig. 46



Source: IHS GLOBAL INSIGHT.

Fig. 47



Source: IHS GLOBAL INSIGHT.

PREVIOUS PAYBACK EXPERIENCE SUMMARY

Based on this review of 'ex post' experience of European scrapping schemes, it is clear that the high payback experienced by the early French scheme is not really in evidence elsewhere and could be a function of the long period (2.5 years) the schemes were in force.

For the purpose of this analysis, where we concentrate on the dynamic of a one-period scrapping scheme, we consider that the payback experience of Italy during 2002/3 is perhaps more representative. As a result, we use the estimated 25% first year payback rate experienced in Italy in 2003 as a reference point for the 'ex ante' impact assessment of other scrapping schemes for 2010.

The actual rate applied to individual countries will vary around this central assumption according to the specifics of scheme design timing and the relative youth of the parc in each market.

Owing to the degree of computational uncertainty around this payback rate, we strongly suggest the use of scenarios around the central case. (For example, base-case first-year payback set at 25%, low payback set at 15%, and high payback set at 40%).

Note: as a reminder, we reiterate that the approach used here is to isolate the impact only of the 2009 funded scrapping schemes. Where the original schemes extend naturally into 2010, this is taken into account. Any additional or modified extended schemes, however, even if they have been confirmed (e.g. France), have not been assumed in the base-case and so the payback estimates are theoretical, for the sake of consistency in measuring impacts and efficiencies.

2.4 ASSESSMENT OF NET SALES IMPACT OF SCRAPPING SCHEMES—OVER CYCLE

Combining the methodologies for both incremental sales assessment and for estimating payback outlined above, it is possible to provide top line estimates of the incremental demand and scrapping over a three year period. This is shown in Fig. 48.

The net growth of car sales from scrapping schemes in 2009, estimated at 2.16 million units at the EU level, comes at a price. The pull-forward effect of sales with accelerated scrapping of vehicles in 2009 is estimated to see net payback of 417,000 units in 2010. This represents a net first-year payback of just around 20%. The net effect here is actually quite low because of scheme spill-over effects as outlined earlier. Some of the spill-over effects are also due to the long waiting lists that built up, primarily for smaller cars, during the second half of 2009.

The payback—or negative incremental growth—in 2010 and 2011 should be interpreted as a reduction in the total number of vehicles that will be sent to be scrapped, compared with that expected in the absence of the schemes.

This effectively implies that vehicle sales will fall below their fundamental trend level by this amount—as replacement demand falls back. This means that for 2010, total car scrapping in Western Europe would fall back by just over 400,000 units below the recent scrapping level, approaching 12 million cars, and then by another 278,000 units again in 2011.

The columns on the right-hand-side of the table show the cumulative impact over time of the initial boost to car sales. This shows the net sales growth of 2.16 million in 2009 reducing to just 1.75 million by 2010 and to 1.46 million at the end of 2011. The payback will continue past this period, but it will decay and become increasingly difficult to spot amongst all the other noise of the automotive demand cycle.

Fig. 48 NET INCREMENTAL SALES GENERATED OVER THE PERIOD 2009 TO 2011 (000S)

Net Incremental Sales Impact of 2009 Schemes—with Payback						
	Annual Volume Impact			Cumulative Increment		
	2009	2010	2011	2009	2010	2011
Germany	1,105	-264	-98	1,105	841	743
Italy	290	-38	-55	290	253	198
United Kingdom	180	13	-36	180	193	157
France	331	-94	-49	331	237	188
Spain	134	-24	-29	134	109	80
The Netherlands	12	2	1	12	14	14
Austria*	49	-8	-5	49	41	35
Romania	18	-3	-1	18	15	14
Greece	7	7	-2	7	14	12
Slovakia	24	-4	-2	24	20	18
Portugal	14	-4	-1	14	10	9
Total EU New Cars	**2,164**	**-417**	**-278**	**2,164**	**1,747**	**1,469**

*Source: IHS GLOBAL INSIGHT. * includes distortion effect due to manufacturer and dealer activity. See note in annexe document on Austria for more information.*

These payback estimates will help, but on their own they cannot be used to determine the likely level of sales in 2010/11. The end of the scrapping incentives effectively reverses the transaction price reduction in the market and so sales would naturally fall back to trend levels—determined by the demand equation—and then fall still further by an amount equal to the estimated paybacks provided. In practice, it is likely that changes in tactical discounting approaches and discount offer values by the car manufacturers may be able to reduce the element of fall-back. Some may even attempt to offer private scrapping replacement schemes, which technically could increase scrapping and slightly reduce the 'payback' element reported here. At the time of writing, Toyota had already started a scheme in the United Kingdom (its so-called Swappage campaign) and Hyundai had begun a version of an own-brand scrapping scheme. (Specific assessment of the impact of scrapping schemes on the automotive industry is provided in Chapter 3).

In Germany, where the extended budget funding was exhausted by October, there is only residual spill-over to be expected in 2010. The result is an expected payback of just over a quarter of a million units. A poll of independent forecasts of the German passenger car market reveals a consensus expectation at just over 2.7 million, more than one million units below the amazing 3.8 million units recorded in 2009. This implies that only a quarter of the predicted market decline will be due to true payback and the vast majority due to the effective increase in average vehicle pricing in the market. Once again, this fallback can be alleviated to some extent by more targeted discounting, but the extent that this can occur or be sustained is almost impossible to determine.

In Italy, government-funded incentives have been extensive (€1.3 billion) and generous. In order to calculate the net impact derived only from the scrapping programmes, it was necessary to remove the impact of the incentives for alternative fuels. The incentives for alternative fuels can in fact be combined with the scrapping scheme. Based on officially reported data, it is clear that the scrapping scheme was in fact the major stimulus—estimated to be an incremental 290,000 units for the year—compared with closer to 100,000 units for the alternative fuel subsidy. The low payback of around 40,000 units for the whole of 2010 is heavily distorted by the significant spill-over into 2010 with as many as 140,000 orders processed that still have to be delivered in the first quarter of 2010.

In the United Kingdom, as in Italy, there are substantial spill-over effects, and even with an estimated 180,000 units of incremental sales in 2009, orders were still being taken in January and February 2010 for the remaining €130 million of extended funding. This is so significant that the boost to sales will extend until May 2010 and may just offset the residual payback so that there is also a small incremental component. The market model for the United Kingdom was augmented to try to isolate the additional surge in car sales at the end of 2009, ahead of the increase in VAT.

In France, the consumer response to the scrapping schemes has been strong, with an estimated 330,000 units of additional sales. This puts France in second place behind Germany, and ahead of Italy, despite the lower incentive value being funded by the government at just €1,000. The reason for this higher elasticity is largely due to the older age of the French car parc, and the fact that there has not been a scrapping scheme in the country for over 13 years. Impending changes to the Bonus Malus system from January 2010 also helped cause an additional technical pull-forward of demand in 2009, and this was isolated from the calculation of incremental demand due only to the scrapping scheme. Although France has enacted a scrapping scheme in 2010 with a phase-down in incentive value, this has been removed from our assumptions for the purpose of this report

In Spain, the consumer response to the scrapping scheme has also been strong considering the enormous collapse in vehicle sales that was still under way when the scheme was launched in May 2009. Car sales would have drifted upwards from this point but even so the incremental demand estimate is put at 134,000 units concentrated into the last half of the year. The scheme funds both passenger cars and

LCVs, and some used vehicles are also eligible but they represent a small fraction of the take-up. Some spill-over for 2010 reduces the unit payback estimated for 2010, but no new scheme is included in our assessment as previously noted, and the payback increases in the year 2011.

In Austria, as in Germany, the funded scheme was exhausted quickly, with funding for just 30,000 units. Estimates of the incremental demand in 2009 generated by the model are put at 49,000 units. This makes Austria a unique case where the apparent total net figure is higher than the gross funded (see also Fig 18). Two things may help to explain this. The first is the high age (>13 years) for the scrapped vehicle. The general view is that vehicles of this age are scrapped and replaced with middle-aged used cars rather than new ones. So, if car owners are persuaded to buy a new car under this scheme, they will tend to be largely incremental and in favour of new cars.

Even if this was the case, it would not be possible for the scheme to have generated any more than 30,000 units due to the funding limit. A more significant reason comes from the actions of the vehicle manufacturers at the end of the official scrapping scheme. A sample survey of dealer websites showed that manufacturers continued to offer virtual scrapping scheme promotions of their own by replacing the €750 government element and at least matching that again themselves. As a result, car sales in the last quarter of 2009 started to accelerate again, even as final unfilled orders from the official scheme were dwindling rapidly. We have allocated this additional private element to the overall incremental demand estimate because it is fundamentally associated with the scrapping scheme even if not publicly funded.

In Romania, the Rabla is one of the few schemes which didn't exhaust its budget in 2009. Some 36,000 units were funded (target 60,000) of which we estimate incremental demand to be 18,000 units. The payback over the cycle is expected to be relatively low due to the very high age of cars being returned for scrap (over 21 years) and the probability that the new sales may be made at the expense of used imports rather than new cars in 2010/11.

In Greece, the scrapping scheme ran for just a period of weeks before an explosion in funding costs ended the scheme. In just a matter of weeks, 70,000 units were funded, but incremental new car sales in 2009 are likely to be very low, around 7,000 units, in part due to the very late start date, and also because the option of a new car with no mandatory scrapping option and just a scrapping option were available. Technically the payback in 2010 will actually be negative because of the spill-over of delivery registrations and also because consumers may use the higher incentives for no replacement to buy new or younger used cars during 2010 outside the scheme.

In Slovakia, consumer response to the scheme has been spectacular. The car market there shows some of the highest short-term and long-term elasticities seen of any scheme. Despite this fact, payback rates are expected to be quite low given the very high age of cars actually being returned for scrap (over 20 years) and the probability that the new sales may be made at the expense of used imports rather than new cars in 2010/11. In addition, some of the payback may have already started in the final quarter of 2009.

In Portugal, the fact that the 2009 scheme is an effective continuation of successive schemes over previous years means that there is more computational risk to the assessment of net incremental demand. This is compounded by changes to the scheme over the year, resulting in an accelerated take-up in the second half, eventually generating an estimated 14,000 units of additional sales compared with the 33,000 passenger cars funded**.**

Fig. 49 ESTIMATES OF ADDITIONALLY SCRAPPED VEHICLES GENERATING USED CAR TRANSACTIONS FOR SCHEMES OFFERING USED CAR OPTION (000S)

Estimated Additional Used Car Transactions of 2009 Schemes—with Payback						
Used Cars	**Annual Volume Impact**			**Cumulative Increment**		
(in 000s)	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
Germany	320	-80	-31	320	240	209
The Netherlands	15	6	-6	15	22	15
Greece	9	-4	-2	9	5	3
Used Car Total	345	-78	-40	345	267	227
All Vehicle (New& Used)	**2,509**	**-495**	**-317**	**2,509**	**2,013**	**1,696**

Source: IHS GLOBAL INSIGHT.

SCRAPPING SCHEMES WITH USED CARS

Germany, the Netherlands, and Greece in particular have schemes that allowed the replacement car to be a used or pre-registered car. In fact, only the Netherlands permitted a relatively free choice of the used car; Greece required the car to be Euro-4 compliant, which limited the age of the replacement car to no more than three years old, while Germany was more restrictive with a maximum age of 14 months old for the replacement vehicle (the so-called 'Jahreswagen'—a vehicle previously owned by the motor industry or distribution network). Please see the Country Appendix for more information on the 'Jahreswagen'.

In contrast, the average age of the used vehicle purchased under the scheme in the Netherlands was around 6.5 years. This clearly caps the one time transaction benefit to emissions, but on the other hand it could be argued to have a less distorting impact on the new car market especially with regard to segmentation.

Clearly, having an option to purchase used vehicles dilutes the very immediate stimulus effect of generating new car sales and on the face of it does not lead to any increase in additional offsetting of tax receipts. Programmes aimed at very young fleet cars, however, help to clear potential build-up in dealer inventory. In the case of Germany, this permits the swifter replacement by new cars, which may in fact be double-counted with the impact on the new incremental estimates of growth.

Given the importance of the rejuvenation effect for the parc even with a used car, however, we have attempted to make similar incremental calculations for the used car market. Fig. 49 shows these tentative estimates based on some scheme results reported near the end of 2009. The results show that an additional 345,000 cars were scrapped during 2009 and replaced with used cars. It is more difficult to interpret the concept of payback with regard to the increase in used car transactions. It is best to think of these vehicles, not as an increase in vehicle transactions but from the opposite side—as additional vehicles scrapped that otherwise would not have occurred in this time period.

In this regard, the total of all vehicles, both new and used, totals 2.5 million units. In other words, an additional 2.5 million cars from the European vehicle parc were retired during 2009. The mechanism by which these vehicles provide benefits to road safety and the environment will be explained and quantified in more detail later in this report.

SCRAPPING SCHEME PRICE ELASTICITIES

Using the estimates of incremental demand outlined earlier, it is possible to impute price elasticities attributable to the scrapping schemes. In fact, there are a whole range of elasticities that can be useful to aid analysis of the schemes' impact and also for future design purposes. Different elasticities are appropriate for the specific time periods being monitored, ranging from short to long term. In some cases, it is also possible to generate specific segment and sector elasticity.

The following discussion is confined to 'whole market mandatory' elasticities. The term 'mandatory' is used to include all publicly funded incentives plus all (usually matching) OEM contributions that are required. It does not include any additional voluntary discounts that can be variously offered by the car manufacturers. The term 'whole market' means that the new sales volume generated is gauged in relation to the total car market, and not just the part of the market that is included in the scheme design itself.

Fig. 50 WHOLE MARKET ELASTICITY BASED ON MANDATORY INCENTIVES

	Short Term	While Running	CY 2009	Long Term
Germany	-4.30	-3.83	-3.53	**-2.08**
Italy	-1.82	-1.81	-1.66	**-0.97**
United Kingdom	-1.71	-1.21	-0.80	**-0.60**
France	-2.54	-2.80	-2.80	**-1.51**
Spain	-3.29	-2.59	-1.53	**-0.65**
The Netherlands	-1.46	-1.11	-0.66	**-0.60**
Austria	-2.27	-1.78	-1.16	**-0.83**
Romania	-2.25	-3.43	-2.93	**-0.94**
Greece	-7.38	-4.48	-0.68	**-0.88**
Slovakia	-7.77	-5.49	-4.06	**-2.16**
Portugal	-1.45	-1.43	-1.43	**-0.62**
EU Countries with Scheme—Un-weighted Average	**-3.34**	**-3.00**	**-2.47**	**-1.42**

Note: Short-term elasticity is calculated using the increase in annualised selling rate for a period of three months starting two months after the start of the scheme. While running elasticity is calculated only for the period that the scheme is actually in operation, CY 2009 uses the volume impact over the whole calendar year. Long-term elasticity is measured over the three year cycle 2009 to 2011 using 2008 as a base year.

Source: IHS GLOBAL INSIGHT.

Certainly, the implied short-term price elasticities attached to scrapping schemes are significantly higher than typical ranges reported in literature or generally used by the industry. In addition, the elasticities attached to scrapping schemes display a perverse tendency for the elasticity to decay over time rather than increase over the longer run as predicted by standard demand theory.

There are several reasons for this:

1) Scrapping schemes give consumers a sense of urgency to transact quickly—given fixed end dates or impending exhaustion of funds.

2) Scrapping schemes bring forward some element of demand from future periods, which increases the one period term response.

3) Consumer psychology responds more to a government 'rebate' than to a private discount of equal amount.

4) Manufacturers often match or partially match government cash incentives even if not required by the scheme rules. This matching can in fact be less than that which was on offer before the scheme from the manufacturer, but it becomes far more transparent to consumers when

associated with the scrapping scheme—we call this the 'transparency effect'. This can increase the implied price elasticity significantly, if only the mandatory price reduction is being used.

5) Increased national publicity and focused advertising by manufacturers and dealers generates both direct and collateral showroom footfall.

The highest elasticities are observed in the very short term—a period of three or four months starting two months after the start of the scheme's operation. Another peak occurs in the last month of the scheme or of available funding. These short-term elasticities range from -1.46 for the Netherlands to extreme highs of 7.0 for Greece or Slovakia. These extremes are explained by special circumstances or by design features of the scheme. In the case of the Netherlands, the purchase of a used car is allowed by the scheme so the new car sales response is actually very low. The average for the EU is almost 3.3—this is a simple unweighted average of the schemes. Removing the extreme observations, however, produces a more general short-term elasticity of -2.8, which is still very high.

In most cases, the elasticities calculated for the period of time that the schemes were in operation are lower than the short-term peak calculations, and for the whole calendar year 2009 response.

Long-term elasticities take into account the assessment of payback in the year 2010 and 2011 and use the net response of demand over the period. When one excludes Germany, the long-term price elasticities of the scrapping scheme come down to levels more in line with comparative literature.

In summary, these very high short-term elasticities attached to scrapping schemes have the potential (if combined with strong industry multipliers and low economic leakage) to be a potent tool in stimulating economic activity.

The fact that the business and company car sector is effectively excluded from benefiting from most of these scrapping schemes means that the private car market price elasticity is considerably higher than that reported in Fig. 50 (based on the whole market). Calculating elasticities for the private market only, while the schemes were in force, suggests elasticity as high as -7 for Germany, almost -3 in the United Kingdom, and -2.5 for Italy.

Additional calculations suggest that voluntary OEM discounts help to explain perhaps 20–40% of the elasticity reported in Fig. 50.

We consider that the use of mandatory elasticities outlined above could provide scheme designers with the best way of assessing the potential impact on incremental sales. It is known that OEM' will almost certainly offer associated incentives if this is not a mandatory requirement of the scheme, and this is actually required on average in order to achieve these elasticities. Since individual manufacturers respond very differently with the tactical discounting, it is difficult to prejudge this in advance of any future scheme introduction, but it can be roughly simulated by using the aggregate elasticities reported.

INITIAL OBSERVATIONS ON SCHEME EFFICIENCY

The table in Fig. 51 demonstrates the relative efficiencies of each scheme in 2009, and the cumulative efficiency with regards to generating incremental sales. Austria appears to enjoy the highest efficiency both in 2009 and over the cumulative period. One should exercise caution, however, when viewing these results, due to the exceptional results that took place after the scheme officially ended due to subsidy matching behaviour that took place on the part of the manufacturers and dealers.

Fig. 51 SCHEME EFFICIENCY AT GENERATING INCREMENTAL SALES IN 2009 (%)

Scheme Unit Efficiency at Generating Incremental Sales (New & Used)		
	Total 2009	**Cumulative 2009–11**
Germany	71.2%	47.6%
Italy	33.9%	23.1%
United Kingdom	45.0%	39.3%
France	55.2%	31.4%
Spain	47.7%	28.7%
The Netherlands	33.8%	62.0%
Austria *	87.6%	117.0%
Romania	35.7%	27.6%
Greece	23.9%	21.9%
Slovakia	54.4%	40.0%
Portugal	44.0%	27.7%
EU	**56.5%**	**38.2%**

Source: IHS GLOBAL INSIGHT.

**includes distortion effect due to manufacturer and dealer activity. See note in annexe document on Austria for more information.*

Fig. 52 provides a simple comparison of vehicle age. Firstly, we show the average age of the car parc during the year directly preceding the scheme, providing for an average age among the participating countries of 8.1 years old. Secondly, we show the average age of the vehicles scrapped under the scheme in 2009, which provides for an average age of 14.8 years old.

Fig. 52 AVERAGE AGE OF PARC COMPARED WITH AVERAGE SCRAPPED AGE UNDER SCHEME (AGE OF CAR)

Country	Average Age of Car Parc 2008	Average Age—Scrapped Under Schemes 2009
Germany	8.2	14.7
Italy	8.0	14.1
United Kingdom	7.1	13.4
France	8.1	14.9
Spain	7.9	15.3
The Netherlands	8.5	16.2
Austria	8.6	17.5
Romania	n/a	21.0
Greece	10.9	19.7
Slovakia	n/a	20.7
Portugal	9.0	17.3
EU Countries with Scheme	**8.1**	**14.8**

Source: IHS GLOBAL INSIGHT.

2.5 OTHER EUROPEAN SCHEMES

2.5.1 Summary of Schemes Under Discussion

As we began this study in September 2009, there were several member states in which discussions were under way regarding the possible introduction of a scrapping scheme. Here we provide a short summary of these markets.

HUNGARY

Calls for a scrapping incentive in Hungary had not been answered by the government at the end of September 2009, and plans were no more developed by the end of 2009. Even though such schemes have proved very effective in other countries, IHS Global Insight does not expect Hungary to introduce a scrapping scheme in 2010 as the fiscal leeway needed for such a move is lacking in the crisis-struck country.

POLAND

The chances of any incentive scheme in Poland remain very unlikely.

The Polish authorities talked about a scrapping scheme in the beginning of 2009, but later in the year rejected the idea, mainly because of the lack of state funds available for the programme.

CZECH REPUBLIC

During early September 2009, the Czech government started to plan a scrapping scheme. The 30,000 koruna (€1,153) support was intended for buyers who purchase a car with a gasoline (petrol) or diesel engine, with a maximum value of 500,000 koruna (€19,234). In exchange, clients would have to scrap a car older than 10 years. Clients buying an environmentally friendly car (electric, hybrid, or LPG) would get 60,000 koruna (€2,308) support, against a maximum value car of 700,000 koruna (€26,928).

Still in early September 2009, the Czech parliament voted in favour of a scrapping incentive, overriding a presidential veto, which took place in July 2009. We had initially assumed that the scheme would be introduced after the government election in November 2009 when the new government formed, rather than being approved by an interim government.

The proposed scrapping scheme would have the objective of benefiting domestic producing manufacturers such as Skoda, TPCA, and Hyundai. The Czech economy contracted by a record 3.4% y/y during the first quarter of 2009 and the government had intended to ensure that this did not have a corresponding effect on the domestic retail automotive industry. As the national elections grew nearer, it appeared that the country's president considered other sectors of the Czech economy to be in greater need of economic assistance, given that the Czech automotive industry was enjoying relatively robust sales performance during the second half of 2009.

Since the Czech election in November 2009, the launch of the scrapping scheme has remained uncertain, with speculation that a scheme would not be approved until after the next election in spring 2010. Hence, we now believe a scheme could still become a possibility in the second half of 2010.

2.5.2 Recent Announcements

IRELAND

In early December 2009, we learned of a new member state announcing a scrapping scheme. Given the advanced stage of our study, we have included a short summary here of the scheme as well as in the Country Appendix. In the 2010 Budget, Ireland announced a scrapping scheme that provides for Vehicle Registration Tax (VRT) relief when a new passenger car with CO_2 emissions of not more than 140g/km (i.e. CO_2 band A or B) is purchased and registered and another passenger car, over 10 years old is scrapped. The scheme will run from 1 January 2010 to 31 December 2010. The scheme makes provision for VRT relief of up to €1,500 applicable to new cars of emission bands A or B (i.e. with CO_2 emissions of 140g/km or less). The Society of the Irish Motor Industry (SIMI) estimates that around 600,000 used cars could be eligible for the scheme. Cars eligible for scrapping must have been registered to the owner for at least 18 months before being scrapped. Furthermore, prior to scrapping, vehicles must have been insured for at least 12 months out of the 18 months before they are scrapped.

2.6 EASTERN EUROPE—OUTSIDE EU27 SCHEMES

SERBIA

In August 2009, the Serbian government extended the car scrapping bonus programme for owners of cars of 11 years old and upwards. The government bonus is €1,000, although it applies only to buyers of the new Fiat Punto, which is currently assembled by the Serbian producer Zastava. The programme kicked off on 15 April 2009. The initial scheme envisioned the subsidy for 5,000 cars, but it will cover another 5,000 cars with the new extension.

RUSSIA

In early January 2010, the Russian government went ahead and approved the launch of a scrapping scheme in Russia. This market falls outside of our study remit, although we include here a short summary of the scheme for information. Buyers will receive 50,000 roubles (€1,187) towards a purchase of a new car in exchange for scrapping their old car, which has to be more than 10-years-old. The scheme will apply only to locally built cars. The programme is expected to start in 2010 and continue in 2011. As Russia does not have many vehicle scrapping centres, however, the scheme is initially being trialled in Moscow and St Petersburg before going live in Samara and Nizhni Novgorod from early March 2010. The Russian government has allocated nearly 10 billion roubles (€237 million) for the scheme, which is estimated to cover around 200,000 car scrapping incentives. Almost half of the Russian car parc is more than 10-years-old and would thus be eligible for the scheme.

2.7 NON-EU SCHEMES

The non-EU schemes that we shall examine in this study are the United States, Japan, and South Korea. Turkey introduced a scheme to stimulate sales, although this was not a scrapping scheme in the sense that an older car was scrapped for renewal.

For the United States, South Korea, and Japan, all three countries implemented a broadly traditional style scrapping scheme, although each country chose a different style of scheme. The United States and Japan both focused on fuel economy improvements as the key requirement for the purchase of the new vehicle. The United States set a wide range for the age of the scrapped vehicle, essentially allowing any vehicle less than 25-years-old with a fuel economy <18mpg. Meanwhile, Japan set a minimum scrapping age of

13-years-old and set specific vehicle types that were eligible to receive the incentive. Japan placed an emphasis on the purchase of so-called 'eco-friendly' vehicles when scrapping an older car, hence stimulating the purchase of electric vehicles, plug-in hybrids, CNG vehicles, and fuel cell vehicles. For standard gasoline (petrol) and diesel vehicles, the Japanese government set a minimum fuel consumption requirement, the 2010 standard for gasoline (petrol) cars, and the 2005 emission regulation standard for diesel cars and LCVs.

South Korea followed a different route and encouraged consumers to scrap a car older than nine-years-old, providing a 70% discount in the acquisition and registration taxes of the new car.

The value of the incentives offered varied from around €900 for a mini-car (Kei car) in Japan to around €3,000 for an LCV in Japan, or €3,245 in the United States for a car offering a 10mpg advantage compared with the scrapped car.

Fig. 53 NON-EUROPEAN SCRAPPING SCHEME COMPARISON

Country	Main Characteristics	Incentives
United States	Scrap car <25-years-old, <18pmg, and purchase a new car with better mpg fuel economy. If buying a new car >10mpg than scrapped car, eligible for higher incentive level.	US$3,500 (€2,525) US$4,500 (€3,245)
South Korea	Scrap a car >9-years-old, and reduction in both acquisition/sales and registration taxes by 70% on the new purchase.	2.5 million South Korean won max incentive (€1,540)
Japan	Incentive if scrapping a car >13-years-old, and purchasing a new more fuel-efficient car or LCV. Incentives also available when not scrapping a vehicle.	¥250,000 (€1,976) Car ¥125,000 (€983) Mini-Car (Kei) ¥400,000 (€3,148) LCV

Source: IHS GLOBAL INSIGHT.

Fig. 54 SUMMARY OF NON-EU SCHEMES—MAIN CHARACTERISTICS AND SCHEME CRITERIA

Country	CO_2	CO_2 Threshold	Euro Norm	Other Environment/Safety Requirement
United States	No	N/a	No	Fuel consumption target for purchase vehicle 5mpg, 10mpg, or 15mpg higher than scrapped, and scrapped vehicle < 18mpg.
South Korea	No	N/a	No	No
Japan	No	N/a	No	Gasoline (petrol) cars must meet 2010 fuel consumption standards, diesel vehicles must meet 2005 fuel consumption standards.

Source: IHS GLOBAL INSIGHT.

As already noted, fuel consumption featured as a requirement for two out of three of the non-European schemes. None of these non-European schemes offered any incentive for CO_2 reduction, or set any CO_2 emission reduction target. Furthermore, there was no explicit safety requirement designed into any of the three non-European schemes.

Fig. 55 SUMMARY OF NON-EU SCHEMES—MAIN CHARACTERISTICS AND SCHEME CRITERIA

Country	New	Used	Scrap
United States	Y	N	Y
South Korea	Y	N	Y
Japan	Y	N	Y

Source: IHS GLOBAL INSIGHT.

All the schemes provided an incentive to purchase a new car when scrapping an older car. None of the schemes permitted the purchase of a used or nearly used car when scrapping an older car.

Fig. 56 SUMMARY OF NON-EU SCHEME RESULTS—VOLUMES BOUGHT AND SCRAPPED

Country	Purchased	Scrapped
United States	677,842	677,842
South Korea	No data available yet	No data available yet
Japan*	Circa 1,580,000	417,000

**Japan total purchased vehicles includes all vehicles that obtained an incentive under the programme, not just those scrapping a vehicle, total scrapped at 24 Dec 2009.*

Source: IHS GLOBAL INSIGHT.

The data relating to the volume of vehicles purchased and scrapped under the schemes vary by market. The United States, having ended its scheme in late August 2009, has excellent data available for analysis, and we can report that a total of 677,842 vehicles were purchased and scrapped. For South Korea, there is no official data yet available that provide a breakdown of the volume of vehicles purchased under the scrapping scheme. Given that the scheme terminated on 31 December 2009, we expect more data to be available during the first six months of 2010. Japan published the volume of scrapped vehicles during late December 2009, and indicated that 1.58 million vehicles had been purchased with incentives during 2009 (including vehicles purchased without having scrapped an older vehicle at the same time).

As the Summary of Official Timing shows in Fig. 57, there was some movement in the official timing that was originally set. We have classified the schemes under three typical duration lengths. We have also provided comments to indicate where schemes have been extended into 2010.

The United States established a scheme due to last from 1 July to 1 November 2009; although this scheme was cut short by three months as the scheme fund was exhausted by 27 August 2009.

Japan established a scrapping scheme to last from 19 June 2009 to 31 March 2010, although by December, the government announced that it would extend the scheme until 30 September 2010, adding a six month extension to the scheme.

South Korea established a scheme that began on 1 May 2009 and lasted until 31 December 2009. The scheme was not extended.

Fig. 57 SUMMARY OF OFFICIAL TIMING OF NON-EU MARKETS

Country	<3 Months (short)	3–12 Months (long)	Extended >12 Months	Comments
United States	Y (actual)	Y		Budget exhausted in < 2 months.
South Korea		Y		Scheme ran for allotted period.
Japan		Y	Y (actual)	Extended 6 months beyond original duration.

Source: IHS GLOBAL INSIGHT

A snapshot of the budgets utilized by the three non-European markets indicates that Japan dedicated the largest budget towards stimulating vehicle sales. It should be noted, however, that the total budget detailed is the national budget for all incentives including vehicle purchases where a scrapped vehicle was not required. If one takes the volume of scrapped vehicles at the end of December 2009, we can see that around 30% of total vehicles purchased under the scheme were tied to a scrapped vehicle also. Hence, the true budget available for scrapping vehicles is clearly much lower.

After removing this distortion, the U.S. Cash for Clunkers scheme enjoyed the largest budget for purely purchasing a new car when scrapping an older vehicle. The U.S. government saw it necessary to extend the initial fund of US$1 billion on 7 August 2009 when it added a further US$2 billion to the budget. The fund allocated towards the administration of the scheme was initially allocated at US$50 million but is thought to have climbed to nearer US$100 million.

South Korea set a budget of 500 billion South Korean won, which we do not believe was exceeded; although, as more information is received, this assumption might change.

Fig. 58 SUMMARY OF BUDGETS OF NON-EU MARKETS AND INCENTIVE VALUE

Country	Budget	Contribution—Government	Contribution—Manufacturer/Dealer
United States	US$3.05 billion (€2.2 billion)	US$3,500 (€2,525) US$4,500 (€3,245)	Not Mandatory
South Korea	500 billion South Korean won (around €307.4 million)	2.5 million South Korean won max incentive (€1,540)	None
Japan	¥370 billion (but extended) (€2.9 billion)	¥250,000 (€1,976) Car ¥125,000 (€983) Mini-Car ¥400,000 (€3,148) LCV	None

Source: IHS GLOBAL INSIGHT.

In terms of the incremental sales generated by the non-European markets, IHS Global Insight estimates that a total of 982,400 units were generated in 2009. By far the largest contributor to incremental sales can be seen to be Japan. The total payback expected from 2009 is in the region of 19.5%, with the most severe payback effect taking place in South Korea where the payback from 2009 will reach -38%.

South Korea will endure the heaviest payback following the year of the scrapping scheme due to the intense distortion created by the massive amount of incremental sales. This extreme amount of pull-forward sales was caused by the highly generous nature of the scrapping incentive (70% discount on the registration and purchase taxes), which drove a far higher volume of consumers to transact in 2009, due to the prospect of an extremely generous one-time discount in relation to the purchase price of the replacement car. The result of the extreme pull-forward is then logically an extreme payback. Japan should

see a far more reduced level of payback on 2009, calculated at -12.2%, with the United States predicted to experience a payback effect of -15.4%.

Fig. 59 INCREMENTAL SALES NON-EU MARKETS AND PAYBACK

	2009	2010	2011	Payback 2009
United States	281,400	-43,400	-19,100	-15.4%
Japan	467,000	-57,000	-119,000	-12.2%
South Korea	234,000	-90,800	-38,400	-38.8%
Total Non-EU	**982,400**	**-191,200**	**-176,500**	**-19.5%**

Source: IHS GLOBAL INSIGHT.

2.8 ADMINISTRATIVE EFFICIENCY OF SCHEMES

The organisation behind the scrapping schemes seems to have been an important factor in the success or failure of the scheme administration. The table in Fig. 60 shows an example of nine of the scrapping scheme markets to show the extent to which administrative efficiency varied.

Fig. 60 COMPARISON OF ADMINISTRATION SYSTEMS

Country	Quality Data Reported	Central Organisation	Fast Processing	Adequate Resources to Manage Scheme
Austria	-	-	-	**-**
United Kingdom	+	+	+	**-**
Germany	++	++	++	**++**
France	-	+	-	**-**
Spain	-	+	-	**-**
Slovakia	++	++	++	**++**
Romania	+	+	++	**+**
Italy	++	++	++	**++**
Portugal	+	+	-/+	**-/+**

Score = - (poor), -/+ (average) + (good) ++ (excellent).
Source: IHS GLOBAL INSIGHT.

Managed Wind-down of Scrapping Schemes—There has been some process improvement where schemes have been extended, which has taken the opportunity to strike at the core of one of the recurring inefficiencies of the schemes in 2009. Certain markets have reviewed the administration of their schemes for the reiterated version in 2010, and the United Kingdom and Spain are notable for including a managed scheme run-out. For Spain, when the scheme reaches 70% of the allocated funding, the remaining 30% will be pro-rated among the participating manufacturers. The amount of deals available will be communicated so as to avoid over-committing of scrapping incentives, and to allow a more equitable diffusion of the remaining funds.

Online Application of Schemes—Where markets have organised a computerised and online application, they seem to have benefited from greater success in administering their schemes. This has been in stark

contrast to markets where the administration of the scheme has been archaic, and as a result little or no data are available, and no analysis regarding the effective performance of the scheme is possible.

Central Body Managing the Scheme—It would seem logical to assume that one central body would be given full responsibility but for some markets this was not their chosen route. As a result, these markets (Austria is notable) have no possibility of gathering data regarding the scheme to allow any reasonable analysis of the success and performance of the scheme. Other large markets such as France, administered by the Agence de Services et de Paiement and the Minister responsible for La Relance, enjoyed the responsibility for processing the results of the scheme but, by very early 2010, there was no processed available data beyond the total of vehicles purchased. Finally, by the end of January 2010, some data were released. Possibly this delay was due in part to a lack of dedicated resources.

Suitable Resources to Manage the Applications—There has been criticism in some markets that the resources dedicated to analysing the scheme have been minimal, or under-funded. While some larger markets were able to manage the scheme centrally, their ability to process the data quickly was hampered by lack of resources. For example, Germany's handling of data by the BAFA was particularly efficient in part due to the substantial resources in terms of manpower the ministry was able to dedicate to the task, which as a result produced good quality and detailed analysis. The United Kingdom, on the other hand, placed responsibility with the BSI, which was hampered by confidentiality restrictions, while anecdotal evidence suggests that the United Kingdom boasted a smaller dedicated team to work on the scrapping programme than Germany. France was unable to provide ANY breakdown beyond the top level volume of purchased cars until the last week of January, when some detail was made available. Spain is only able to provide very minimal data regarding top level purchases, scrapped volumes, split of new and used, type of consumer, and basic volume analysis by segment of CO_2, although the Ministry of Tourism and Industry is responsible for disseminating these data.

Inbuilt Fraud Avoidance—The Netherlands was notable in creating a scheme that they felt would reduce the ability to defraud the scheme from the start. This is a laudable intention, and clearly one that would benefit from the establishment of a best practice policy. Early in the operation of the schemes, there were reports in some markets of vehicles that had been scrapped being sold on as used cars, with dealers benefiting twice from the scrapping scheme and the resale of the vehicle. It is possible that in such markets, there is a flimsy reporting system and poor ability to analyse the results of the scheme. Elsewhere, there were anecdotal and unconfirmed reports of scrapped vehicles being exported overseas.

Process Improvement—As it became clear that some markets would extend their schemes into 2010, these same markets looked at revising their schemes to improve efficiencies in some areas. For example, in Spain and the United Kingdom, there was a managed run-out of the scheme as it neared the end of the allocated funds. This avoided customers applying for the subsidy and purchasing a vehicle but then finding out that their application could not be processed due to the exhaustion of funds.

Poor Scheme Organisation (Technical)—In some markets, the excitement and speed to implement a scrapping scheme led to a delay in tackling and informing users of the details of the scheme operation. For example, in the United Kingdom there were initial difficulties with how to process the VAT component of the deals done under the scrapping scheme. In Spain, there were delays in the process by which the dealers received the monies funded by the regional and national government, which put the distribution network in a needlessly precarious position.

3 Evaluate Effectiveness of Schemes upon Automotive Industry

3.1 ANALYSIS OF AUTOMOTIVE INDUSTRY IMPACT—EU LEVEL

3.1.1 Overview: Introduction

The €7.9 billion of public funding from the 2009 scrapping schemes would support a maximum of 4.44 million vehicles over the scheduled period. The total includes incentivised sales of 4.1 million new vehicles during calendar 2009, leaving a spill-over volume of 355,000 units for 2010.

This has helped provide a significant boost to vehicle assembly volumes in the midst of the sharpest and largest contraction in output every witnessed. We calculate that the incremental boost of almost two million units to 2009 production had the potential to forestall (if not eventually prevent) the loss of up to 120,000 direct manufacturing jobs in the industry.

In fact, there is probably much agreement that scrapping schemes have impeded the prospects for wider industry restructuring but debate has moved on to the concept of 'second best' and the assumption of some government intervention, and whether scrapping schemes are an appropriate or efficient mechanism for crisis management and industry support.

Scrapping schemes, however, have significantly distorted the structure of car markets.

3.1.2 Impact of Scrapping Schemes on European Sales and Retail Distribution Networks

Chapter 2 provided details of the estimated net boost to sales of new passenger cars from the scrapping schemes funded by the EU member states. Of the potential 4.1 million units funded, it is estimated that 2.16 million net incremental sales were actually created in 2009. Put another way, without these incentives, the European car market would have been some 20% lower than the eventual outcome. Quite apart from the boost to vehicle production, the improvement in cash flow, and the reduction in inventory for manufacturers, this has provided significant support for the retail distribution network.

3.1.3 Retail Automotive Industry

The retail motor industry is represented at European level by the Executive Board of the European Council for Motor Traders and Repairers (CECRA). In total, 27 national associations from the motor vehicle repair and retail sector are represented by CECRA, providing coverage at EU27 level. In addition, CECRA counts 14 European dealer councils among its members, ensuring that the vehicle passenger distribution sector is also represented. A meeting of CECRA in December 2009 concluded that the scrapping schemes in participating markets have had a positive effect on retail dealer activity.

CECRA points out that it was notable that national governments directed help mainly at the manufacturing side, with the belief that increased volumes of registrations would indirectly support the retail dealers.

The assistance to manufacturing is interesting, however, when one compares the relative volume of employees in both sectors. CECRA data indicate that the manufacturing industry employs around 2.2 million people while the related sales and distribution industry employs 2.8 million people (around 27% more).

In fact, the dealer network also benefits from those schemes, thanks to used car replacement options. This component (detailed in Chapter 2) adds another 15% to the volume; this is in addition to the new car business generated by the scrapping schemes at EU level. Even dealers in Poland (for example) benefited from the German scrapping scheme.

Survey data of motor vehicle retailers in Europe show how, after hitting a record low in the fourth quarter of 2008, their confidence in the level of sales activity rebounded and climbed strongly as more scrapping schemes were launched and budgets extended (Fig. 61). CECRA provides key information about the European retail motor industry, supplied by the 27 professional associations and 14 dealer councils from across Europe that it counts among its membership, and which we have summarised below in Fig 61.

Fig. 61

KEY FACTS—EUROPEAN RETAIL MOTOR INDUSTRY 2009	
Size	380,000 businesses involved in motor trade and repair. 120,000 authorised dealers and repairers (contract with a manufacturer). 71,000 selling and repairing vehicles. 42,000 repairing vehicles. 7,000 selling spare parts. 260,000 independent repairers.
Turnover	€800 billion in sales and service (total). €630 billion in sales of new and used vehicles. €80 billion in repair and maintenance. €90 billion in sales of spare parts.
Number of employees (members of CECRA) Total employed	1.55 million authorised dealers. 1.15 million independent repairers. 0.15 million in distribution of spare parts. 2.8 million (25% of all employees in total automotive sector).
Net profit before tax	**0.3–0.6% of total turnover (2008)**

Source CECRA (2009.)

Before the scrapping schemes were introduced, dealers across Europe were closing down at an accelerated rate as the volume of car sales collapsed in the face of the crisis of confidence and difficulty in obtaining credit financing. In Spain, for example, GANVAM (the trade association for motor traders and repairers) estimated that some 10% of small and medium-sized dealers closed during 2009, and around 30,000 employees in the retail and repair industry lost their jobs. That was even with a scrapping scheme that was fully launched by mid-year, providing an estimated boost of over 130,000 units, or 14% of the market.

CECRA estimates that the arrival of the scrapping schemes helped to stem the closure of dealers and the consequent loss of jobs.

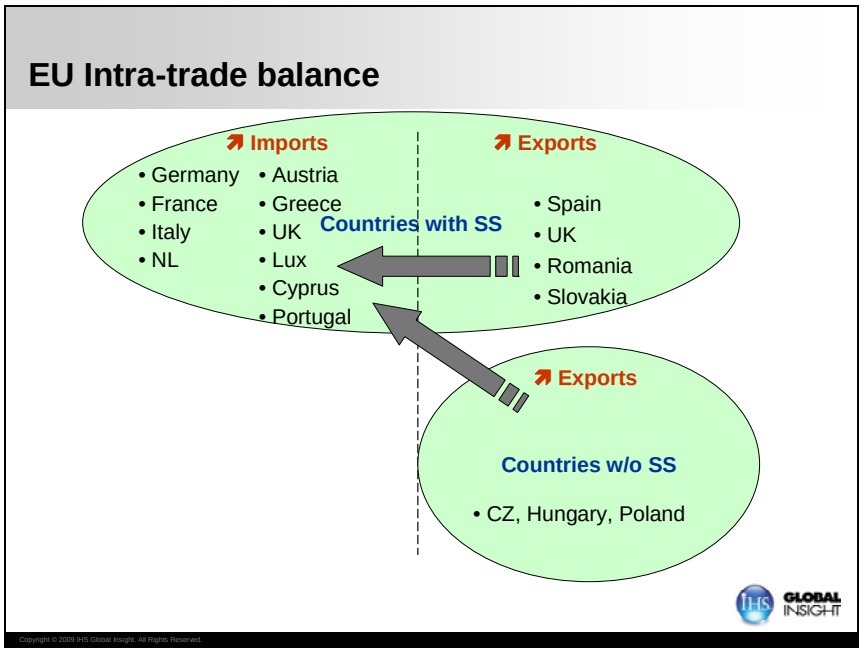
In CECRA's opinion, the situation in 2010 is still worrying, despite the levels of national and government support meted out during the course of 2009. CECRA is concerned that retail dealers will experience a substantial decline in activity in 2010 as incentives are terminated.

3.1.4 Impact on Vehicle Imports from Outside the EU

One concern repeatedly raised over scrapping schemes at a member state level was that the increase in sales generated would be met largely by imports. This leakage would not provide the wider economic stimulus to the domestic economy and so there were typical complaints that tax money was being used to support jobs in other countries.

The extremes of this issue are in evidence in Cyprus, Luxemburg, and Greece, which do not have any final vehicle assembly base. Portugal, the Netherlands, and Austria each have only one car assembly plant, so they are affected to a lesser extent. The only primary linkages in these countries come from the direct components and parts industry that has been supplying other European car plants. These country-specific economic influences are assessed in Chapter 4.

Fig. 62 NET INTRA-TRADE IN EU OWING TO SCRAPPAGE SCHEMES



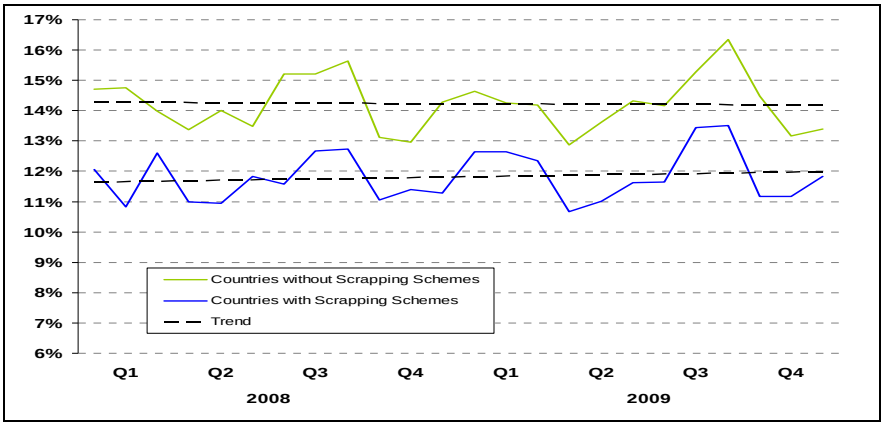
Source: IHS GLOBAL INSIGHT.

At an EU level, we find that the leakages are actually fairly small. Although there is some evidence that they have increased as a result of the scrapping schemes, the increase has not been substantial.

Fig. 63 shows the import penetration of the EU passenger car market. This relates to a sample of countries that had reported year-end data by 15 January. The import share is calculated on the basis of unit volumes sold rather than value, and it is based on the manufacturing source of vehicles registered rather than shipped.

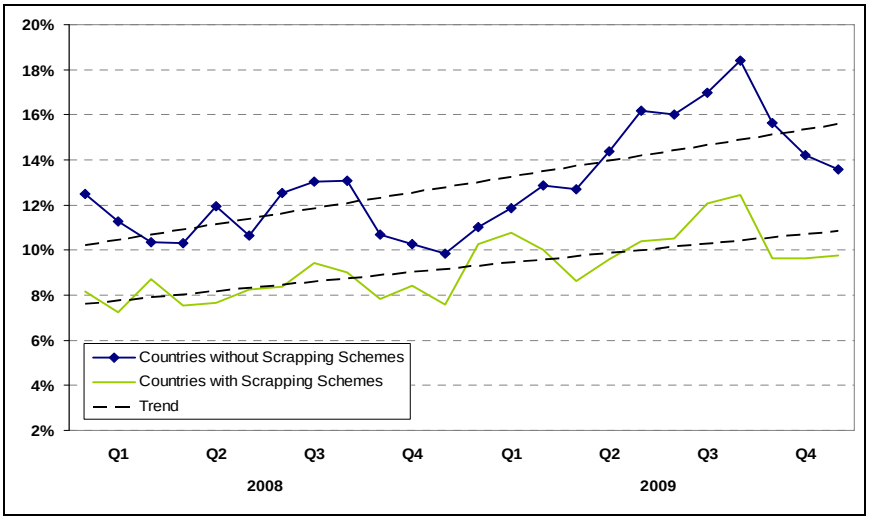
Countries with scrapping schemes have a lower extra EU propensity to import vehicles than those without schemes: just under 12% compared with just over 14%. During the height of the scrapping schemes in 2009 there was, perhaps surprisingly, only a small increase in the aggregate import share relative to those countries without schemes.

Fig. 63 MARKET SHARE FOR CAR IMPORTS INTO THE EU25: TOTAL MARKET



Source: IHS GLOBAL INSIGHT.

Fig. 64 MARKET SHARE FOR CAR IMPORTS INTO THE EU25 SMALLER SEGMENTS (A, B, AND C1)



Source: IHS GLOBAL INSIGHT.

Since scrapping schemes have a disproportionate effect on smaller and cheaper cars (see below), we have performed the same comparative analysis for the smaller market segments: A, B, and C1 (Fig. 64). In fact, Europe has a strong competitive position in the small car segments, and import penetration has been historically lower here (although at the other extreme for premium brands). **In other words, scrapping schemes actually target vehicles with stronger domestic regional linkages.** To some extent, the import penetration of smaller cars is expected to increase over time, with more global sourcing of vehicles by established European players.

Also noticeable is that where the scrapping schemes were up and running, the import penetration rates in the smaller car segments increased from around 8% to over 10%. This suggests some increase in leakages because of the scrapping schemes. The effect is weaker than it appears. First, even at this higher rate, it is still below the average import propensity of the wider market. Second, if anything, the increase in import penetration exhibited by those countries without schemes was higher than those with schemes. Third, new

Asian-sourced micro-car additions to the Toyota and Nissan European line-ups were likely to have increased import penetration of these segments, even without scrapping schemes.

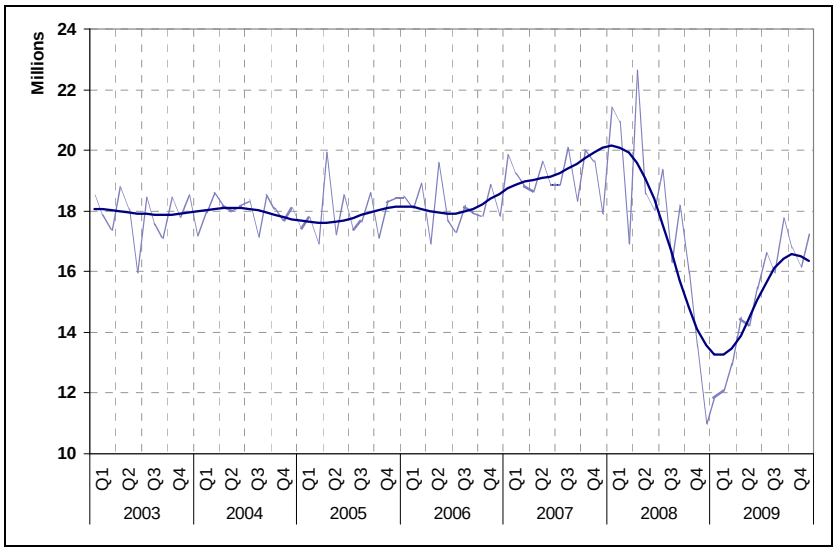
Based on scrapping scheme data from early November, and adjusting for exogenous sourcing decisions, we estimate that the import propensity of all cars sold under scrapping schemes was 16.3%. This represents an additional leakage compared with the 13% for the total market. This is applied only to the incremental volume generated by the scheme.

In volume terms, the additional 2.16 million vehicles sold under the scrapping schemes increased imports into the EU by approximately 350,000 units. Most of this is the natural increase generated by a stronger market. In fact, we estimate that just 70,000 units out of this total were caused by the increase in import penetration generated as a by-product of the down-pricing and downsizing effect of scrapping schemes.

3.1.5 Impact of Scrapping Schemes on European Vehicle Production

The shot in the arm that European sales received from the 2009 scrapping schemes did not translate directly, or immediately, into better vehicle production prospects for domestic vehicle manufacturing. First, the boost to the total market suffered from the increase in import leakages described above. Second, the initial surge in sales, which occurred during the first three to four months of the operation, was fed primarily by inventory and used to accelerate inventory reduction. As a result, there was a lag of several months before production lines started to respond to the higher sales trajectory. Complicating the attempt to re-engage production rates with orders was the substantial remixing (down-segmenting) of the market. This resulted in inventory of small cars being quickly exhausted and shortages began to develop.

Fig. 65 EU25 LV PRODUCTION TREND
SEASONALLY ADJUSTED ANNUALISED PRODUCTION RUNNING RATE



Source: IHS GLOBAL INSIGHT.

The initial unexpected surge in sales and then its unexpected extension and continued strength continued to keep production planners behind the curve. Inventory was continually being run down, despite the strong recovery in production rates by the middle of 2009. This situation basically persisted throughout the second half of 2009. Paradoxically, the scrapping schemes actually resulted in inventory reduction being larger than would otherwise have taken place because of the sharp swing from planned, to unplanned, inventory

reduction during the year. This is likely to be a temporary distortion created only by calendar year cut-off points. In fact, it implies that European production entered 2010 with abnormally low stocks, even accounting for the general expectation of a significant slide in car sales in 2010. These will have to be rebuilt in 2010, at least for smaller cars.

By adjusting the incremental sales growth for these distortions to timing, imports, and inventory, it is possible to provide some estimate of how EU-wide motor vehicle production would have developed in the absence of the scrapping incentives. Fig. 66 shows that production rates really started to accelerate in the third quarter, as manufacturers moved into catch-up mode.

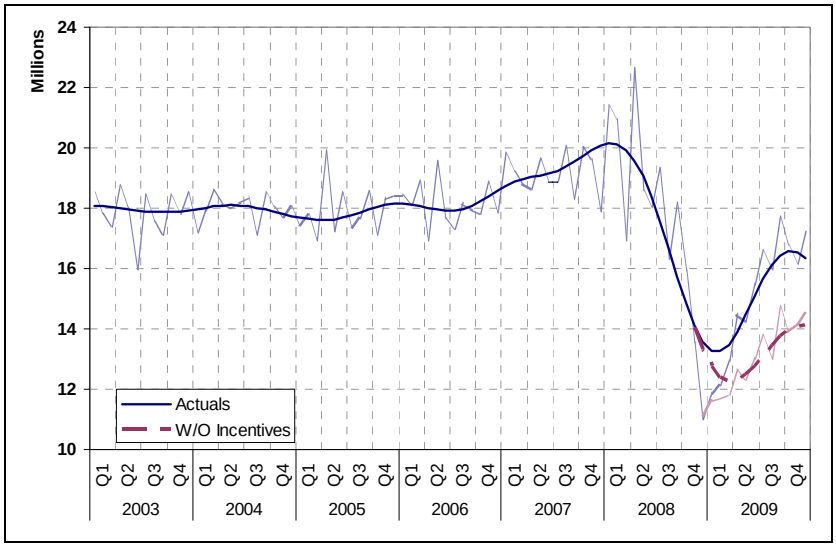
The sharp increase in vehicle manufacturing (on a quarter-on-quarter basis) supported an improvement in industrial production and aided the eventual emergence of the Eurozone from recession in the third quarter.

Only a few countries had reported 2009 vehicle production at the time of writing. Incoming estimates suggest, however, that EU production of light vehicles will be around 15.1 million units: a substantial decline of 2.7 million units or 15% lower than 2008.

In the absence of European scrapping schemes, production is projected to have fallen by an additional two million units to little more than 13 million units and it would have recorded a collapse of 26% on 2008 vehicle output.

The net positive effect of domestic scrapping schemes on EU production volumes in 2009 is estimated to be two million units, which is 15% higher than would otherwise have been the case. The greatest effects were seen in the third and fourth quarters.

Fig. 66 EU25 LV Production Compared with Projected Development Without Scrapping Schemes
Seasonally Adjusted Annualised Production Running Rate



Source: IHS GLOBAL INSIGHT.

In summary, scrapping schemes have provided an unusually efficient mechanism for supporting vehicle manufacturers (and eventually the automotive supply chain) in this particular crisis. With access to corporate financing limited in the early phase of the financial crisis, OEMs were able to generate their own cash financing by selling out of inventory and shutting down production (which was happening at a far higher rate than seen before). The scrapping schemes enabled an accelerated burn of inventory, and generation of cash

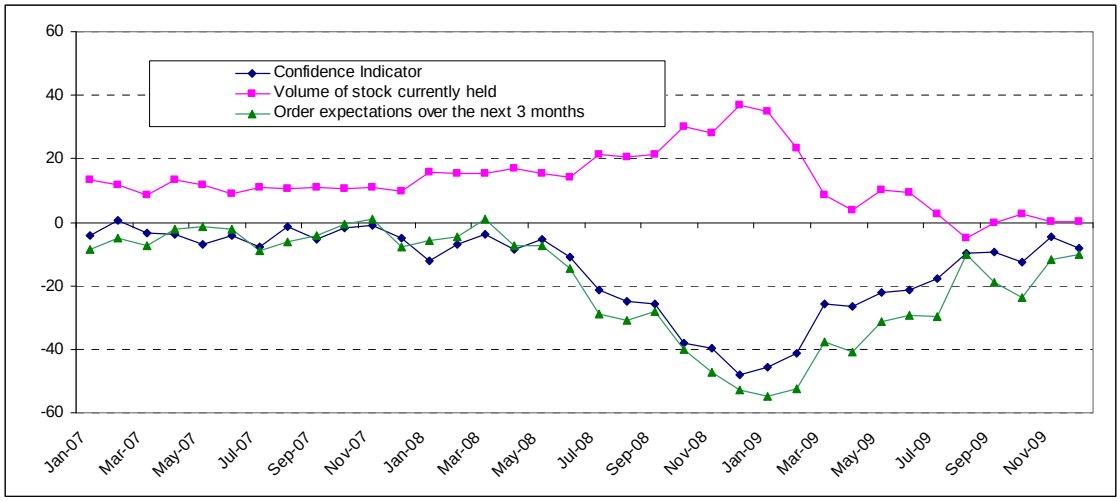
flow financing for the car manufacturers, who would otherwise have seen longer and deeper production stoppages.

While the OEMs were generating cash in this process, the supply chain of component parts manufacturers were not delivering, and their financial situation was deteriorating by the month. The scrapping schemes allowed car manufacturers to increase production schedules at an earlier stage and at a stronger rate, thus helping the supply chain, while at the same time continuing to see an improvement in cash flow generation via inventory reduction.

3.1.6 Impact of Scrapping Schemes on European Automotive Capacity Utilisation

Survey data of manufacturers in Europe suggest that there was a significant rise in vehicle inventory levels at the end of 2008 (Fig. 67). With very severe cutbacks in vehicle production across the entire EU, record de-stocking was already under way by early spring 2009. Then, at the height of the scrapping schemes, inventory levels continued to fall and register consistently low readings. Paradoxically, most anecdotal evidence suggests that serious order backlogs were developing, with delivery times for 'hot-selling' scrapping scheme vehicles lengthening dramatically, despite the fact that large tracts of the assembly base were severely underused.

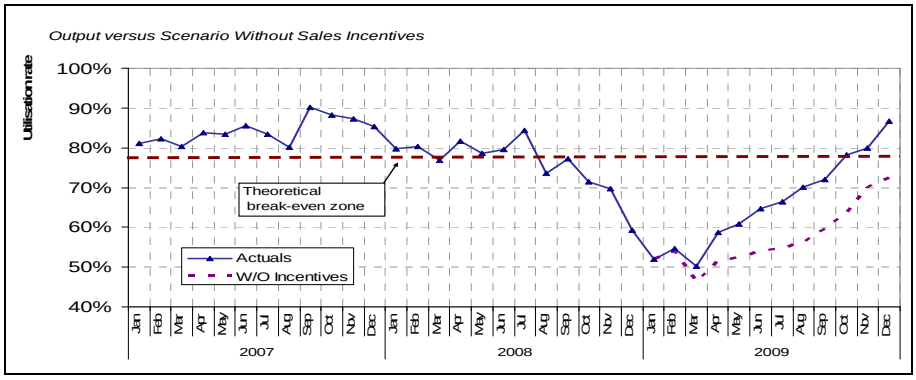
Fig. 67 Business Climate Indicator for Motor Vehicle Retail Sales in Next 12 Months in EU27



Source: IHS Global Insight, BCI, Eurostat.

Recent European production running rates can be summarised in four distinctive phases over 2008–09. From August to October 2008, we saw a "wait-and-see" phase. In November and December 2008, we saw the "collapse" that extended into February. A few months after that, it was clear that production levels had hit bottom, with "severe planned de-stocking". Finally, from May to December 2009, there was the "catching up" phase that eventually resulted in excessive or unplanned inventory reduction. These phases can also be seen by analysing Fig. 68, which shows estimated monthly capacity utilisation rates for all light vehicle manufacturers inside the EU.

Fig. 68 MONTHLY UTILISATION RATES FOR LIGHT VEHICLE PRODUCTION IN THE EU27



Source: IHS GLOBAL INSIGHT.

During the period of "collapse", manufacturers took a very aggressive line, with almost daily announcements of long plant shutdowns. In the first quarter of 2009, virtually every assembly plant in Europe had some downtime and some were closed for the whole quarter. As discussed earlier, the scrappage-boosted sales did not have an immediate effect on production. This can be seen as the lag between the ramp-up of the schemes and better use of capacity. Production was still running at the lowest levels recorded in recent European history: barely at 50% for three months running. The second quarter of 2009 saw the first wave of the effects of the numerous scrappage schemes on production and capacity utilisation. Budget brands such as Dacia and Skoda and the smaller car plants of the European mass-market brands started to re-open, reversing already announced closures. Indeed, for some plants there was a return to three-shift working. The car plants exclusively making larger and more expensive cars continued with their enforced short-time work or plant closure. Only a few assembly plants have closed or have been scheduled for closure since the start of the crisis. These include a Land Rover facility in Britain, Fiat closing its Sicilian plant of Termini (Italy), and Opel pressing ahead with the closure of its factory in Antwerp (Belgium).

The scrapping schemes meant that European plants saw utilisation rates below the critical limit of 60% for a period of five months, eventually reaching generally accepted break-even levels for the last two or three months of the year (Fig. 68).

Likely rates of utilisation in the absence of scrapping schemes would have prolonged this critical period to nearer to 10 months, without reaching break-even therefore in any month in 2009.

These conclusions will provide ammunition for both sides in the debate on industry restructuring.

On the one hand, the scrapping schemes were enormously effective in providing direct stimulus to the automotive industry, preventing an untold number of companies in the supply chain from facing bankruptcy. In addition, it probably reduced other forms of government financial support that would have been eventually offered as the financial condition of key industry players deteriorated still further. In terms of wider restructuring, they allowed a time for managed rather than enforced rightsizing of industrial capacity.

On the other hand, sufficient stimulus reached car manufacturers early enough, and so they did not take significant steps to reduce installed capacity. No manufacturer exited the market during the crisis. This means that, with the most critical period past, even if they do act at a later date, manufacturers may not take restructuring far enough for the longer term. (In the EU, capacity utilisation was just below 65% in 2009 and, based on current market forecasts in the absence of further plant closures, it may not exceed 70% until 2012).

3.2 IMPACT OF SCRAPPING SCHEMES ON MARKET STRUCTURE

3.2.1 Impact on Market Segmentation

Some of the largest shifts seen in recent history and in a single year occurred in European car market segmentation during 2009. The severity of the financial and economic crisis is the backdrop for this phenomenon. Notable was the effect of the crisis on corporate financing with a steep drop in business and company car sales. This, in turn, hit the middle and upper segments and demand for premium brands; however, European car scrapping schemes provide most of the explanation for these significant changes in market mix.

The segmentation system used in this report is a detailed 26-segment subdivision of the market, based largely on size, body concept, and price. The segment scheme is typical of that used by the automotive industry, although no two systems are identical. The A segment comprises micro-cars or city cars up to 3,800mm long, typified by the Fiat Panda. The B Segment is the super-mini class, typified by the Renault Clio. The C1 segment comprises compact cars, represented by the VW Golf. Other segments (in alphabetical order) include cars that are more than 4,500mm in length and priced higher than those in the C1 segment. Vehicles are also classified as having SUV or MPV body shapes. A summary of this market classification at EU level for 2004–09 is provided in Fig. 69. (The table is based on new registration data as at mid-January 2010; it excludes Luxembourg, Cyprus, and Malta).

Fig. 69 ACTUAL CAR MARKET SEGMENTATION: VOLUME AND MARKET SHARE

EU24 Passenger Car Market Segmentation						
Segments	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
A	876,701	885,608	1,038,841	1,121,343	1,287,101	1,693,035
A Share	5.84%	5.90%	6.85%	7.32%	9.16%	12.13%
B	4,060,680	3,888,775	4,120,947	4,146,800	3,765,501	4,049,535
B Share	27.06%	25.90%	27.17%	27.05%	26.78%	29.01%
C1	3,162,695	3,231,291	2,926,563	2,870,596	2,622,601	2,536,279
C1 Share	21.08%	21.52%	19.29%	18.73%	18.65%	18.17%
MPV	2,114,493	2,124007	2,113,802	2,111,970	1,672,227	1,372,083
MPV Share	14.09%	14.14%	13.94%	13.78%	11.89%	9.83%
SUV	837,968	939,334	1,032,563	1,257,366	1,137,382	1,157,886
SUV Share	5.58%	6.26%	6.81%	8.20%	8.09%	8.29%
Utility Vans	210,399	212,668	215,529	197,819	222,891	282,914
Utility Vans Share	1.40%	1.42%	1.42%	1.29%	1.59%	2.03%
Other Segments	3,741,008	3,734,959	3,719,819	3,621,584	3,351,195	2,868,822
Other Segments Share	24.93%	24.87%	24.52%	23.63%	23.84%	20.55%
Total Market	**15,003,944**	**15,016,642**	**15,168,064**	**15,327,478**	**14,058,898**	**13,960,554**

Source: IHS GLOBAL INSIGHT.

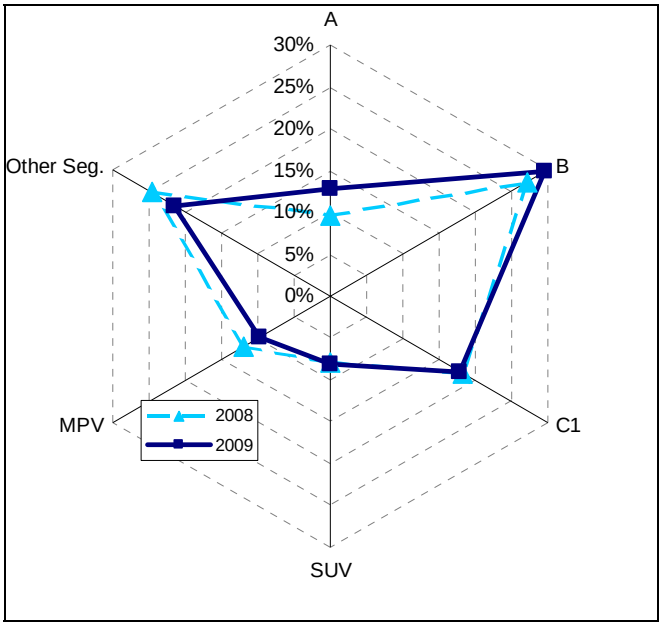
The EU passenger car market fell slightly in 2009, despite the enormous positive influence of the scrapping stimulus. It is clear that within this relatively stable top-line number, the market structure changed dramatically.

Sales of the smallest cars (A segment) surged by over 400,000 units or 31%, taking their share to 12.1%. This represents an extra 300 basis points of market share. Sales of cars in the next size and price class

(B segment) also increased significantly: up by almost 300,000 units, thus taking their market share up by 220 basis points.

The only two other segments to see growth were small SUV and utility van segments. All other segments contracted sharply in terms of sales and market share. Utility vans are passenger versions of vehicles like the Citroen Berlingo. Their sales increased sharply while the generally more expensive car-derived MPV concepts suffered a collapse in sales: down by 18% to 300,000 units. In the larger, more expensive, segment, only the SUV category saw an increase in sales. This can be partly explained by the recent entry of new lightweight crossover vehicles (such as the Nissan Qashqai), which are segmented as SUVs because of their silhouette. All other segments registered significant sales declines; these averaged 15% (a loss of 320 basis points of market share).

Fig. 70 CHANGE TO MARKET SEGMENTATION IN 2009 FOR MARKETS WITH SCRAPPING SCHEMES



Source: IHS GLOBAL INSIGHT.

These changes are also shown graphically in Fig. 70. We use the term 'downsizing' as shorthand for these changes, although we want to be clear that the specific mechanism by which this occurs is more probably because of a change in the propensity to purchase lower-priced cars than in the propensity to purchase smaller cars. The physical downsizing is primarily a side-effect of down-pricing.

There appears to be a **change in consumer psychology when scrapping schemes are in place**. One important theory here is what we call 'bargain price maximisation'. In this context, purchasers are swayed by attempting to achieve the highest percentage discount. At the point of purchase, the perceived satisfaction of this can be higher and it can thus offset the difference in the expected utility between competing cars.

While car-scrapping schemes are running, this bargain price maximisation therefore results in consumers choosing vehicles that are cheaper and smaller than they may have chosen under non-incentive conditions. The downsizing effect is a pure side-effect of bargain price maximisation.

One possible explanation of the change is the typical demographic profile of new car buyers while scrapping schemes are in force. Since a section of the new incremental buyers would, by definition, have transacted in

the used car market (see Chapter 2), the mix of new car buyers under scrapping schemes changes and they may influence aggregate consumer psychology.

Another important reason for the strong sensitivity to price is the tighter budget constraint likely to be in operation for consumers typically buying used cars. Some of these consumers may stretch that allocated budget. It is obvious, however, that a far larger proportion of typical buyers of used vehicles (say, four to five years old) will be able to afford to purchase a small car with a net incentive price of €6,000–7,000 (compared with the average price of nearer €18,000 for a car in the EU). Also, with the discounting effect taking place as a result of the scrapping schemes activity, cars normally priced at the €18,000 level have been reduced, thanks to the various discounts in place to nearer the €12,000–13,000 level, hence taking these vehicles within reach of the traditional used car buyers who have stretched their budgets (see Fig. 82–86 for sample data collected to display the observed pricing and discounting activity).

Fig. 71

NEW SALES PERFORMANCE OF SELECTED BRANDS IN MARKETS WITH AND WITHOUT SCRAPPAGE SCHEMES									
		EU Countries with Scrappage Schemes				EU Countries Without Scrappage Schemes			
Group	Brand	2008	2009	2008	2009	2008	2009	2008	2009
		Volumes	Volumes	Mkt %	Mkt %	Volumes	Volumes	Mkt %	Mkt %
BMW	BMW	580,868	495,088	4.75%	3.96%	72,033	58,615	3.45%	3.52%
	Mini	128,453	123,774	1.05%	0.99%	10,882	7,836	0.52%	0.47%
	Total BMW	**709,321**	**618,862**	**5.80%**	**4.96%**	**82,915**	**66,451**	**3.98%**	**4.00%**
Chrysler LLC	**Total Chrysler**	**73,145**	**40,938**	**0.60%**	**0.33%**	**11,699**	**6,744**	**0.56%**	**0.41%**
Daimler AG	Mercedes-Benz	608,282	525,645	4.98%	4.21%	57,373	47,262	2.75%	2.84%
	SMART	97,780	90,260	0.80%	0.72%	3,248	2,543	0.16%	0.15%
	Total Daimler	**706,062**	**615,905**	**5.78%**	**4.93%**	**60,621**	**49,805**	**2.91%**	**2.99%**
Fiat Group	Alfa Romeo	90,908	100,401	0.74%	0.80%	7,089	6,182	0.34%	0.37%
	Fiat	861,301	935,999	7.05%	7.50%	76,486	66,111	3.67%	3.97%
	Lancia	109,842	117,081	0.90%	0.94%	2,925	3,037	0.14%	0.18%
	Total Fiat*	**1,068,037**	**1,158,160**	**8.74%**	**9.28%**	**86,871**	**75,623**	**4.17%**	**4.55%**
Ford	Ford	1,047,165	1,135,217	8.57%	9.09%	162,681	142,818	7.80%	8.59%
	Volvo	123,982	119,397	1.01%	0.96%	89,614	77,525	4.30%	4.66%
	Total Ford	**1,171,147**	**1,254,614**	**9.58%**	**10.05%**	**252,295**	**220,343**	**12.10%**	**13.25%**
GM	Chevrolet	145,616	165,880	1.19%	1.33%	30,605	21,148	1.47%	1.27%
	Opel / Vauxhall	987,688	945,471	8.08%	7.57%	143,297	101,809	6.87%	6.12%
	Saab	34,326	15,526	0.28%	0.12%	28,227	10,096	1.35%	0.61%
	Total GM	**1,167,630**	**1,126,877**	**9.55%**	**9.02%**	**203,067**	**133,530**	**9.74%**	**8.03%**
Honda	**Total Honda**	**202,791**	**195,547**	**1.66%**	**1.57%**	**51,874**	**39,216**	**2.49%**	**2.36%**
Hyundai	Hyundai	200,810	279,896	1.64%	2.24%	58,589	54,400	2.81%	3.27%
	Kia	168,441	199,660	1.38%	1.60%	59,303	53,360	2.84%	3.21%
	Total Hyundai	**369,251**	**479,556**	**3.02%**	**3.84%**	**117,892**	**107,760**	**5.65%**	**6.48%**
Mazda	**Total Mazda**	**190,358**	**173,841**	**1.56%**	**1.39%**	**42,908**	**28,108**	**2.06%**	**1.69%**
Mitsubishi	**Total Mitsubishi**	**88,169**	**71,173**	**0.72%**	**0.57%**	**25,766**	**22,781**	**1.24%**	**1.37%**
Nissan	**Total Nissan**	**272,746**	**315,486**	**2.23%**	**2.53%**	**57,039**	**46,079**	**2.74%**	**2.77%**
Other	**Total Other**	**67,663**	**58,475**	**0.55%**	**0.47%**	**17,227**	**13,954**	**0.83%**	**0.84%**
Porsche Se	**Total Porsche**	**31,737**	**29,629**	**0.26%**	**0.24%**	**2,192**	**1,986**	**0.11%**	**0.12%**
PSA	Citroen	728,829	768,617	5.96%	6.16%	110,578	85,286	5.30%	5.13%
	Peugeot	850,294	879,164	6.96%	7.04%	134,099	98,515	6.43%	5.92%
	Total PSA	**1,579,123**	**1,647,781**	**12.92%**	**13.20%**	**244,677**	**183,801**	**11.73%**	**11.05%**
Renault	Dacia	169,020	223,488	1.38%	1.79%	10,576	10,389	0.51%	0.62%
	Renault	963,309	972,638	7.88%	7.79%	116,114	104,679	5.57%	6.29%
	Total Renault	**1,132,329**	**1,196,126**	**9.26%**	**9.58%**	**126,690**	**115,068**	**6.08%**	**6.92%**
Suzuki	**Total Suzuki**	**179,027**	**201,144**	**1.46%**	**1.61%**	**61,283**	**40,528**	**2.94%**	**2.44%**
Tata	**Total Tata**	**102,986**	**84,464**	**0.84%**	**0.68%**	**9,755**	**6,171**	**0.47%**	**0.37%**
Toyota	Lexus	22,999	16,273	0.19%	0.13%	5,369	3,191	0.26%	0.19%
	Toyota	556,804	564,284	4.55%	4.52%	172,542	127,740	8.28%	7.68%
	Total Toyota**	**632,621**	**613,702**	**5.18%**	**4.91%**	**179,597**	**131,522**	**8.61%**	**7.91%**
VW Group	Audi	562,651	526,048	4.60%	4.21%	77,071	64,099	3.70%	3.85%
	Seat	293,124	284,102	2.40%	2.28%	34,002	24,884	1.63%	1.50%
	Skoda	289,850	336,336	2.37%	2.69%	142,850	129,850	6.85%	7.81%
	VW	1,331,870	1,456,619	10.90%	11.67%	196,789	154,870	9.44%	9.31%
	Total VW***	**2,479,934**	**2,604,343**	**20.29%**	**20.86%**	**450,712**	**373,703**	**21.62%**	**22.47%**
GRAND TOTAL		**12,224,077**	**12,486,623**	**100.00%**	**100.00%**	**2,085,084**	**1,663,180**	**100.00%**	**100.00%**

Source: IHS GLOBAL INSIGHT.

** Total Fiat includes Ferrari, Iveco and Maserati brands. **Total Toyota includes Daihatsu and Scion brands. ***Total VW includes Bentley, Bugatti and Lamborghini brands.*

Fig. 72

EU25 Sales by Group and Brand							
	Brand	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
BMW	BMW	569,911	636,326	662,566	682,212	652,665	553,554
	Mini	120,863	125,523	110,971	140,814	139,335	131,610
	Total BMW	**690,907**	**761,986**	**773,649**	**823,225**	**792,236**	**685,313**
Chrysler LLC	**Total Chrysler**	**94,797**	**89,506**	**106,724**	**113,584**	**84,844**	**47,682**
Daimler AG	Mercedes-Benz	686,483	686,201	707,969	709,803	665,614	572,864
	SMART	129,984	129,197	99,977	92,044	101,028	92,803
	Total Daimler	**816,551**	**815,449**	**808,012**	**801,905**	**766,683**	**665,710**
Fiat Group	Alfa Romeo	149,865	124,882	140,024	138,977	97,997	106,583
	Fiat	848,998	747,690	891,117	961,804	937,726	1,002,059
	Lancia	114,321	117,396	115,436	120,987	112,767	120,118
	Total Fiat	**1,117,465**	**995,084**	**1,151,746**	**1,227,942**	**1,154,908**	**1,233,783**
Ford	Ford	1,290,111	1,252,776	1,261,349	1,283,311	1,209,840	1,278,028
	Volvo	247,824	245,696	235,691	255,682	213,593	196,916
	Total Ford	**1,537,955**	**1,498,496**	**1,497,055**	**1,539,004**	**1,423,442**	**1,474,957**
GM	Chevrolet	43,925	169,596	176,741	195,653	176,221	187,028
	Opel / Vauxhall	1,364,117	1,350,631	1,308,793	1,316,182	1,128,644	1,046,226
	Saab	78,559	79,417	87,055	81,547	62,553	25,622
	Total GM	**1,607,902**	**1,609,946**	**1,575,676**	**1,597,068**	**1,370,700**	**1,260,407**
Honda	**Total Honda**	**228,179**	**250,681**	**268,001**	**299,847**	**254,665**	**234,763**
Hyundai	Hyundai	316,389	330,008	313,513	295,374	259,399	334,296
	Kia	174,879	251,877	235,411	246,011	227,744	253,020
	Total Hyundai	**491,268**	**581,885**	**548,924**	**541,385**	**487,143**	**587,316**
Mazda	**Total Mazda**	**248,754**	**227,455**	**247,886**	**232,068**	**233,266**	**201,949**
Mitsubishi	**Total Mitsubishi**	**130,909**	**139,549**	**129,554**	**136,943**	**113,935**	**93,954**
Nissan	**Total Nissan**	**392,475**	**368,392**	**324,825**	**305,566**	**329,952**	**362,435**
Other	**Total Other**	**215,957**	**159,026**	**140,886**	**109,447**	**84,724**	**71,566**
Porsche Se	**Total Porsche**	**37,452**	**42,641**	**42,380**	**43,013**	**33,929**	**31,615**
PSA	Citroen	905,900	919,636	899,525	925,197	839,407	853,903
	Peugeot	1,189,054	1,119,047	1,098,972	1,083,680	984,393	977,679
	Total PSA	**2,094,954**	**2,038,683**	**1,998,497**	**2,008,877**	**1,823,800**	**1,831,582**
Renault	Dacia	61,537	116,262	136,510	169,845	179,596	233,877
	Renault	1,550,984	1,467,806	1,284,547	1,187,279	1,079,423	1,077,317
	Total Renault	**1,612,521**	**1,584,068**	**1,421,057**	**1,357,124**	**1,259,019**	**1,311,194**
Suzuki	**Total Suzuki**	**213,146**	**237,612**	**255,219**	**277,583**	**240,310**	**241,672**
Tata	**Total Tata**	**139,601**	**135,913**	**130,715**	**138,515**	**112,741**	**90,635**
Toyota	Lexus	20,104	22,401	38,592	38,961	28,368	19,464
	Toyota	744,209	768,909	833,887	872,069	729,346	692,024
	Total Toyota	**789,549**	**823,506**	**916,095**	**966,182**	**812,218**	**745,224**
VW Group	Audi	548,602	600,373	621,243	639,257	639,722	590,147
	Seat	391,553	371,821	381,655	378,047	327,126	308,986
	Skoda	388,645	411,573	437,581	452,757	432,700	466,186
	VW	1,469,375	1,527,322	1,641,984	1,588,640	1,527,877	1,610,923
	Total VW	**2,801,575**	**2,914,832**	**3,086,027**	**3,062,946**	**2,930,646**	**2,978,046**
Grand Total		**15,261,917**	**15,274,710**	**15,422,928**	**15,582,224**	**14,309,161**	**14,149,803**

Source: IHS GLOBAL INSIGHT.

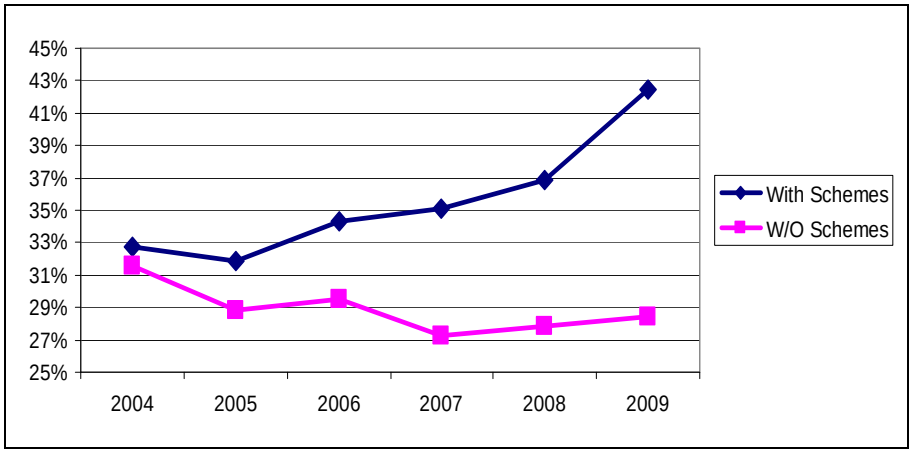
Fig. 73

EU25 Market Share by Group and Brand							
	Brand	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
BMW	BMW	3.73%	4.17%	4.30%	4.38%	4.56%	3.91%
	Mini	0.79%	0.82%	0.72%	0.90%	0.97%	0.93%
	Total BMW	**4.53%**	**4.99%**	**5.02%**	**5.28%**	**5.54%**	**4.84%**
Chrysler LLC	**Total Chrysler**	**0.62%**	**0.59%**	**0.69%**	**0.73%**	**0.59%**	**0.34%**
Daimler AG	Mercedes-Benz	4.50%	4.49%	4.59%	4.56%	4.65%	4.05%
	SMART	0.85%	0.85%	0.65%	0.59%	0.71%	0.66%
	Total Daimler	**5.35%**	**5.34%**	**5.24%**	**5.15%**	**5.36%**	**4.70%**
Fiat Group	Alfa Romeo	0.98%	0.82%	0.91%	0.89%	0.68%	0.75%
	Fiat	5.56%	4.89%	5.78%	6.17%	6.55%	7.08%
	Lancia	0.75%	0.77%	0.75%	0.78%	0.79%	0.85%
	Total Fiat	**7.32%**	**6.51%**	**7.47%**	**7.88%**	**8.07%**	**8.72%**
Ford	Ford	8.45%	8.20%	8.18%	8.24%	8.46%	9.03%
	Volvo	1.62%	1.61%	1.53%	1.64%	1.49%	1.39%
	Total Ford	**10.08%**	**9.81%**	**9.71%**	**9.88%**	**9.95%**	**10.42%**
GM	Chevrolet	0.29%	1.11%	1.15%	1.26%	1.23%	1.32%
	Opel / Vauxhall	8.94%	8.84%	8.49%	8.45%	7.89%	7.39%
	Saab	0.51%	0.52%	0.56%	0.52%	0.44%	0.18%
	Total GM	**10.54%**	**10.54%**	**10.22%**	**10.25%**	**9.58%**	**8.91%**
Honda	**Total Honda**	**1.50%**	**1.64%**	**1.74%**	**1.92%**	**1.78%**	**1.66%**
Hyundai	Hyundai	2.07%	2.16%	2.03%	1.90%	1.81%	2.36%
	Kia	1.15%	1.65%	1.53%	1.58%	1.59%	1.79%
	Total Hyundai	**3.22%**	**3.81%**	**3.56%**	**3.47%**	**3.40%**	**4.15%**
Mazda	**Total Mazda**	**1.63%**	**1.49%**	**1.61%**	**1.49%**	**1.63%**	**1.43%**
Mitsubishi	**Total Mitsubishi**	**0.86%**	**0.91%**	**0.84%**	**0.88%**	**0.80%**	**0.66%**
Nissan	**Total Nissan**	**2.57%**	**2.41%**	**2.11%**	**1.96%**	**2.31%**	**2.56%**
Other	**Total Other**	**1.42%**	**1.04%**	**0.91%**	**0.70%**	**0.59%**	**0.51%**
Porsche Se	**Total Porsche**	**0.25%**	**0.28%**	**0.27%**	**0.28%**	**0.24%**	**0.22%**
PSA	Citroen	5.94%	6.02%	5.83%	5.94%	5.87%	6.03%
	Peugeot	7.79%	7.33%	7.13%	6.95%	6.88%	6.91%
	Total PSA	**13.73%**	**13.35%**	**12.96%**	**12.89%**	**12.75%**	**12.94%**
Renault	Dacia	0.40%	0.76%	0.89%	1.09%	1.26%	1.65%
	Renault	10.16%	9.61%	8.33%	7.62%	7.54%	7.61%
	Total Renault	**10.57%**	**10.37%**	**9.21%**	**8.71%**	**8.80%**	**9.27%**
Suzuki	**Total Suzuki**	**1.40%**	**1.56%**	**1.65%**	**1.78%**	**1.68%**	**1.71%**
Tata	**Total Tata**	**0.91%**	**0.89%**	**0.85%**	**0.89%**	**0.79%**	**0.64%**
Toyota	Lexus	0.13%	0.15%	0.25%	0.25%	0.20%	0.14%
	Toyota	4.88%	5.03%	5.41%	5.60%	5.10%	4.89%
	Total Toyota	**5.17%**	**5.39%**	**5.94%**	**6.20%**	**5.68%**	**5.27%**
VW Group	Audi	3.59%	3.93%	4.03%	4.10%	4.47%	4.17%
	Seat	2.57%	2.43%	2.47%	2.43%	2.29%	2.18%
	Skoda	2.55%	2.69%	2.84%	2.91%	3.02%	3.29%
	VW	9.63%	10.00%	10.65%	10.20%	10.68%	11.38%
	Total VW	**18.36%**	**19.08%**	**20.01%**	**19.66%**	**20.48%**	**21.05%**
Grand Total		**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: IHS GLOBAL INSIGHT.

Fig. 71 shows how the combination of consumer behaviour along with the price discounting has affected segmentation decision making. This can best be seen by comparing developments in countries with and without scrapping schemes. The market share of smaller cars (A and B segments) increased only marginally in those countries that did not have scrapping schemes while there was a dramatic increase of 550 basis points in incentivised markets.

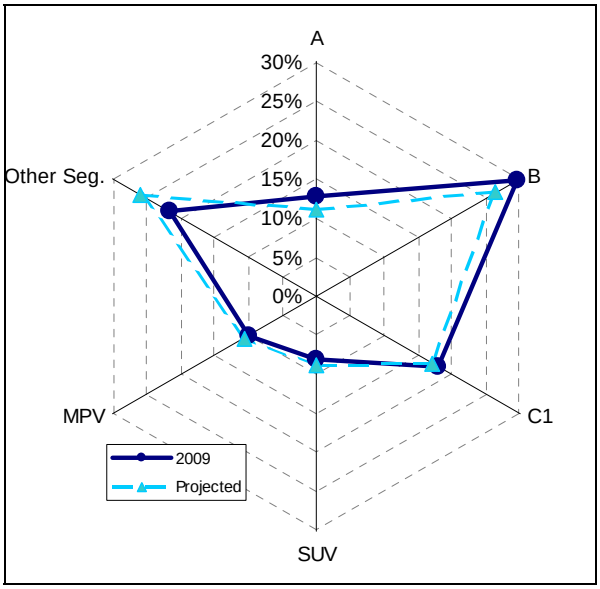
Fig. 74 Combined Market Share of A-Segment and B-Segment Vehicles in Countries with and Without Scrapping Schemes



Source: IHS GLOBAL INSIGHT.

A simple comparative projection method was used to gauge the effect of scrapping schemes on the overall market segmentation of those markets. Taking the relative changes in segment shares in those countries without scrapping schemes and applying these to the market mix in 2008 makes it possible to get a simple projection of how segments may have developed in the absence of scrapping schemes (Fig. 75).

Fig. 75 Segmentation for 2009 Compared with Projections Without Scrapping Schemes



Note: Market share data for 2009 are actualised. The 2009 projected shares are based on segment trends and on observed segment developments in EU countries that do not have scrapping schemes.

Source: IHS GLOBAL INSIGHT.

3.2.2 Segmentation of Scrapping-Scheme-Induced Demand

The analysis provides a clear description of the changes in overall market segmentation. It is an aggregate of vehicles sold in the market, the vast majority of which (around 83%) were not part of the scrapping programmes.

In order to assess the vehicle choice made by consumers purchasing cars via the scrapping schemes, we used the same simple comparative projection method outlined above. This was applied only to the incremental sales generated by the scrapping schemes. The results are outlined in Figs. 76, 77, and 78.

Fig. 76 Calculated Net Impact of Scrapping Schemes By Segment and Propensity Relative to Overall Market (Markets with Scrapping Schemes)

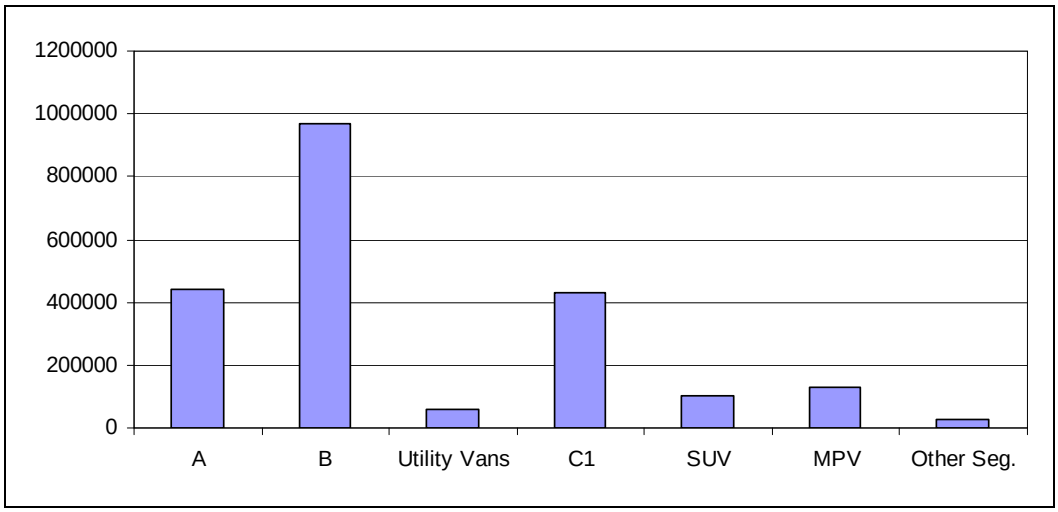
Calculated Distribution of Incremental Demand by Segment			
Segments	**Volume Boost**	**% Boost**	**Relative Propensity**
A	440,056	38%	82%
B	970,161	35%	69%
Utility Vans	59.853	34%	62%
C1	432,842	24%	14%
SUV	102,755	11%	-46%
MPV	129,278	12%	-44%
Other Segs	29,147	4%	-82%
Total Market	**2,164,092**	**21.0%**	**n/a**

Source: IHS GLOBAL INSIGHT.

In volume terms, B-segment cars were the biggest beneficiaries of the 2009 European scrapping subsidies, with an estimated 970,000 units of additional sales being generated. This represents a 35% boost to likely B-segment sales if no incentives had been enacted. This gives a 69% higher propensity to purchase a B-segment car.

Even smaller cars, in the A segment, exhibited still higher relative propensities, and benefited from 440,000 units of additional scheme-induced sales.

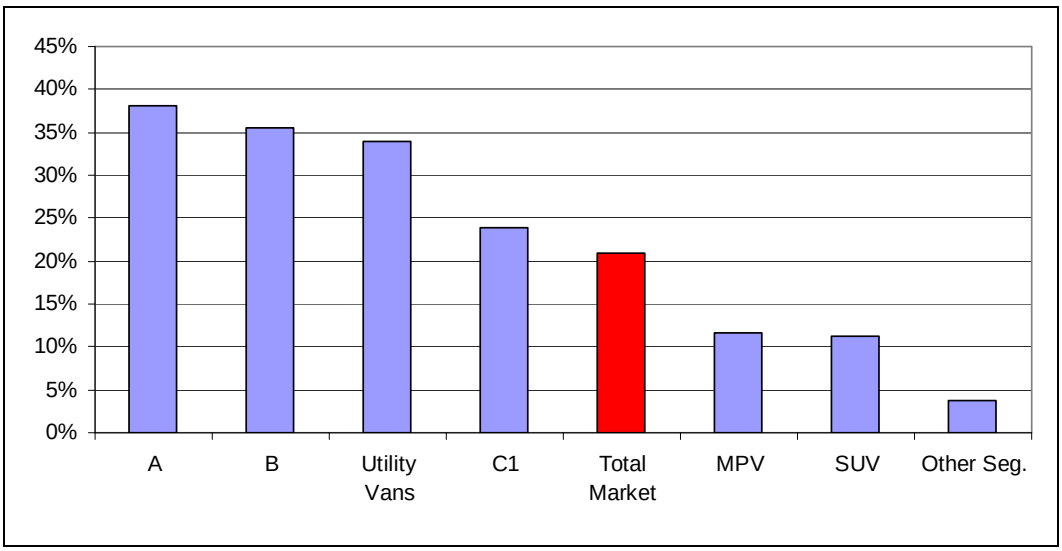
Fig. 77 CALCULATED DISTRIBUTION OF INCREMENTAL SALES VOLUME FROM EU SCRAPPING SCHEMES BY SEGMENT (UNITS)



Source: IHS GLOBAL INSIGHT.

Two-thirds of the 2.16 million units of estimated additional demand generated by scrapping schemes were in the lowest two segments price-wise (A/B and utility vans). Only 4.7% more customers bought SUVs compared with 6% buying MPVs and 20% buying compact cars (C1 segment). The other segments combined (medium/large cars and premium/luxury vehicles) benefited from only 1.4% of the incremental incentivised sales.

Fig. 78 CALCULATED NET IMPACT OF EU SCRAPPING SCHEMES ON INDIVIDUAL SEGMENTS: PERCENTAGE GROWTH



Source: IHS GLOBAL INSIGHT.

Data on model and segment purchases were incomplete and we were thus unable to compile a summary at EU level. The limited data available at the time of publishing, however, do largely confirm the relative segment behaviour projected above. (See individual country chapters for further details).

3.2.3 Impact on Vehicle Brand Class

Fig. 79 IMPACT ON VEHICLE CLASS

	2004	2005	2006	2007	2008	2009	2009 Projected
Budget	16.54%	16.82%	17.43%	17.60%	17.24%	18.61%	18.18%
Low Budget	0.53%	0.90%	1.07%	1.31%	1.50%	1.93%	1.83%
Mass Market	66.42%	65.19%	64.04%	63.44%	63.51%	64.08%	63.02%
Premium	16.51%	17.09%	17.46%	17.65%	17.75%	15.37%	16.96%
Total Market	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

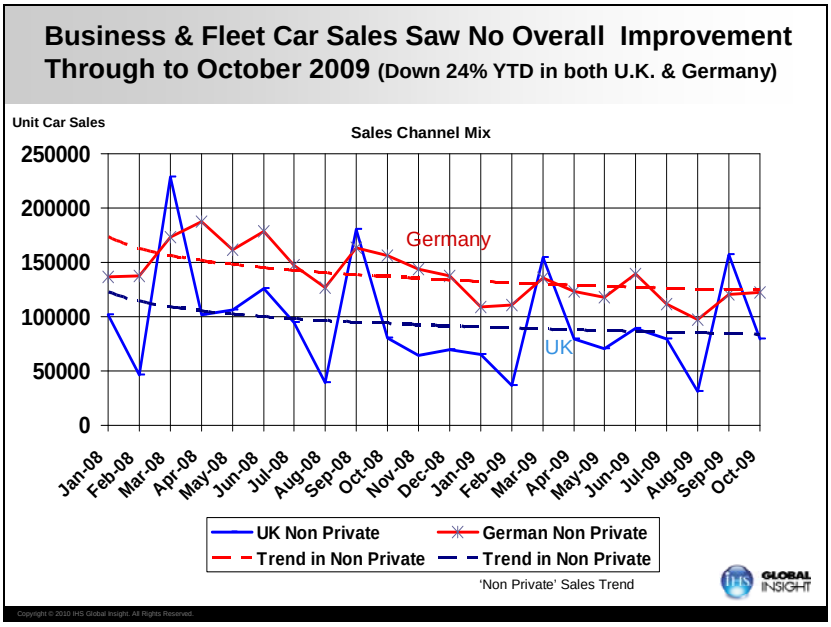
Note: data for 2009 are actualised. The 2009 projected data column is based on market trends and on developments in EU countries that do not have scrapping schemes.

Source: IHS GLOBAL INSIGHT.

3.2.4 Impact on Channel Mix—Business and Company Car Sales Channels

Some, but not all, of the schemes specifically limit their scrapping scheme incentives to 'private individuals'. This means that significant parts of the European new vehicle market are officially excluded and have not benefited directly from the stimulus. Even where they are not excluded from the schemes, other conditions effectively bar them from participating. In particular, the typical minimum scrappage condition means that there are virtually no company fleets or rental businesses with vehicles over that age, other than some small private owner businesses for example. In addition, recent duty-of-care legislation applicable to vehicle transport may limit this even further in the future.

Fig. 80 BUSINESS AND FLEET SALES CHANNEL MIX, UK AND GERMANY



Source: IHS GLOBAL INSIGHT.

As a result, although private demand surged dramatically during the 2009 scrapping schemes, new sales to the non-private sales channels saw little if any improvement over the same time period. The non-private sector is made up of government departments, short-term rental companies, business and company car fleets, manufacturers, and dealers. These make up more than a third of the total EU market.

Fig. 80 shows sales trends for these non-private sales channels in the United Kingdom and Germany. In the latter, this sector makes up at least 50% of the market (under normal conditions). Overall, both countries show that business sales were down by 24% over January–October 2009, and the exhibited monthly sales development is in stark contrast to that of private demand.

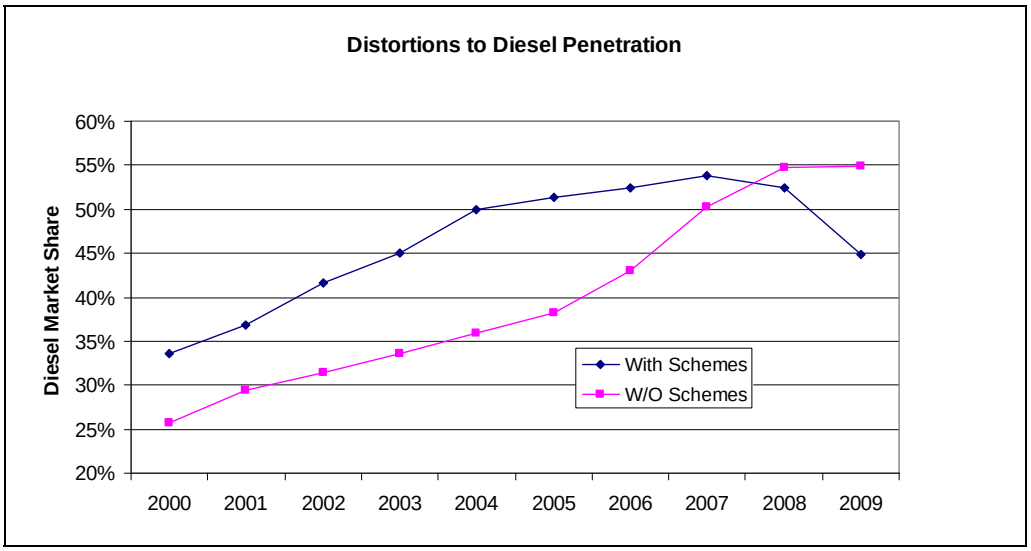
The business channel is generally expected to improve in 2010. Its growth could additionally be hampered, however, by higher lease rates caused by weaker residual values for cars that are three to four years old. The diversion of buyers that would otherwise buy used cars into the new car market under the scrapping scheme reduces demand and causes a softening of used car prices. The effect of the economic crisis and scrapping schemes on residual values has been assessed and reported by EurotaxGlass for both the German and the U.K. car markets.

3.2.5 Impact on Fuel Choice—Diesel

Several of the European scrapping schemes have maximum CO_2 conditions on the new vehicle purchased. Taken on its own, this would tend to favour an increase in diesel share. In fact, the opposite trend has been observed and it has been quite strong. Every country with a significant scrapping scheme in place in 2009 saw the penetration of diesel in its passenger car market fall.

For those car markets without a scrapping scheme in 2009, diesel share was effectively stable on the year earlier (Fig. 81). In aggregate, markets with scrapping schemes had suffered a small decline in diesel penetration in 2008 (the first in a decade) but a severe slide developed during 2009. We saw a loss of over 7% in market share during 2009.

Fig. 81 MARKET SHARE OF DIESEL HAS FALLEN SHARPLY IN COUNTRIES WITH SCRAPPING SCHEMES



Note: The figure for 2009 is estimated and based on 10 months of actual data. The countries covered exclude Romania, Slovakia, and Luxembourg.
Source: IHS GLOBAL INSIGHT.

Some scrapping scheme design conditions may have contributed to some of this fall. For example, in the Netherlands, a higher scrapping incentive was offered to those who replaced a scrapped diesel car with a gasoline (petrol) model, rather than scrapping a gasoline (petrol) car. There are a few other developments that have also depressed diesel demand (such as the alternative fuel subsidies in Italy) but these are thought to play a relatively minor role in explaining the collapse in diesel share.

More significant are the changes in the market mix (outlined above); these are strongly correlated to the demand for diesel cars. The business and fleet channels have a far higher propensity to purchase diesels, compared with private customers (who, on average, travel fewer kilometres in a year). The sharp contraction in the company car sector depresses the diesel mix, while the sharp rise in private demand works to increase the gasoline (petrol) mix.

The change in consumer psychology when scrapping schemes are in operation is another important factor. What we have termed 'bargain price maximisation' on the part of consumers resulted in the significant down-pricing observed in the market. This in turn became most apparent by a downshifting of market segmentation.

The same basic psychology (and also similar income constraints) also applies to diesel cars. Since diesel powertrain options typically run at €1,500 above equivalently specified gasoline (petrol) cars, the percentage discount with a scrapping voucher is smaller than for a gasoline (petrol) car, and this is on an entry price that is also that much higher. In addition, the downsizing effect of car scrapping schemes compounds this, as the product offering of smaller cars tends to offer a lower diesel share.

Another factor that cannot be ignored is the proportion of scrapped cars under the scheme that are diesel compared with the number of new vehicles being bought. Since the average car scrapped under the 2009 schemes was between 14 and 15 years old (see Chapter 2), the diesel penetration of these is estimated to have been between 20% and 25%. This is less than half of the share of the new car market in recent years.

At the same time, the lower average kilometres travelled by cars of this age (which we estimate at 10,000–11,000 kilometres) means that the payback period for the more expensive diesel option is extended and so (in theory) there would be a substantially reduced take-up rate.

The effect of these market distortions has meant that the inventory of diesel cars has not fallen as fast as for small gasoline (petrol) cars. Production of diesel cars has fallen faster, and engine plants making diesel engines have suffered bigger cutbacks than those producing gasoline (petrol) engines. The effect on emissions of the changing market share for fuel type is examined in Chapter 5.

3.2.6 Impact of Scrapping Schemes on Employment

We calculate that the incremental boost of almost two million units to 2009 production had the potential to forestall (if not eventually prevent) the loss of up to 120,000 direct manufacturing jobs in the industry. This is explained in more detail in Chapter 4.

Fig. 82

TYPICAL INCENTIVES AND DISCOUNTS OFFERED DURING THE SCRAPPING SCHEME IN THE United Kingdom—2009*

								Available Incentives/Discounts (as of January 2010)				
	Brand	Model	Car Market Share	Units	List Price (Entry or Representative Version)		CO_2 (g/km)	Scrap Incentive 1 (Paid by Government)	Scrap Incentive 2 (Paid by OEM)	Additional Pricing Incentives (OEM)	Client Price	Total Discount*
1	Ford	Fiesta	5.9%	117,296	£13,580	1.25 Zetec gasoline (petrol)	133	£1,000	£1,000	£500	£11,080	-18%
2	Ford	Focus	4.7%	93,517	£18,635	1.6 Zetec gasoline (petrol)	157	£1,000	£1,000	£1,500	£15,135	-19%
3	Vauxhall	Corsa	4.2%	84,478	£10,255	1.0 Life gasoline (petrol)	134	£1,000	£1,000	£1,260	£6,995	-32%
4	Vauxhall	Astra**	3.4%	67,729	£15,405	1.4 Life gasoline (petrol)	146	£1,000	£1,000	£4,410	£8,995	-42%
5	VW	Golf	2.9%	57,187	£16,570	Golf S 1.6 TDI 90PS 3-door diesel hatch	132	£1,000	£1,000	£950	£13,620	-18%
6	Peugeot	207	2.4%	48,037	£10,995	207 Urban 1.4 8v 75bhp 3-door gasoline (petrol) hatch	147	£1,000	£1,000	£1,290	£7,705	-30%
7	MINI	MINI	2.0%	39,866	£10,950	MINI FIRST	128	£1,000	£1,000	£0	£8,950	-18%
8	BMW	3 Series	2.0%	39,029	£21,525	318i ES gasoline (petrol) sedan	142	£1,000	£1,000	£0	£19,525	-9%
9	Vauxhall	Insignia	1.8%	36,040	£18,645	1.6T Exclusive gasoline (petrol) hatch	181	£1,000	£1,000	£0	£16,645	-11%
10	Ford	Mondeo	1.7%	34,418	£20,895	2.0TDCI 140 PS ZETEC diesel hatch	156	£1,000	£1,000	£0	£18,895	-10%

2009 CAR TIV = 1,994,999 units.

* Estimated discount.

**Note: Old Astra model explaining seemingly ultra-generous incentives.

Fig. 83

TYPICAL INCENTIVES AND DISCOUNTS OFFERED DURING THE SCRAPPING SCHEME IN SPAIN—2009*

								Available Incentives/Discounts in euro (Early December 2009)				
	Brand	Model	Car Market Share	Units	List Price (Entry or Representative Version**)		CO_2 (g/km)	Scrap Incentive (Paid by Government) Nat & Reg	Scrap Incentive 2 (paid by OEM))	Sales Discount (Paid by OEM)***	Client Price	Total Discount****
1	RENAULT	MEGANE/SCENIC	5.5%	52,156	14,965	(Sedan/G Tour 1.5 DCI 85 Pack Authentique)	117	1,000	1000	1,490	11,475	-23.3%
					15,490	(Scenic 1.5 DCI 85 Pack Authentique)	117	1,000	1000	1,490	12,000	-22.5%
2	CITROEN	C4/C4 PICASSO	4.4%	42,369	16,700	(C4 HDI 110 FAP 5-door)	120	1,000	1000	0	14,700	-12.0%
3	SEAT	IBIZA	4.3%	40,859	14,810	(1.4 Tdi Ecomotive 80)	98	1,000	1000	4,200	8,610	-41.9%
4	PEUGEOT	207/206	3.3%	31,059	14,380	(207 SW 1,6 HDi 90 confort)	119	1,000	1000	2,000	10,380	-27.8%
					13,120	(207 1,4 HDI 90 Confort 5-door)	115	1,000	1000	2,000	9,120	-30.5%
5	FORD	FOCUS	3.0%	28,865	18,665	(1.6TDCi Trend 5-door)	119	1,000	1000	0	16,665	-10.7%
6	PEUGEOT	308	3.0%	28,986	17,630	(308 HDI 90 Confort Pack 5-door)	120	1,000	1000	2,000	13,630	-22.7%
7	VW	GOLF	2.7%	25,927	20,630	(Golf 1,6 TDI 90 Advance 5-door)	119	1,000	1000	1,130	17,500	-15.2%
8	OPEL	ASTRA	2.6%	25,166	17,610	Astra 1.3 ecoFLEX Essentia 5-door	137	1,000	1000	1,810	13,800	-21.6%
9	NISSAN	QASHQAI	2.6%	24,601	21,350	(QASHQAI 1.5dCi Acenta 4x2 5-door)	145	1,000	1000	0	19,350	-9.4%
10	SEAT	LEON	2.5%	23,966	16,465	(LEON 1,6 Signa 3-door)	118	1,000	1000	0	15,465	-6.1%

CAR TIV = 952,772 units.

* Source: ANFAC.
** Market observation.
*** Source: Autopista.es January 2010, assume incentive is continuing as before since Plan2000e extended.
**** Best possible discount.
***** Average 2009 sales discount = €2,479 - Source: FACONAUTO.

Fig. 84

TYPICAL INCENTIVES AND DISCOUNTS OFFERED DURING THE SCRAPPING SCHEME IN ITALY—2009*

								Available Incentives/Discounts in euro or as %				
	Brand	Model	Car Market Share	Units		List Price (Entry Version)	CO_2 (g/km)	Govt Incentive	Sales Discount**	Client Price	Total Discount***	Additional euro to Buy LPG & CNG Entry Level Version**** Offered Additional Government Incentive of up to €3,500
1	FIAT	PUNTO (INCLUDING BOTH 188 AND 199)	8.5%	182,622	10,301	Punto Classic 1.2 3-door. Active gasoline (petrol)	133	1,500	11.63%	7,603	-26.2%	2,000 (LPG)
					11,601	Grande Punto 1.2 3-door. Actual gasoline (petrol)	135	1,500	11.63%	8,752	-24.6%	2,550 (LPG) and 3800 (CNG)
					11,951	Punto Evo 1.2 3-door. Active gasoline (petrol)	135	1,500	11.63%	9,061	-24.2%	2,500 (LPG) and 3750 (CNG)
2	FIAT	PANDA	7.9%	171,435	9,001	Panda 1.1 Actual Eco gasoline (petrol)	119	1,500	11.63%	6,454	-28.3%	3,550 (LPG) and 5200 (CNG)
3	FORD	FIESTA	4.9%	106,260	11,401	Fiesta+ 1.2 16V 60CV 3--door. gasoline (petrol)	128	1,500	11.63%	8,575	-24.8%	2,500 (LPG)
4	FIAT	500	3.7%	80,078	11,401	500 1.2 Pop gasoline (petrol)	119	1,500	11.63%	8,575	-24.8%	No LPG and CNG version is available
5	CITROEN	C3	2.7%	57,467	10,341	C3 1.1 airdream Ideal gasoline (petrol)	140	1,500	11.63%	7,638	-26.1%	3,500 (LPG) and 5750 (CNG)
6	VOLKSWAGEN	GOLF	2.6%	56,391	17,526	Golf 1.2 TSI 3--door. Trendline gasoline (petrol)	134	1,500	11.63%	13,988	-20.2%	2,827 (LPG)
7	OPEL	CORSA	2.4%	52,267	11,251	Corsa 1.0 12V 3--door. Club gasoline (petrol)	134	1,500	11.63%	8,443	-25.0%	2,500 (LPG)
8	LANCIA	YPSILON	2.4%	50,870	11,451	Ypsilon 1.2 Argento gasoline (petrol)	139	1,500	11.63%	8,619	-24.7%	2,750 (LPG)
9	PEUGEOT	207	2.1%	45,930	14,526	207 1.4 16V VTi 95CV 3--door. X Line gasoline (petrol)***	140	1,500	11.63%	11,337	-22.0%	1,100 (LPG)
10	TOYOTA	YARIS	2.0%	42,721	10,651	Yaris 1.0 3--door. gasoline (petrol)	118	1,500	11.63%	7,912	-25.7%	No LPG and CNG version is available

2009 CAR TIV = 2,158,010 units.
* Source: UNRAE.
** November 2009 average as per InterAutoNews panel.
*** Not entry version but lowest priced among those getting government incentive.
**** Not necessarily corresponding engines.

Fig. 85

TYPICAL INCENTIVES AND DISCOUNTS OFFERED DURING THE SCRAPPING SCHEME IN FRANCE—2009*

								Available Incentives/Discounts in euro (Early Dec 2009)				
	BRAND	MODEL	Car Market Share	Units	List Price (Entry or Rep. Version**)	List Price(Entry or Representative Version**)	CO_2 (g/km)	Scrapping Incentive (Paid by Government)	Bonus Based on CO_2 Emission (Paid by Government)	Sales Discount (Paid by OEM)***	Client Price	Total Discount****
1	PEUGEOT	207/206	8.0%	181,498	16,150	(207 1,4 HDI 70 Active 3-door)	115	1,000	700	2,600	11,850	-26.6%
					13,750	(206+ 1,4 HD I70 Urban 3-door)	110	1,000	700	1,700	10,350	-24.7%
2	RENAULT	MEGANE/ SCENIC	6.8%	154,274	19,750	(Mégane DCI 85 Authentique 5-door)	118	1,000	700	2,540	15,510	-21.5%
					21,200	(Scénic DCI 85 Authentique)	130	1,000	200	2,490	17,510	-17.4%
3	RENAULT	CLIO	6.5%	147,467	12,800	(Clio 1,2 16V Authentique 3-door)	139	1,000	0	2,110	9,690	-24.3%
4	RENAULT	TWINGO	4.7%	106,630	10,050	(Twingo 1,2 16V LEV 75 Authentique)	119	1,000	700	1,451	6,899	-31.4%
5	CITROEN	C3	4.7%	106,630	12,150	(C3 1,1i Génération 5-door)	140	1,000	0	2,210	8,940	-26.4%
6	CITROEN	C4/C4 PICASSO	4.3%	200	21,750	(C4 HDI 92 Millenium 5-door)	115	1,000	700	3,450	16,600	-23.7%
					27,000	(Grand C4 Picasso HDI 110 FAP Millenium)	145	1,000	0	3,000	23,000	-14.8%
7	PEUGEOT	308	3.7%	83,943	20,250	(308 HDI 90 Confort Pack 5-door)	120	1,000	700	3,300	15,250	-24.7%
8	FORD	FIESTA	2.2%	49,912	14,450	(Fiesta 1,4 TDCI Ambiente 5-door)	110	1,000	700	2,760	9,990	-30.9%
9	VW	GOLF	2.1%	47,643	19,950	(Golf 1,6 TDI 90 Trendline 3-door)	118	1,000	700	3,000	16,250	-18.5%
10	VW	POLO	2.0%	45,375	11,990	(Polo 1,2 60 Trendline 3-door)	128	1,000	200	2,000	9,790	-18.3%

CAR TIV -2,268,730 units.
* Source: CCFA (more details available later, i.e. split between 207 and 206 models).
** Market observation.
*** Source: L'Argus December 2009 issues.
**** Best possible discount.

Fig. 86

TYPICAL INCENTIVES AND DISCOUNTS OFFERED DURING THE SCRAPPING SCHEME IN GERMANY*

					Available Incentives/Discounts in euro (at the Start of the Scrapping Programme in Feb/Mar 2009)						
	BRAND	MODEL	Car Market Share*	Units*	List Price in euro (MSRP incl. 19% VAT) (at the Start of the Scrapping Programme in Feb/Mar 2009) (Base Version of Model Line)		CO_2 (g/km)	Scrapping Incentive (Paid by Government) Available Until August 2009	Max. OEM Price Discount**	Minimum. Transaction Price	Total Max. Discount***
1	VW	GOLF	7.4%	283,222	€16,500	Golf, 3HB, Trendline, 1.4L 59kW (80PS), 5MT	149	2,500	2,500	11,500	-30.3%
2	VW	POLO	3.3%	124,468	€12,050	Old Polo, 3HB, Trendline, 1.2L 44kW (60PS), 5MT	128	2,500	2,000	7,550	-37.3%
					€12,885	New Polo, 5HB, Trendline, 1.2L 44kW (60PS), 5MT	128	2,500	0	10,385	-19.4%
3	OPEL	ASTRA	2.9%	111,798	€16,300	Astra, 5HB, Selection, 1.4L 66kW (90PS), 5MT	146	2,500	2,500	11,300	-30.7%
					€16,900	Astra, 5HB, Selection, 1.4L 74kW (100PS), 5MT	129	2,500	0	14,400	-14.8%
4	SKODA	FABIA	2.7%	104,345	€10,990	Fabia, 3HB, Classic, 1.2L 44kW (60PS), 5MT	140	2,500	2,000	6,490	-40.9%
5	OPEL	CORSA	2.7%	103,189	€11,140	Corsa, 3HB, Selection, 1.0L 44kW (60 PS), 5MT	130	2,500	2,000	6,640	-40.4%
6	FORD (EU)	FIESTA	2.7%	102,295	€11,500	Fiesta, 3HB, Ambiente, 1.25L 44kW (60PS), 5MT	127	2,500	0	9,000	-21.7%
7	VW	PASSAT	2.0%	75,007	€23,300	Passat, 4SDN, Trendline, 1.6L 75kW (102PS) 5MT	179	2,500	4,000	16,800	-27.9%
8	AUDI	A4	1.9%	71,923	€26,100	A4, 4SDN, Attraction, 1.8L TSFI 88kW (120PS), 6MT	164	2,500	2,500	21,100	-19.2%
9	BMW	1-SERIES	1.9%	70,925	€22,000	1er, 3HB, 116i, 2.0L 90kW (122), 6MT	143	2,500	2,500	17,000	-22.7%
10	AUDI	A3	1.8%	70,060	€20,350	A3, 3HB, Attraction, 1.6L 75kW (102PS), 5MT	162	2,500	2,500	15,350	-24.6%

CAR TIV = 3,810,966 units.

* Source: Data (Ytd-09/2009): KBA / Forecast (CY2009): IHS Global Insight.

** Maximum available OEM discount at the time immediately after introduction of the scrapping programme (Feb/Mar-2009).
Overt incentive spending by the industry was initially high and available for a wide range of models (Feb/Mar-09), but later it was strongly decreased and more limited to selective models (e.g. run-out models) when public awareness for the scrapping scheme increased and it began to impact strongly on sales. It was increased again when the scrapping budget was exploited from Sep-09 onwards; e.g. Price Discounts, Eco/Trade-in/Conquest-Premiums, Special Versions, Special Financing, etc. - Negotiated Dealer Discounts are not included!
Source: Auto Bild magazines No. 9/2009 (27-02-2009), 10/2009 (06-03-2009) and 25/2009 (19-06-2009).

*** Best possible discount available only at limited times, for specific versions and under specific conditions.

4 Evaluation of Scrapping Scheme Against Economic Effectiveness

4.1 METHODOLOGY

To analyse the impact of scrapping schemes at a macro economic level, our study looks at three aspects: public finance, supply, and demand, at MS and European levels. Demand-side and supply-side impacts are net of tax in order to not double count tax revenue already calculated in the public finance impact.

Fig. 87 DESCRIPTION OF METHODOLOGY—THREE LEVEL IMPACTS

Public Finance Impact	Demand-Side Impact (Net of Tax)	Supply-Side Impact (Net of Tax)
Country level	Country level	Country level
EU level	EU level	EU level

Source: IHS GLOBAL INSIGHT.

To calculate the impact in value of the incremental demand for vehicles (what we have called NIVS in following graphs), we have valued these sales in volume by a weighted average selling price minus incentive (net of taxes; minus an average weighted incentive for the EU and for countries with various incentives).

In order to analyse the impact of the schemes on public finance (Fig. 89), we considered the main taxes that resulted from these additional vehicle demands: VAT, import duties (when vehicles are imported from outside the EU we took 25% of import duties for each country, the rest being additional revenue for the EU budget), and registration taxes. Then, we compared these additional revenues “Incremental taxes” with the cost of scrapping schemes by state.

We have used the two definitions of GDP (below) as a “validation” of our results for both demand and supply-side economics (considering, at the macro economic level, that demand equals supply) and also to estimate the main impact of scrapping schemes (Fig. 91):

- GDP is the sum of effective final consumption, plus investment, plus stock variations, plus exports, minus imports. For countries with scrapping schemes, we took into account the incremental value produced locally. At the EU level, in order to evaluate the impact on the component sector, we have considered that more than 80% of the total incremental value is produced in Europe. We also included an additional value for the distribution network of imported vehicles and for service maintenance.
- GDP is the sum of the added values of the various institutional sectors or business sectors. We used this definition to estimate the impact of scrapping schemes on the supply side. We split light vehicle production into production for the domestic market and for export, and then valued the light vehicle production for the domestic market at an average cost price by country. This step helped to estimate the short-term effect of an incremental demand on value added production at vehicle manufacturing level as well as at component level.

Several distortion effects took place and needed to be analysed due to the sudden change in the selling prices of certain categories of vehicles (mainly segments A, B, and C1):

- First of all, incentives for purchasing new cars introduced a price distortion between segments concerned and the market average because of vehicle downsizing and price discounting. This led to undervaluing the market during the implementation of the schemes. We chose to analyse the impact of the incremental demand on segment A, B, and C1 cars.
- Some households, which are usually used car buyers, took the opportunity to buy a new car, which produced a short-term substitution effect between vehicles.
- With European manufacturers implementing Europe-wide production strategies, the schemes encouraged exports in some countries (even in countries with no scrapping scheme) and imports in others. At the country level, we did not factor in this intra-trade; we only considered imports from outside the EU.

To calculate these effects, we compared current scrapping schemes' data with a 10-year average of consumer behaviour and a three-year average for automotive sector data.

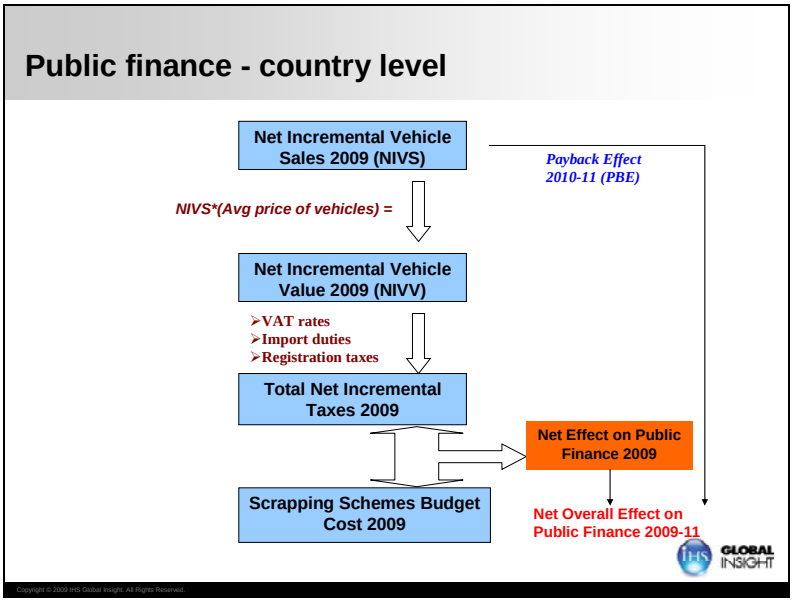
Fig. 88 DESCRIPTION OF METHODOLOGY—DEMAND-SIDE AND SUPPLY-SIDE LEVELS / MAIN SCRAPPING SCHEMES EFFECTS

Demand-Side Impact	Supply-Side Impact
✓ Substitution effect new vehicles vs. other goods ✓ Price distortion	✓ Substitution effect imported vs local production vehicles ✓ Production EU vs non-EU production

Source: IHS GLOBAL INSIGHT.

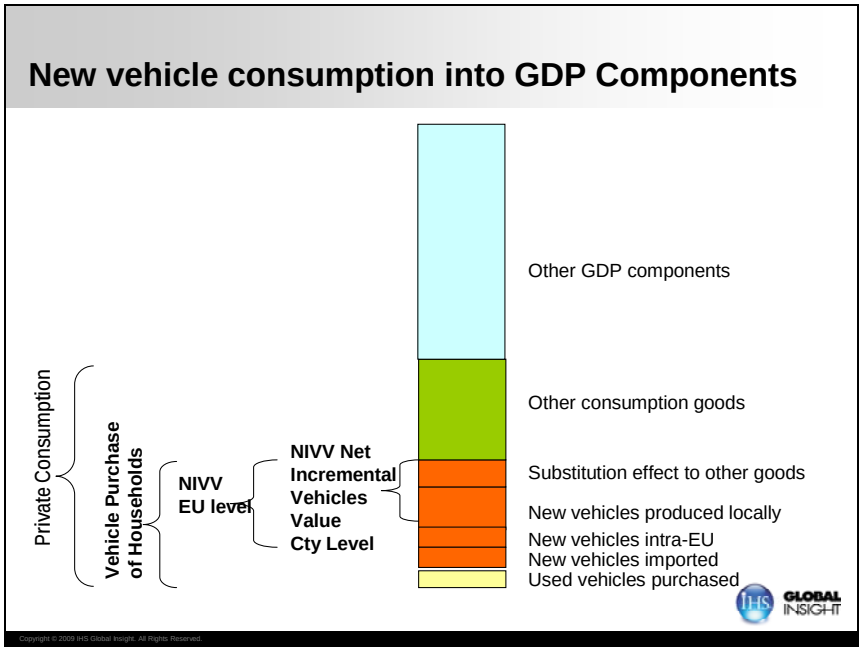
The following charts in Fig. 89 to Fig. 91 demonstrate our Economic Impact Methodology. It should be noted that in Fig. 90, the GDP components are just a graphical representation of this concept and are not to scale.

Fig. 89 ECONOMIC IMPACT METHODOLOGY



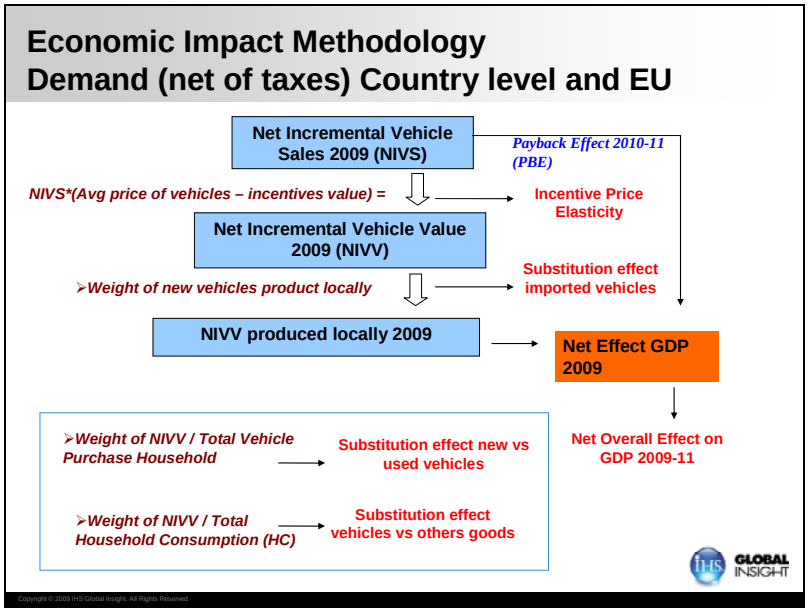
Source: IHS GLOBAL INSIGHT.

Fig. 90 GDP COMPOSITION AND NEW VEHICLES CONSUMPTION IMPACT

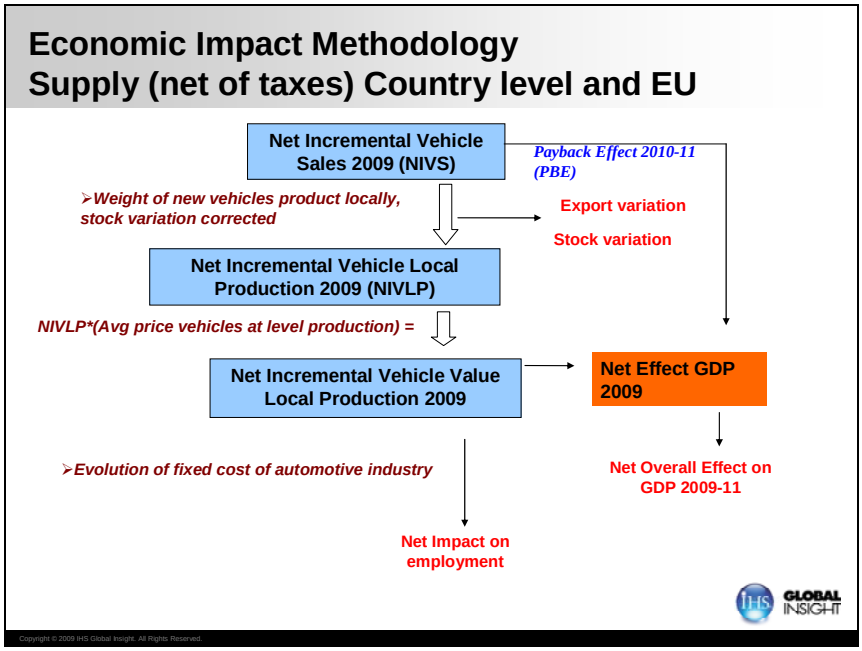


Source: IHS GLOBAL INSIGHT.

Fig. 91 ECONOMIC IMPACT METHODOLOGY



Source: IHS GLOBAL INSIGHT.



Source: IHS GLOBAL INSIGHT.

4.2 IMPACT ON PUBLIC FINANCES

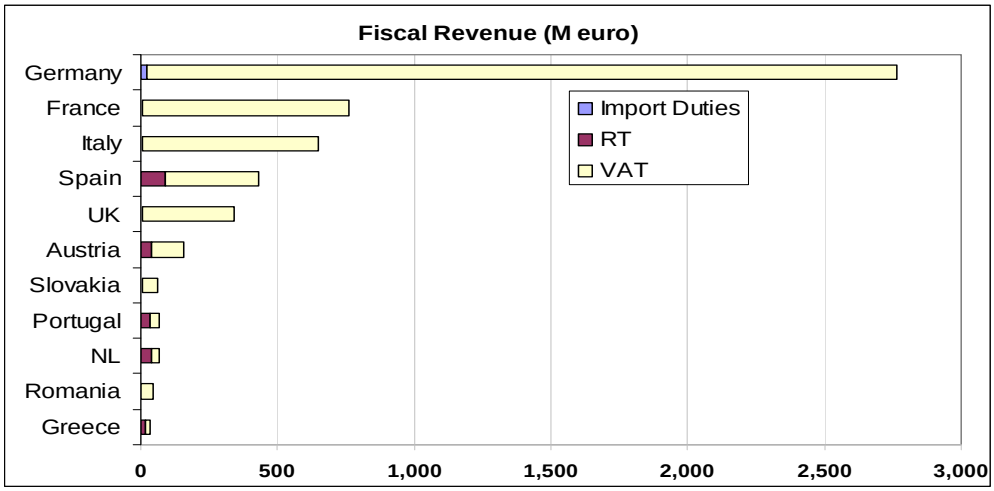
The calculation of impact on public finance of IVS (Incremental Vehicle Sales) was based only on new passenger car sales, so we used the passenger car taxation system (VAT, Registration Taxes (RT), and import duties, each as appropriate).

4.2.1 Revenue Impact

The fiscal revenue for incremental vehicle sales in 2009 (€2.8 billion in Germany compared with less than €500 million for Spain and the United Kingdom) came from the volume of the cars affected rather than VAT rates which, except in the case of the United Kingdom, remained broadly similar throughout Europe in 2009. The import duties are relatively insignificant as many vehicles concerned are produced in Europe (more than 80%). For countries where registration taxes (RT) are levied, this had only a small impact on fiscal revenue (exceptions being the Netherlands 58% of revenues; Greece: 47%). Note: incremental vehicle ales contributed to increasing the cost of some national schemes because of bonus payment systems in place (Austria, France); this is not taken into account in our calculation.

The import duties levied at EU level reached €123 million in 2009; these account for less than 1% of total EU revenue from import duties. The EU 2009 budget will also benefit from additional MS VAT resources (not calculated in this report).

Fig. 92 INCREMENTAL TAXES BY EU COUNTRIES WITH SCRAPPING SCHEMES IN 2009



Source: IHS GLOBAL INSIGHT.

4.2.2 Cost Impact

The direct fiscal cost of scrapping schemes in 2009 is the total amount of the public budget allocated to these governmental measures. A simplistic analysis would say that the higher the incentives, the higher the public cost for an MS. Nevertheless, two important points need to be underlined:

- The effectiveness of a scheme could be assessed based on the percentage of the cost of the incremental sales on total funding for new cars: a higher percentage means that the scheme creates more additional sales than would happen without the scheme (Fig. 93.);

- The net cost also needs to be estimated per new vehicle sold (regardless of whether it was considered an incremental sale). This net cost actually depends on the spread between the incentive amount and the level of vehicle taxes (Fig. 94). Only Germany and the United Kingdom showed a net negative effect per vehicle sold in 2009. For these two countries, the unit value of the incentive reached more than €2,000. The Netherlands is still an exception given its high level of registration taxes.

Fig. 93 ESTIMATED PUBLIC COST OF INCREMENTAL NEW CAR SALES (000S EURO; %)

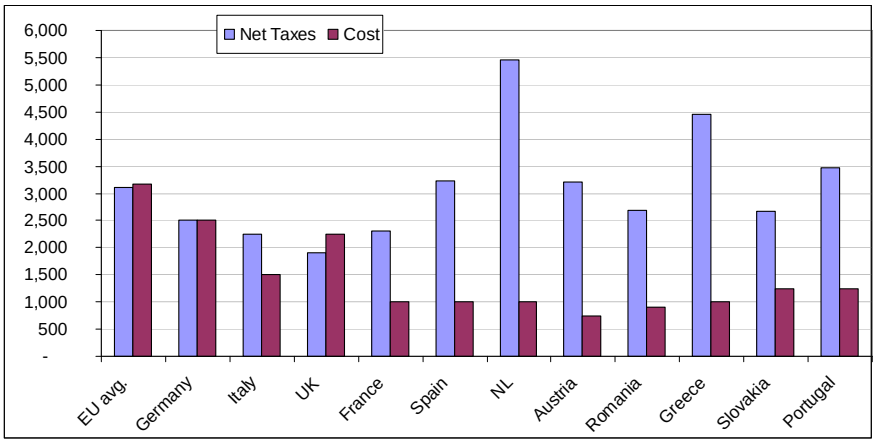
	Cost of Incremental Sales (1)	Total Scheme Budget (M€)	Total Funding New Cars (M€)	Of which Spillover 2010 Financing	% Cost Incremental Sales on New Cars Funding
Germany	2,762	5,000	3,900	-	71%
Italy	436	1,284	1,284	210	34%
United Kingdom	202	460	460	130	44%
France	331	600	600	-	55%
Spain	134	280	264	38	51%
The Netherlands	12	85	23	10	52%
Austria*	37	23	23	-	100%
Romania	16	45	45	16	36%
Greece	7	70	17	3	43%
Slovakia	30	55	55	-	54%
Greece	18	45	45	-	40%
EU	**3,984**	**7,947**	**6,311**	**406**	**59%**

*(1) Incremental sales * incentive per unit.*

** In the increasing demand, the share of OEM contributions is taken into account.*

Source: IHS GLOBAL INSIGHT.

Fig. 94 TAX REVENUE AND COST PER NEW CAR SOLD IN 2009 (EURO)



Source: IHS GLOBAL INSIGHT.

4.2.3 Net Effect

If we also include the payback effect in 2010 and 2011 of scrapping schemes, we see that the higher the scheme's impact in terms of volumes, the higher the net overall cost at public level over three years (Fig. 95). This net impact is only the net direct impact of a scheme upon the vehicle tax system of one country. Austria, the Netherlands, and Spain show mainly benefits because of their high registration taxes in the first year.

Fig. 95 Net Effect on Public Finance of Car Tax System Including Payback Effect in 2010 and 2011 (M euro)

	2009	2010	2011	Net Effect
Austria	120	-30	-20	70
The Netherlands	52	8	2	62
Spain	210	-80	-90	40
Greece	18	26	-8	36
Portugal	22	-18	-7	0
Romania	19	-23	-3	-7
Slovakia	9	-11	-6	-8
United Kingdom	10	-110	-70	-170
France	160	-220	-110	-170
Italy	-420	-290	-120	-830
Germany	-1,140	-670	-240	-2,050
EU	**-940**	**-1,418**	**-672**	**-3,027**

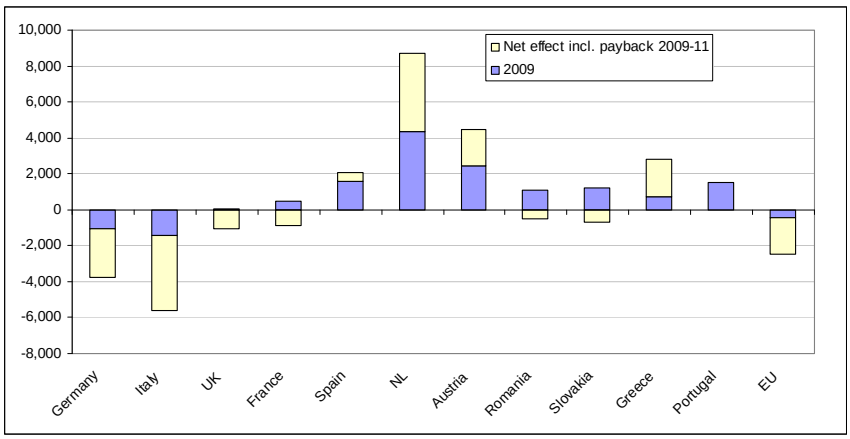
Source: IHS GLOBAL INSIGHT.

The result per additional car sold in 2009 can be expressed in two ways (Fig. 96):

- The impact in 2009, which is the difference between revenue and cost per car;
- The net effect of incremental demand including payback effect in 2010 and 2011.

On average in the EU, the cost per car is estimated at €430 in 2009 and, with payback, €2,060 per vehicle: note this is heavily weighted by Germany and Italy.

Fig. 96 Net Effect on Public Finance Per Car 2009–11 (euro) (Segments A, B, and C1)



Source: IHS GLOBAL INSIGHT.

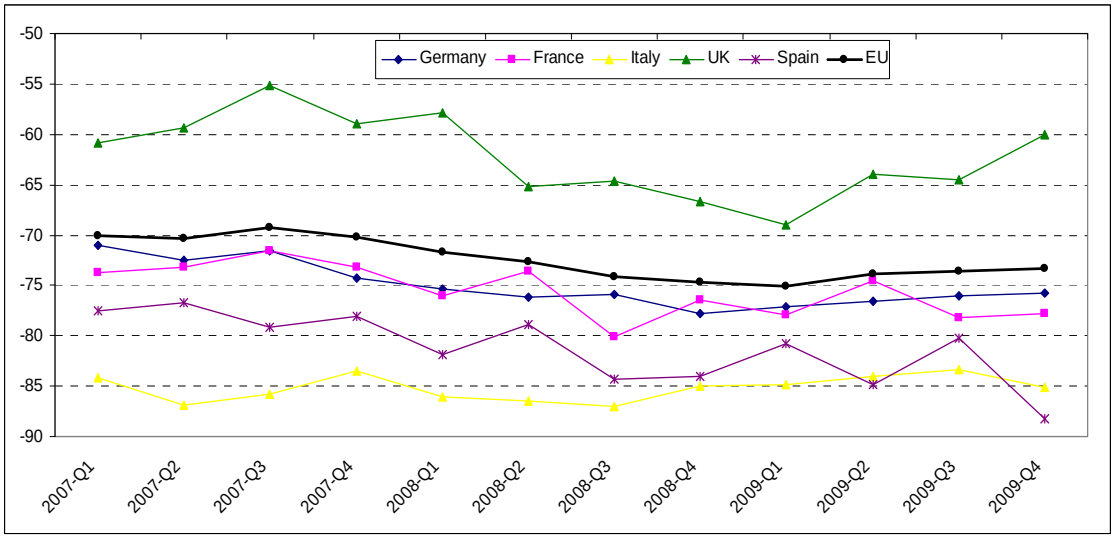
4.3 IMPACT ON ECONOMY

4.3.1 Impact on the Consumer

4.3.1.1 Impact of Scrapping Schemes on Household Vehicle Purchases

The implementation of scrapping schemes started to improve households' intentions to purchase a vehicle after the first quarter of 2009 (in particular in Germany and France). At the European level, however, the effect was limited. The intentions to purchase a car over the next 12 months remained substantially negative (more households had no intention of buying a car in the near future) and at a lower level than in 2007 (except for Italy).

Fig. 97 BUSINESS CLIMATE INDICATOR FOR PURCHASING A CAR IN NEXT 12 MONTHS IN EU AND BIG 5 COUNTRIES

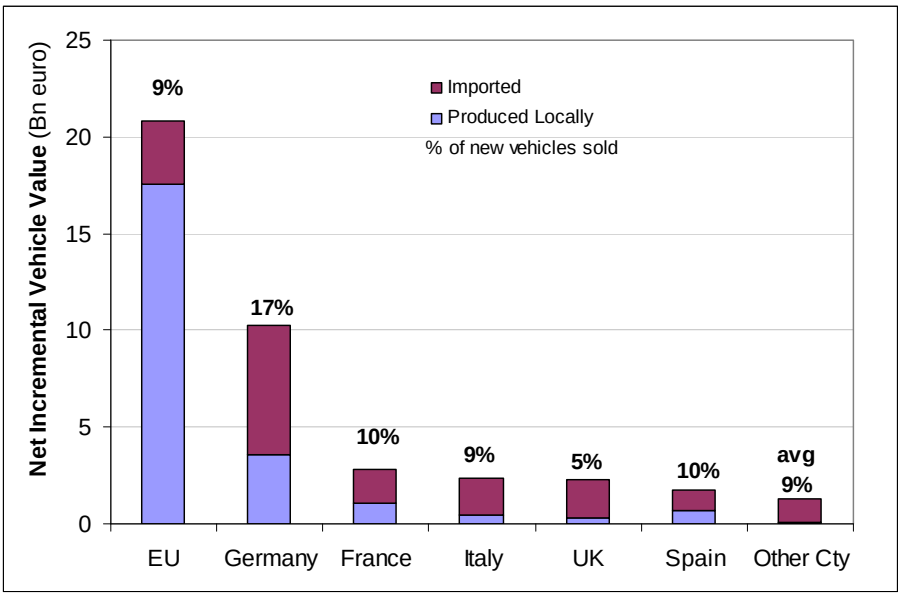


Source: Eurostat.

The net incremental value generated by scrappage schemes in the EU is estimated at €22.5 billion in 2009, i.e. 9% of the total vehicle sales value. Although a large number of these vehicles were produced in Europe, the impact on individual countries depends on the number of vehicles produced locally (Fig. 98).

Clearly, the increase in vehicle sales resulted from the lower prices generated by these schemes. The amount of the incentives had more or less of an impact upon market prices depending upon model retail sales value—the less expensive the vehicle, the greater was the effect of the incentive. The incentives introduced a price distortion which could be measured, in volume, by the downsizing of vehicle purchase and, in value, by the net discount (the distortion being increased by the additional discounts offered by car manufacturers over the same period).

Fig. 98 VALUE OF INCREMENTAL NEW CAR SALES IN THE EU AND BIG 5 SPLIT BY PRODUCTION TYPE—LOCAL PRODUCTION VS IMPORTS (BN EURO; % OF TOTAL SALES) SEGMENTS A, B, AND C1



Source: IHS GLOBAL INSIGHT.

4.3.1.2 Substitution Effect Between Vehicle Consumption and Other Goods

On average, vehicle consumption accounts for around 5% of total consumption of households in the EU. The economic crisis is expected to strongly impact private consumption; most EU countries will register declines in 2009.

According to data available at the time of completion of the study, we believe that incremental vehicle sales should lead to a medium substitution effect with other consumer goods at a European level and on an annual basis. The prime reason is that these sales represent less than 10% of overall EU spending on vehicles in most countries with scrapping schemes, except for Germany where the percentage reached 17%.

The purchase of these vehicles is likely to have been financed through three to five year car loans. If a substitution exists at a micro-level per household, the impact on the budget will be spread during the total period of the loan and not concentrated only on the year of acquisition of the vehicle. Typical items affected by the substitution effect are purchases of home improvement items or of semi-durable goods for the home.

Two main substitution effects are to be expected:

1) The substitution with home improvement could have a substantially negative impact as these goods or services are mainly created inside the country;
2) On the other hand, durable goods of home equipment are produced both within and outside the EU—this substitution effect could be neutral or positive by reducing the trade balance deficit.

At EU level, we have estimated that 70% of these goods are produced inside the EU. We estimate the overall substitution effect to be a reduction of between 15% and 20% of consumption of those people who bought new cars under scrapping schemes in Europe. The impact will be higher during the payback period

and will continue for the life of the car loans. But, this impact represents only 0.15% of total European private consumption over three years.

Most of the studies that look at the substitution effect between goods during a scrapping scheme (JRC and ECB reports[7]) compare the total vehicle registrations with the consumption of other goods (or to the retail trade of other goods, if the detailed quarterly consumption trend is not available). These studies fail, however, to factor in the additional effect of a car purchase. Of course, there can be a substitution effect at micro-economic level, and this effect could be higher if a revenue effect is introduced (as was the case in 2009 for most households) but they are not completely due to the scheme. As consumption statistics are structural and the vehicle market in Europe is a replacement market, the incentive must be substantial and implemented for more than a year for real substitution effects to be visible (as the JRC model shows with a five year scheme).

Fig. 99 VEHICLE CONSUMPTION WEIGHT IN TOTAL PRIVATE CONSUMPTION (%)

	Avg 10 Y (1997 v 2007)
Austria	3.82%
Cyprus	5.53%
France	4.09%
Germany	5.46%
Greece	4.72%
Italy	4.06%
Luxembourg	6.89%
The Netherlands	3.72%
Portugal	6.10%
Romania	2.19%
Slovakia	2.71%
Spain	4.59%
United Kingdom	5.36%
Other EU	5.18%
EU 27	**4.77%**

Source: IHS GLOBAL INSIGHT. EUROSTAT.

[7] JRC, Feebate and scrapping policy instruments, Environmental and economic impacts for the EU27— 2009.

European Central Bank, Monthly bulletin, October 2009.

4.3.2 Impact on GDP: Demand-Side and Supply-Side

The direct effect of the Net Incremental Vehicle Value (NIVV) on demand is estimated at around €20.2 billion for 2009 based on vehicles in segments A, B, and C1. But considering the payback effects in 2010 and 2011 (Fig. 101), the net effect over three years is reduced almost by half to €11.6 billion (the payback effect is estimated at -43% for the two years and -26% for 2010). If we look at the global car market (i.e. including segments D, E, and F vehicles; Fig. 102), the net effect is estimated at €13.4 billion, which could slightly over-estimate the schemes' impact.

The direct effect of schemes for countries with scrapping schemes is 32% of total additional value generated in 2009. As most segment A, B, and C1 cars are produced typically in the NMS, some countries with scrapping schemes (Romania, United Kingdom, and Spain) benefited from other countries' schemes as did some countries without schemes (Czech Republic and Poland).

This impact is not insignificant at the EU level: the value added for this incremental demand reached 10% of the automotive industry value added, which accounted for around 1% of GDP. Without these economic supports, the European GDP might have contracted by more than 4% in 2009.

Fig. 100 WEIGHT OF AUTOMOTIVE INDUSTRY ON GDP INCLUDING SCHEME GROWTH 2009–11

		2008	2009	2010	2011
Share of VA automotive industry(1) on GDP	%	1.17	0.91	0.93	0.95
Var VA (n/n-1)	%	-4.7	-25.0	3.4	3.2
Var GDP (n/n-1)	%	0.67	-3.86	0.91	1.51
Contribution of VA automotive to GDP growth	points	-0.06	-0.29	0.03	0.03

(1) Vehicles and parts industry.

Source: IHS GLOBAL INSIGHT.

Fig. 101 DIRECT IMPACT ON GDP AT EU LEVEL OF INCREMENTAL NEW CAR DEMAND IN SEGMENTS A, B, AND C1 (M EURO)

M euro	2009	2010	2011	Net Effect
Demand-Side				
NIVV produced in EU	19,000	-5,000	-3,300	10,700
Of which produced in country with SS	6,400	-1,800	-900	3,700
Of which produced in country w/o SS and intra-trade	12,600			12,600
NIVV imported outside the EU	1,200	-200	-100	900
TOTAL GDP Impact	20,200	-5,200	-3,400	11,600
Supply-Side				
VA IVV produced in TOTAL VA automotive	10%			
VA IVV on GDP	0.08%			
VA auto on GDP	0.91%			
Impact w/o SS				
Share of VA auto/GDP	0.83%	0.95%	0.96%	
Var VA (n/n-1)	-31.5%	5.0%	4.3%	
Var GDP (n/n-1)	-4.04%	-0.99%	-3.98%	
Contribution of VA automotive to GDP growth	-0.37	0.05	0.04	

** Surplus of activity at distribution level, service maintenance and used vehicle distribution for Germany, Greece, and the Netherlands.*

Source: IHS GLOBAL INSIGHT.

Fig. 102 DIRECT IMPACT ON GDP AT EU LEVEL OF INCREMENTAL NEW CAR DEMAND IN TOTAL MARKET (M EURO)

M euro	2009	2010	2011	Net effect
Demand-Side				
NIVV produced in EU	19,600	-4,300	-2,800	12,500
NIVV imported outside the EU	1,200	-200	-100	900
TOTAL GDP Impact	20,800	-4,500	-2,900	13,400

Source: IHS GLOBAL INSIGHT.

In most cases, the schemes increased the purchase of new cars to the detriment of used cars (except for Germany and the Netherlands where used cars are included in the scheme). Some countries, including those able to coordinate local production (France, Italy, and the United Kingdom), suffered from a higher import penetration rate in 2009. Compared with 2009, the substitution with other goods at national level can be estimated at lower than 1% of total private consumption.

Fig. 103 SUBSTITUTION EFFECT ON COUNTRIES WITH SCRAPPING SCHEMES—DEMAND-SIDE

	New vs. Used Cars	Imported vs. Produced Locally	Cars vs. Other Goods	Net Effect
Germany	+	-	-/=	-/=
France	+	--	-/=	-
Italy	+	--	-/=	-
The Netherlands	=	-	-/=	-/=
Romania	+	++	-/=	++
Slovakia	+	+	-/=	++
Spain	+	-	-/=	-/=
United Kingdom	+	--	-/=	-
Greece	=	=	-/=	=
Portugal	+	=	-/=	=

Score:
- - strong negative effect.
– medium negative effect.
-/= low negative effect.
= no effect.
=/+ low positive effect.
+ medium positive effect.
++ strong positive effect.
Source: IHS GLOBAL INSIGHT.

Most producing countries with scrapping schemes first reduced stocks within the distribution network, which delayed the recovery in vehicle production. Others benefited through an increase in their exports (Romania and the United Kingdom).

Fig. 104 SUBSTITUTION EFFECT ON PRODUCING SEGMENTS A, B, AND C1 COUNTRIES WITH SCRAPPING SCHEMES—SUPPLY-SIDE

	Stock Variation	Export vs. Produced Locally	Net effect
Germany	-	-	--
France	--	--	--
Italy	-	-	--
The Netherlands	-/=	-	-/=
Romania	-	++	+
Slovakia	--	=	-
Spain	+	-	=
United Kingdom	-	+	=

Score:

- - strong negative effect.

– medium negative effect.

-/= low negative effect.

= no effect.

=/+ low positive effect.

+ medium positive effect.

++ strong positive effect.

Source: IHS GLOBAL INSIGHT.

4.3.3 Impact on Automotive and Component Production and Employment

The estimated incremental value added of the automotive industry was around €9 billion in Europe in 2009—53% at car manufacturers, 47% at suppliers. The payback effect is estimated to reduce by a third this additional value added by the end of 2011.

The complete value chain of car production benefited from these schemes (even if some components were produced before the schemes' introduction).

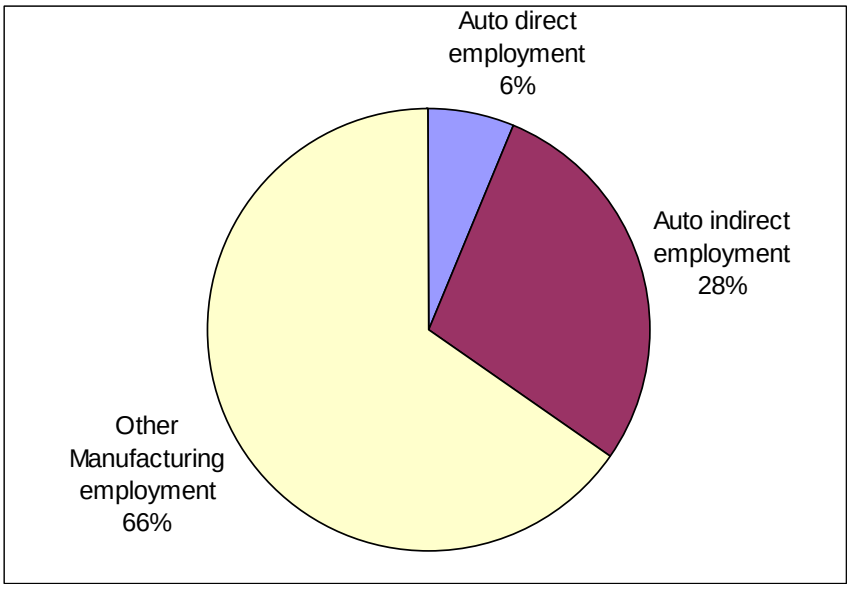
Fig. 105 INCREMENTAL VALUE ADDED AT PRODUCTION-SIDE IN EU

		2009	2010	2011	Net Effect
Gross output IVV 2009 at supply-side	M euro	21,600	-4,100	-2,700	14,800
VA auto IVV 2009	M euro	8,900	-1,700	-1,100	6,100
Incl. VA MV IVV	M euro	4,600	-900	-600	3,100
Incl. VA Parts IVV	M euro	4,300	-800	-500	3,000
Estimated Bought-in	M euro	12,700	-2,400	-1,600	8,700

Source: IHS GLOBAL INSIGHT.

With around 12 million people working directly or indirectly for the automotive industry, the industry plays a major role in manufacturing. In the automotive industry, one person working for a vehicle manufacturer creates employment for more than four people in the broader automotive sector in Europe.

Fig. 106 SHARE OF AUTOMOTIVE EMPLOYMENT IN MANUFACTURING ACTIVITY IN THE EU27 IN 2008



Direct: motor vehicle industry and parts.

Indirect: up-stream and down-stream level of automotive industry— recycling, sales, maintenance and repair of motor vehicles, road transport (passenger transport, taxi operations, freight transport), manufacture of tyres, construction of highways and roads.

Source: ACEA.

We estimate that scrapping schemes might have contributed to the maintenance of up to 120,000 jobs in the automotive direct sector. This figure needs to be taken cautiously as this calculation is based on an average number of vehicles produced per person.

The impact on indirect employment is estimated to be small as many upstream or downstream sectors are not directly linked to local vehicle production and are not, therefore, affected by scrapping schemes (i.e. repair and maintenance, recycling, road transport...).

4.4 ESTIMATION OF NET EFFECT

Despite the relatively small size of the direct automotive industry compared with overall GDP, the overall impact of scrapping schemes is important given the strong linkages with other industries. If we include a multiplier consumption effect generated by these additional values and subtract the substitution effect with others goods, the overall effect is estimated between €18 billion and €23 billion, which represents 0.16–0.20% of real European GDP in 2009.

In other terms, €1 of value added created through scrappage schemes is estimated to have created between €2 and €3 value added within the broader economy in 2009.

The direct payback rate is estimated to oscillate between -30% and -45% over the next two years and even more if we include in the payback effect and ongoing reduction of consumption due to the continuation of car-loans (around -80%).

Fig. 107 OVERALL ESTIMATED EFFECT OF SCRAPPING SCHEMES IN EU

2009	Public Finance	Consumer Spend	Impact on Automotive Sector: Motor Vehicles	Vehicle Parts	Direct Employ	Indirect Employ	Multiplier Effect on Consumption vs. Substitution Effects	Total Effect
EU Cty w SS	+/-	++	+/-	++	+	+		**++**
EU Cty w/o SS	=	=	++	++	+	+		**++**
Total EU		**€20bn Incl. €19bn prod in EU**	**€4.6bn VA**	**€4.3bn VA**			**++ multiplier effect - for goods substitution**	**€23-18bn**
2009–11								
EU Cty w SS	+/-	+	+	+	=	=		**+**
EU Cty w/o SS	=	=	+	+	=	=		**+**
Total EU		**€11.6bn Incl. €10bn prod in EU**	**€3.1bn**	**€3bn**				**€4-8bn**

Score:

= no impact.

+/- impact positive or negative according to country.

+ Medium positive impact.

++ Strong positive impact.

Source: IHS GLOBAL INSIGHT.

5 Evaluation of Scrapping Schemes Against Environmental Effectiveness

5.1 METHODOLOGY

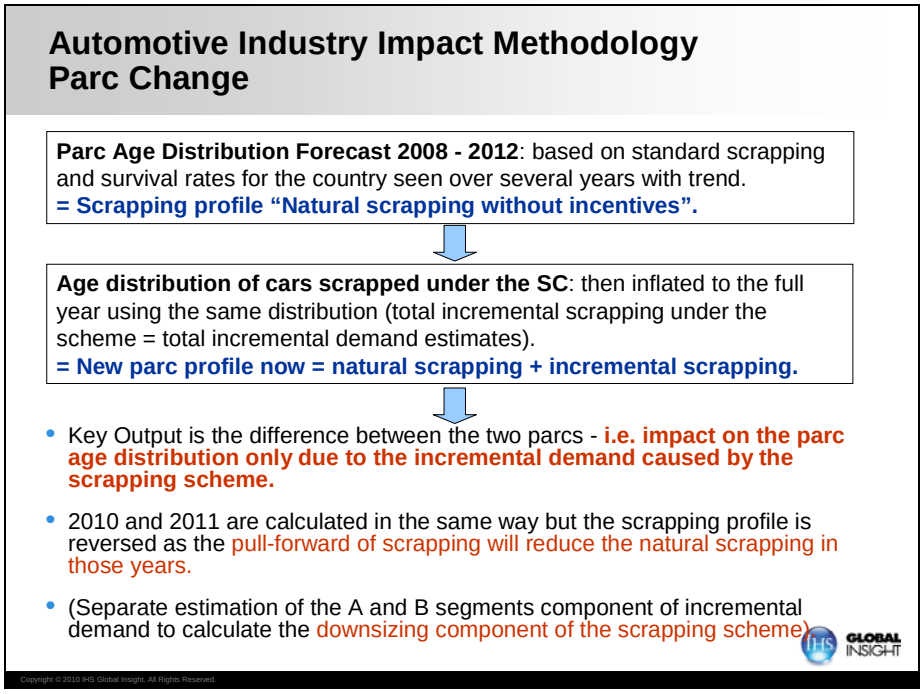
5.1.1 The Parc-Emissions Model

The environmental impact module was the last chain of the stepped models. The exogenous variable input from the stage one models is the quantification of net incremental demand and the assessment of pulled forward and payback elements for future time periods (described in chapter 2). Other exogenous inputs also include reported data from member states on the characteristics of vehicles scrapped including age and emissions performance. Reported data on the characteristics of new or used vehicles purchased under each scheme such as CO_2 and vehicle size or segmentation were also taken as exogenous inputs (described in the country chapter annexes).

Variables endogenous to the parc-emissions model include the age distribution of vehicle parc, age-dependent marginal scrapping rates, scheme-dependent skew, and behavioural equations for vehicle passenger kilometres travelled, by country and age. Each country has the same basic structure, which has been calibrated with available data.

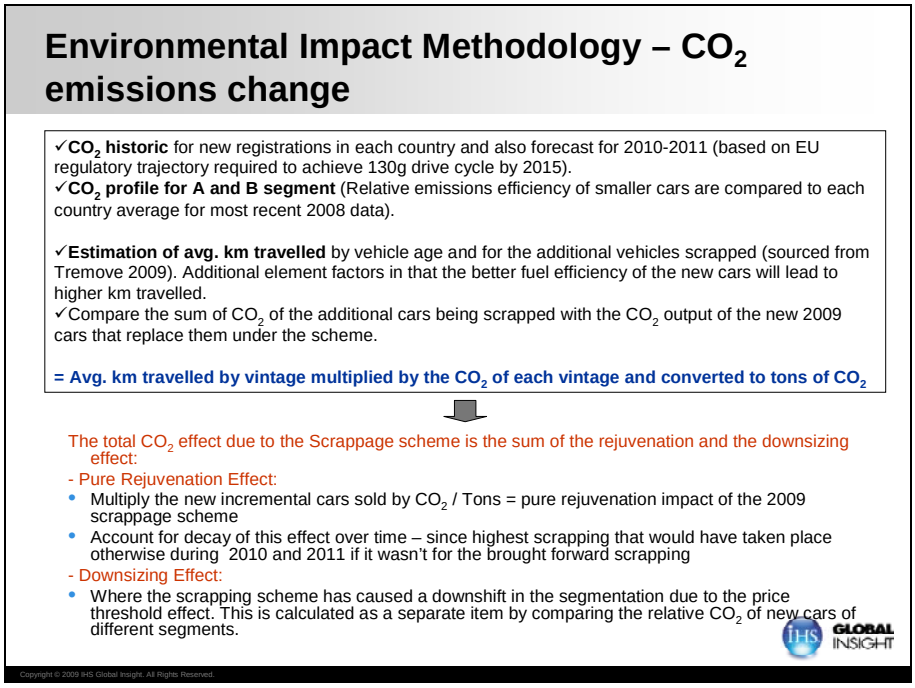
The basic requirement is to quantify the total number of additional cars being scrapped under the scheme, compared with normal scrapping behaviour, i.e. without schemes in place. Again, we use the term 'incremental increase in vehicle scrapping' to distinguish it from the total level or rate of vehicle scrapping in the country. Specifically, this has to be determined for each vehicle age or vintage (defined by the year of first registration).

Fig. 108 ENVIRONMENTAL IMPACT METHODOLOGY



Source: IHS Global Insight.

Fig. 109 ENVIRONMENTAL IMPACT METHODOLOGY



Source: IHS Global Insight.

Once data on the incremental changes to the age distribution of the parc are quantified, they can also be used to asses any improvements in vehicle safety (Chapter 6) and emissions reduction.

It then becomes possible to match the numbers of vehicles being scrapped from each vintage with the average unit vehicle emissions quality in terms of CO_2, NOx, PM, and Euro Emissions standards. This is then compared with the same metrics for new vehicles registered under the scheme to determine the relative improvement in emissions as a result of the rejuvenating mechanism of scrapping schemes.

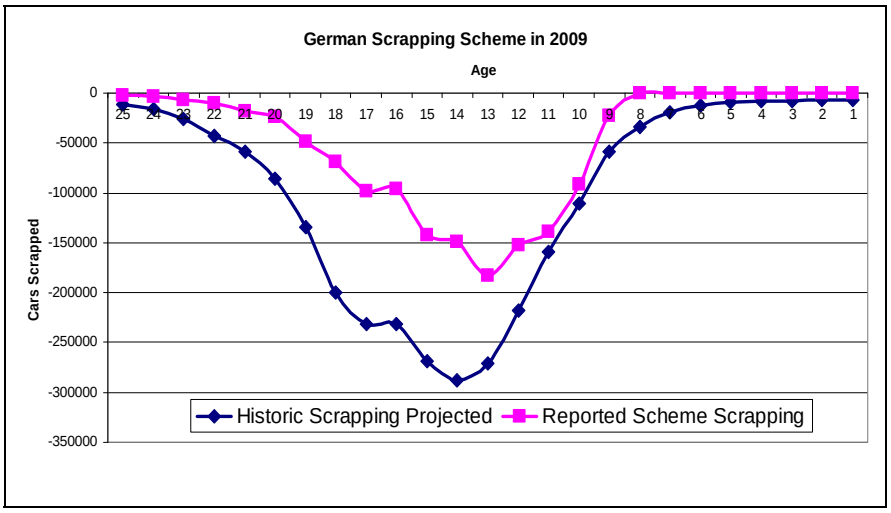
Finally, matching these against typical distances travelled by vehicles of different vintages provides a quantification of possible emissions abatement due to the scrapping schemes.

5.1.2 Changes to the Age Structure of the Vehicle Parc Due to Scrapping Schemes

IHS Global Insight has maintained detailed European car parc databases for almost two decades now. Where possible, this is based around official data on the age of the parc and implied scrapping of vehicles. We have used these databases to generate normalised vehicle scrapping distributions for each country, assumed in the absence of any scrapping incentive scheme. Incoming data from member states on the age distribution of cars scrapped under the scrapping scheme (usually only part year) was then assessed and inflated to year-end totals based on the incremental scrapping component only.

A good example of this is provided by the German scrapping scheme for 2009 shown in Fig. 110; data available on the ages of cars scrapped only under the scrapping programme were provided (at the end of October). We compare this with the expected scrapping distribution based on the recent trends in German vehicle survival, which are simulated via a modified Weibull function.

Fig. 110 CHANGES IN THE DISTRIBUTION OF CAR SCRAPPING IN GERMANY 2009



Source: IHS Global Insight.

Compared with the peak in the normal distribution, it is clear that the German scrapping scheme has a strong skew towards younger ages of vehicles. This is at its most extreme for vehicles of just 10 and 11 years of age; 91,000 processed scrapping scheme cars were 10 years of age, which is almost 80% of the total scrapping expected. The propensity to scrap much older cars under the schemes (say over 17 years) is actually much lower than generally seen in the market.

This strong skew, which is also observed in other markets, has several implications.

It reinforces our view that there is a strong psychological element to car scrapping schemes over and above rational economic behaviour. For example, consumers may feel a benefit from a perception of increased convenience in disposing of their car, or some may even feel that they are doing an environmentally reasonable transaction.

The amount of pull-forward is likely to be delayed, and spread several periods into the future and not just concentrated into 2010.

It suggests that the environmental benefits from scrapping-scheme-induced rejuvenation may be weaker than expected.

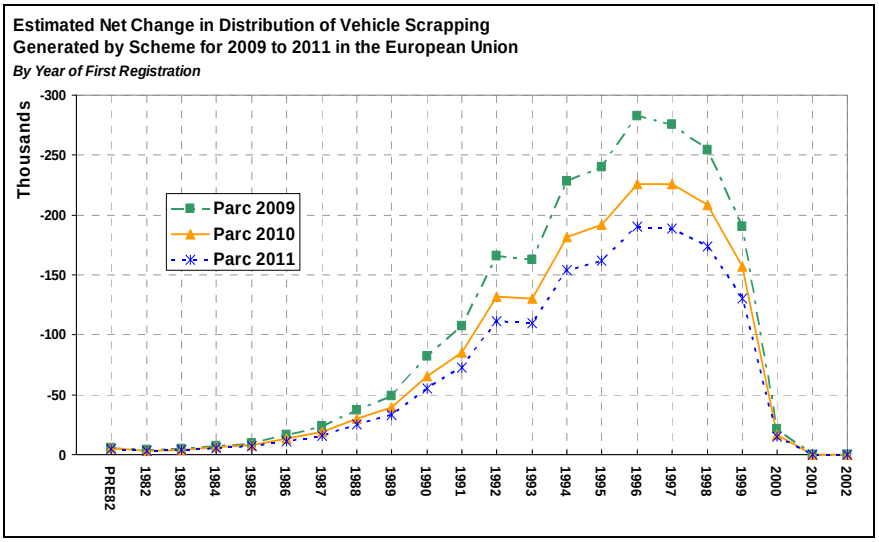
It suggests that there is an additional direct cost to society, as vehicles still with economic life, may be being scrapped. (The costs of this were not studied in this report but have been estimated separately in the JRC study EUR 23896 EN 2009).

5.1.3 EU-level Scrapping Scheme Dynamics

By performing this comparative age distribution analysis for each scrapping scheme, we then generate an assessment of the incremental change to each country's parc purely due to the scrapping scheme. This is then summarised at the EU level in Fig. 111. The chart shows (using an inverted scale) the net or incremental increase in the number of cars being scrapped, due to all the member state scrapping schemes launched in 2009.

The 2009 parc series, for example, shows that scrapping schemes induced an extra 190,000 units of cars being scrapped from cars first registered in 1999 (10 years old). This rises to almost 280,000 extra scrappings for cars of the 1996 vintage.

Fig. 111 SCRAPPING SCHEME DYNAMICS AT THE EU LEVEL



Source: IHS Global Insight.

Clearly, if scrapping schemes encourage accelerated scrapping of vehicles in this period, then there will be, by definition, a smaller pool of older vintage cars to get scrapped in future periods. As a result, we see some decay in the net increase in scrapping once schemes have ended. In this analysis, we have assumed that all the 2009 schemes end on schedule and are not replaced.

The rate of decay in the net incremental scrapping of the European car parc can be seen by observing the parc 2010 and parc 2011 series. For example, the initial removal of the extra 280,000 units of 1996 vintage cars in the 2009 parc decays to just 250,000 units by the end of 2010 and 185,000 units by the end of 2011.

It is this decay that makes a significant proportion of the environmental benefits of scrapping schemes transitory (although cumulative).

5.2 CO_2 IMPACTS—EUROPEAN CONTEXT

The EU started taking a leading role in reducing the effects of car use on the environment, see Fig. 112. In particular, in relation to global warming and CO_2 emissions, there is the mandatory CO_2 framework in place, "Regulation (EC) No 443/2009", which sets binding emission targets. According to the regulation, all new vehicles registered in the EU after 2012—whether produced domestically or imported—will have to respect a "limit value curve of permitted CO_2 emissions", based on their weight. These mandatory CO_2 framework regulations drive developments in the market, as vehicle manufacturers that miss their allocated CO_2 compliance targets are subjected to a penalty.

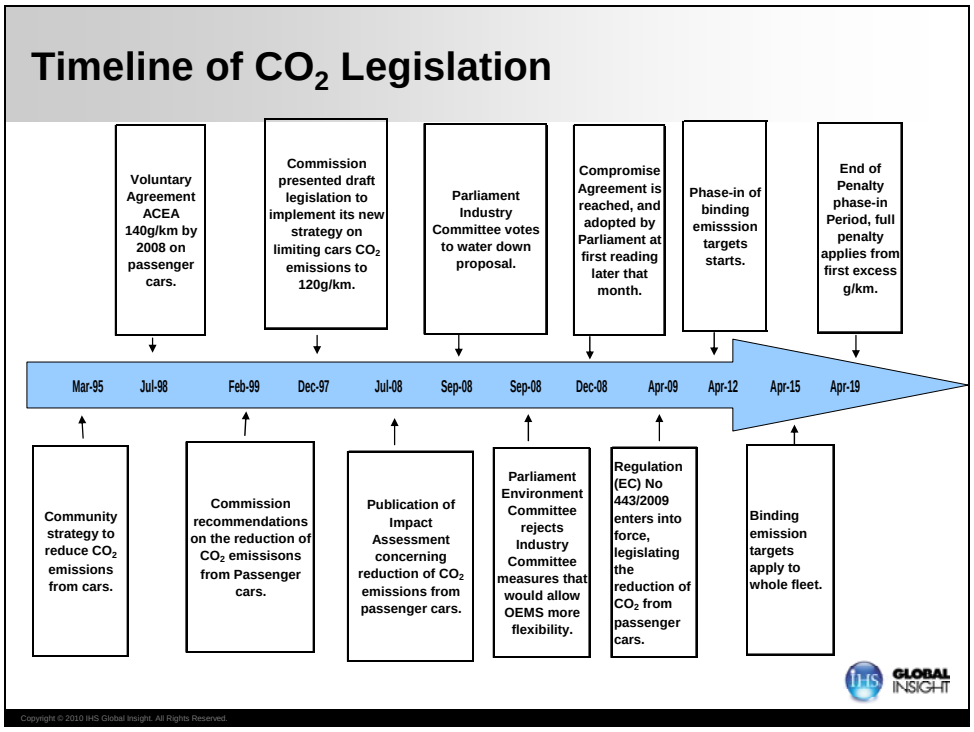
Penalties for missing the mandatory CO_2 framework targets were due to apply between the phase-in dates 2012 to 2015, but the compromise agreement that was reached introduced a delayed phase-in period for the fines. Therefore, the manufacturers will now pay lower penalty payments for small excess emissions beyond the target from 2012 to 2018.

In late October 2009, the European Commission published the first draft regulation to limit carbon dioxide emissions from new light commercial vehicles. The proposal sets out a target for the average new van to emit no more than 175 grams of CO_2 per kilometre by 2016.

The draft regulation proposes a phased introduction, which would require that an average of 75% of new vans must meet the 175g target by 2014, 80% by 2015, and 100% by 2016.

Average emissions from new vans in 2007 were 203 g/km, which means that if the average new van meets the 175g target by 2016, it will require a 14% reduction over nine years.

Fig. 112 TIMELINE OF CO_2 AND FISCAL POLICY LEGISLATION



Source: IHS GLOBAL INSIGHT.

Fig. 113 AVERAGE CO_2 EMISSIONS FOR MEMBER STATES WITH A SCRAPPING SCHEME 2008

Gram CO_2/km	EU25	PT	IT	FR	SK[2]	ES	AT	IE	NL	UK	DE	RO	LU	CY	GR
2008 [1]	153.5	138	145	140	-	148	158	157	158	158	165	156	160	166	161

1) *Based on results from European Federation for Transport and Environment, Reducing CO_2 Emissions from New Cars—A Study of Major Car Manufacturers progress in 2008, and shown in Chapter 1.*

2) *Not reported by European Federation for Transport and Environment in its 2008 report.*

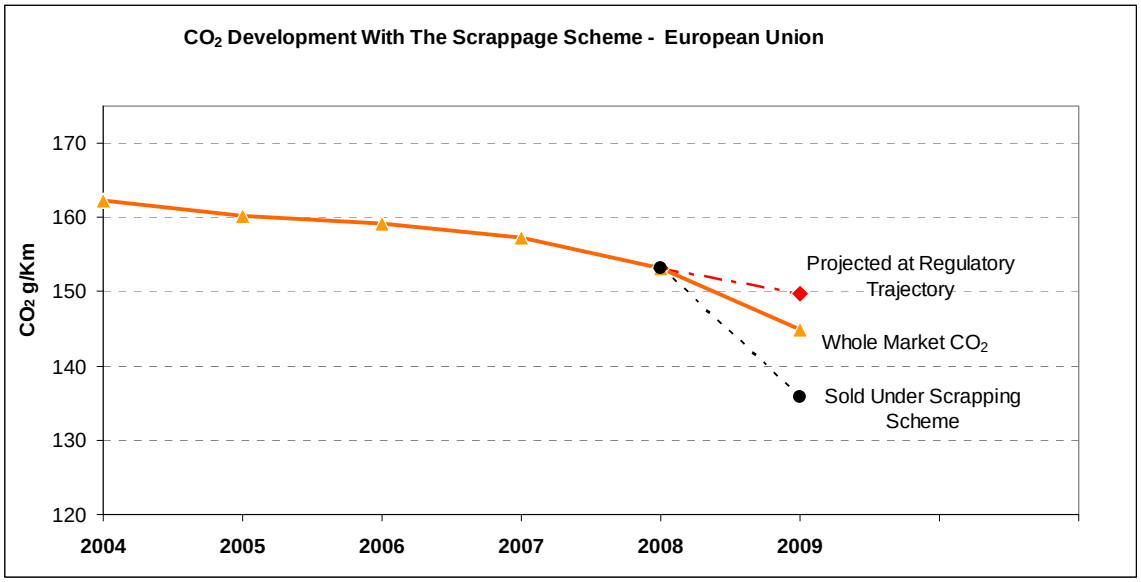
Source: IHS Global Insight.

Based on the most recent vehicle CO_2 emissions data available and the regulatory framework outlined above, we can make projections for each market of the future period average vehicle CO_2 output. This is required in order to control for what would have occurred independently, and without the distortions of scrapping schemes. It is important also to look at future periods and not just 2009 because the secondary payback of scrapping schemes may reduce the number of cars entering the parc with a better future CO_2 performance. This has to be taken into account in any longer term assessment of the CO_2 abatement potential of scrapping schemes.

We developed a projected CO_2 forecast based on the regulatory trajectory implied to achieve full compliance to the mandatory framework by the year 2015 (Fig. 114). The regulatory trajectory projects that average EU27 CO_2 would drop by almost 4g/km in 2009 to just below 150g/km.

Data compiled for each member state with a scheme during this study suggests that the actual average CO_2 of the European market for 2009 will come in at 145g/km. This was pulled down sharply by the scrapping schemes. The average new European car bought as part of the scrapping schemes was just 135.9g/km.

Fig. 114 CO_2 DEVELOPMENT WITH SCRAPPING SCHEMES, EU27 (PASSENGER CARS)



Source: IHS Global Insight.

A more detailed assessment at the member state level is summarised in Fig. 115. The weighted average age of cars scrapped under the schemes was 14.8 years with a range of between 13.4 and 21.0 years. The weighted average CO_2 of the scheme scrapped cars is estimated to have been 186.5g/km with a range of 175.0g/km to 194.0g/km.

Fig. 115 CO_2 Performance Metrics of Countries with Scrapping Schemes

Country	Average Age of Parc 2008	Average Age of Cars Scrapped Under Scheme 2009	CO_2 of Scheme Scrapped Cars	Projected CO_2 2009*	Actual 2009 CO_2	2009 Scheme CO_2
Germany	8.16	14.70	194.0	160.4	154.4	142.0
Italy	7.97	14.10	177.2	141.1	136.6	123.5
United Kingdom	7.10	13.43	182.7	154.6	149.5	132.1
France	8.12	14.93	175.6	136.6	132.0	128.2
Spain	7.89	15.29	177.1	145.6	141.9	131.0
The Netherlands	8.51	16.16	187.9	154.2	149.5	130.0
Austria	8.57	17.54	188.4	154.2	150.7	143.6
Romania	n/a	20.98	190.5	152.3	152.0	149.9
Greece	10.87	19.73	192.5	157.1	156.8	154.5
Slovakia	n/a	20.67	186.4	152.3	148.3	142.4
Portugal	9.02	17.29	173.0	134.7	134.3	126.6
EU Countries with Scheme	**8.1**	**14.8**	**186.5**	**149.8**	**145.0**	**135.9**

Source: IHS Global Insight.

** Projected figure based on IHS Global Insight calculations*

5.2.1 Identifying Components of CO_2 Abatement Derived from Scrapping Schemes

Three mechanisms by which CO_2 reduction take place are in evidence in the typical European scrapping scheme. (These are explained below by the use of simple European averages outlined in Fig. 115 but are actually calculated on an individual country basis and based on individual vintages of scrapped cars).

The first is termed the **Rejuvenation Mechanism**. This is the well understood replacement of old, less efficient vehicles with new, clean ones with better fuel consumption. On a single unit basis, the rejuvenation effect is best seen as the replacement of a 186.5g/km car with a 149.8g/km car (based on the regulatory trajectory). In other words a 36.7g/km more efficient car.

The **Mix and Technology Mechanism** is the additional CO_2 reduction actually observed with scrapping scheme cars compared with the projected development. This occurs due to a combination of downsizing/downpricing changes to market segmentation and also due to changes in the powertrain/technology mix within each segment; for example, the choice of a 1.2-litre gasoline (petrol) engine instead of a 1.6-litre engine (see chapter 3). The mix effect is effectively the additional 13.9g/km of reduction between the 149.8g/km projection and the actual observed average of new replacement cars at 135.9g/km.

Of the total mix effect, the **Segment Downsizing Mechanism** of scrapping schemes is specifically isolated. As previously outlined, a major side-effect of all scrapping schemes is the significant degree of segment downsizing. To calculate this effect, we take the difference in average CO_2 of a typical A and B segment car, compared with the average market projection, multiplied by the incremental sales in these smaller segments. The relative difference in segment emissions performance varies by market.

5.2.2 Vehicle Kilometres Travelled

Data on vehicle kilometres travelled was sourced for each country from the Tremove 2008 databank. The data consisted of average kilometres travelled by age of vehicle. Older vehicles typically travel less annual distance than new cars, and cars of the age range eligible for scrapping schemes also tend to travel less than the average of the market.

The weighted average kilometres travelled by all the incrementally scrapped cars were calculated. This is the loss to total passenger mobility that needs to be replaced by the new cars purchased under the scrapping schemes. Since the new cars bought have better fuel consumption, this will in theory lead to an increase in notional kilometres travelled—another side-effect of incentive schemes, although one that reduces the aggregate reduction in CO_2. This was calculated using typical usage cost elasticities reported in comparative literature on this subject. On average, it suggests that total kilometres travelled will increase by between 250km and 450km per new car owned by household, and on a per year basis.

5.2.3 Total CO_2 Abatement Due To Scrapping Schemes

Fig. 116 CO_2 ABATEMENT RESULTING FROM SCRAPPING SCHEMES

	CO_2 ABATEMENT (Tonnes CO_2)	2009	2010	2011	2009	2010	2011
					% Contribution to Annual CO_2 Reduction		
Germany	Rejuvenation Mechanism	-327,020	-193,439	-120,867	60.5%	55.1%	46.8%
	Mix and Technology Mechanism	-213,799	-157,764	-137,316	39.5%	44.9%	53.2%
	Of Which Segment Downsizing (A&B)	-207,934	-153,436	-133,057	38.4%	43.7%	51.5%
	Total CO_2 Reduction—Annual	**-540,819**	**-351,203**	**-258,183**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-540,819**	**-892,021**	**-1,150,204**			
Italy	Rejuvenation Mechanism	-93,333	-66,143	-31,576	63.0%	57.8%	44.5%
	Mix and Technology Mechanism	-54,777	-48,298	-39,411	37.0%	42.2%	55.5%
	Of Which Segment Downsizing (A&B)	-30,972	-27,309	-22,175	20.9%	23.9%	31.2%
	Total CO_2 Reduction—Annual	**-148,110**	**-114,441**	**-70,988**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-148,110**	**-262,550**	**-333,538**			
UK	Rejuvenation Mechanism	-54,256	-46,710	-27,527	51.1%	45.7%	38.0%
	Mix and Technology Mechanism	-51,848	-55,522	-44,980	48.9%	54.3%	62.0%
	Of Which Segment Downsizing (A&B)	-45,240	-48,445	-39,374	42.6%	47.4%	54.3%
	Total CO_2 Reduction—Annual	**-106,105**	**-102,231**	**-72,507**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-106,105**	**-208,336**	**-280,843**			
France	Rejuvenation Mechanism	-111,772	-62,252	-33,457	79.5%	73.9%	64.4%
	Mix and Technology Mechanism	-28,863	-21,957	-18,482	20.5%	26.1%	35.6%
	Of Which Segment Downsizing (A&B)	-32,860	-24,997	-20,908	23.4%	29.7%	40.3%
	Total CO_2 Reduction—Annual	**-140,635**	**-84,208**	**-51,939**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-140,635**	**-224,843**	**-276,782**			
Spain	Rejuvenation Mechanism	-35,569	-22,119	-9,959	61.3%	54.0%	40.1%
	Mix and Technology Mechanism	-22,424	-18,878	-14,889	38.7%	46.0%	59.9%
	Of Which Segment Downsizing (A&B)	-3,420	-3,420	-3,420	5.9%	8.3%	13.8%
	Total CO_2 Reduction—Annual	**-57,993**	**-40,997**	**-24,848**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-57,993**	**-98,990**	**-123,838**			
NL	Rejuvenation Mechanism	-3,825	-3,625	-2,981	53.9%	49.2%	43.4%
	Mix and Technology Mechanism	-3,273	-3,748	-3,882	46.1%	50.8%	56.6%
	Of Which Segment Downsizing (A&B)	-2,836	-3,248	-3,373	40.0%	44.0%	49.1%
	Total CO_2 Reduction—Annual	**-7,099**	**-7,374**	**-6,863**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-7,099**	**-14,473**	**-21,336**			

Source: IHS Global Insight. (2009 assumes full year of operation;nNo data available for Luxembourg and Cyprus).

Fig 116 (CONT'D) CO_2 ABATEMENT RESULTING FROM SCRAPPING SCHEMES

	CO_2 ABATEMENT (Tonnes CO_2)	2009	2010	2011	2009	2010	2011
					% Contribution to Annual CO_2 Reduction		
Austria	Rejuvenation Mechanism	-15,145	-14,712	-10,696	76.2%	80.1%	78.4%
	Mix and Technology Mechanism	-4,721	-3,645	-2,952	23.8%	19.9%	21.6%
	Of Which Segment Downsizing (A&B)	-4,062	-3,136	-2,744	20.4%	17.1%	20.1%
	Total CO_2 Reduction—Annual	**-19,866**	**-18,357**	**-13,648**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-19,866**	**-38,223**	**-51,870**			
Romania	Rejuvenation Mechanism	-6,422	-5,127	-3,400	93.1%	92.9%	90.3%
	Mix and Technology Mechanism	-475	-393	-364	6.9%	7.1%	9.7%
	Of Which Segment Downsizing (A&B)	-2,296	-1,902	-1,767	33.3%	34.5%	46.9%
	Total CO_2 Reduction—Annual	**-6,897**	**-5,521**	**-3,764**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-6,897**	**-12,418**	**-16,182**			
Greece	Rejuvenation Mechanism	-3,381	-6,004	-4,448	93.3%	92.8%	91.8%
	Mix and Technology Mechanism	-242	-465	-400	6.7%	7.2%	8.2%
	Of Which Segment Downsizing (A&B)	2,873	5,523	4,754	-79.3%	-85.4%	-98.1%
	Total CO_2 Reduction—Annual	**-3,623**	**-6,468**	**-4,848**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-3,623**	**-10,091**	**-14,939**			
Slovakia	Rejuvenation Mechanism	-7,855	-6,167	-3,599	74.3%	73.4%	64.2%
	Mix and Technology Mechanism	-2,712	-2,230	-2,007	25.7%	26.6%	35.8%
	Of Which Segment Downsizing (A&B)	-2,924	-2,404	-2,166	27.7%	28.6%	38.6%
	Total CO_2 Reduction—Annual	**-10,566**	**-8,396**	**-5,605**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-10,566**	**-18,963**	**-24,568**			
Portugal	Rejuvenation Mechanism	-6,861	-4,326	-3,092	79.9%	77.0%	73.4%
	Mix and Technology Mechanism	-1,727	-1,295	-1,121	20.1%	23.0%	26.6%
	Of Which Segment Downsizing (A&B)	-173	-130	-112	2.0%	2.3%	2.7%
	Total CO_2 Reduction—Annual	**-8,588**	**-5,622**	**-4,212**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-8,588**	**-14,210**	**-18,422**			
EU Total*	Rejuvenation Mechanism	-665,440	-430,624	-251,601	63.4%	57.8%	48.6%
	Mix and Technology Mechanism	-384,860	-314,194	-265,803	36.6%	42.2%	51.4%
	Of Which Segment Downsizing (A&B)	-329,843	-262,902	-224,342	31.4%	35.3%	43.4%
	Total CO_2 Reduction—Annual	**-1,050,300**	**-744,818**	**-517,404**	**100.0%**	**100.0%**	**100.0%**
	Cumulative CO_2 Abatement	**-1,050,300**	**-1,795,118**	**-2,312,522**			

Source: IHS Global Insight. (2009 assumes full year of operation; no data available for Luxembourg and Cyprus).

**EU total is European markets with a scrapping scheme.*

Fig. 116 shows the final results of the parc-emissions model applied to each member state operating a scrapping scheme. It provides a total assessment of the CO_2 abatement potential of each scheme measured in metric tonnes for new passenger cars.

At the aggregate level, 1.05 million tonnes of CO_2 were saved during the year by the scrapping schemes launched in 2009. (This is assuming a full year of the scheme operation as we have observed in the note in Fig. 116). This represents an average saving of 0.29 tonnes per car funded by governments or 0.49 tonnes per incremental car.

Initially, the most important contribution to this overall reduction is the rejuvenation effect worth 0.66 million tonnes of the 1.05 million total (or 63%). The other 0.38 tonnes (37%) of reduction is due to the overall mix effect, 85% of which is pure downsizing into A and B segment vehicles.

The impact of the 2009 scrapping schemes is still positive during 2010 and 2011 although the annual abatement falls to 0.74 million tonnes and 0.52 tonnes, respectively. There are two reasons for this. Firstly, some of the accelerated scrapping of vehicles in 2009 would have occurred naturally in near future periods and so the net rejuvenation effect decays over time. Secondly, any brought-forward sales into 2009, that would otherwise have been bought in the near future, would have a higher, on average, CO_2 emission because of continuous industry efforts to improve fuel efficiency.

The decay in the rejuvenation effect means that by the end of 2011 it contributes just less than 50% to the total annual CO_2 reduction. Over the same period, the relative importance of the downsizing effect increases. The surge in small car sales in 2009 will still represent an abnormal small car weighting in the parc of that vintage for many years—in fact, until they themselves are scrapped.

We find that the significance of this downsizing effect of scrapping schemes has been largely neglected in previous assessments of the emissions abatement potential of scrapping schemes.

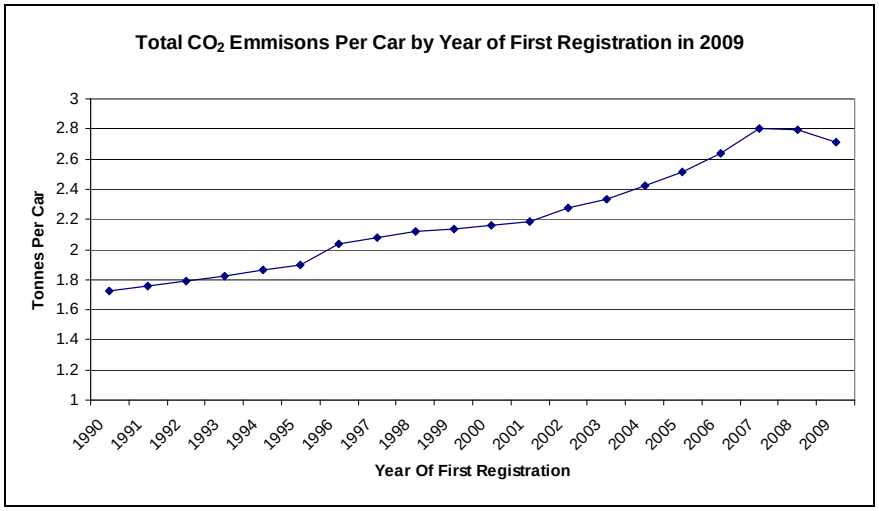
Although the annual reduction of CO_2 from the scrapping schemes decays after they end, it is still a cumulative effect. By the end of 2010, a total of 1.79 million tonnes of CO_2 emissions will have been saved—rising to 2.3 million tonnes by the end of 2011.

The cumulative net abatement of CO_2 due to the 2009 scrapping schemes is 2.3 million tonnes over a three year period. This represents an average saving over the three year period of 2009–11of 0.65 tonnes per car funded by governments, or 0.22 tonnes per car funded per year. Unfairly, allocating the entire net financial cost of the scrapping schemes purely to CO_2 reduction leads to a cost estimate of €1,100 per tonne saved. (Actually, the very generous scheme in Germany distorts the average cost significantly).

5.2.4 Gross Emitters

Most previous studies commenting on the design of schemes suggest that scrapping schemes should target older vehicles (via the use of the minimum age criterion). The main reason is the degradation in fuel consumption with vehicle age. In fact, we find that this is the case only on a per vehicle basis with static average distances travelled. When factoring in the fact that average distances travelled also decay with vehicle age, it is clear that this effect is weaker than initially expected. Fig. 117 shows calculated average gross emissions of vehicles of each vintage during 2009 (CO_2 multiplied by average kilometres).

Fig. 117 TOTAL CO_2 EMISSIONS PER CAR BY YEAR OF FIRST REGISTRATION IN 2009



Source: IHS Global Insight.

For example, a 15-year-old vehicle in the year 2009 has a CO_2 output that is around 7% worse than a 10-year-old vehicle but, it also on average travels around 17% few kilometres per year. The total gross CO_2 emissions of a typical 10-year-old car are 2.13 million tonnes per year compared with just 1.86 million tonnes for a 15-year-old car. The amount of degradation observed in each year parc depends on the historic rate of improvement in CO_2 emissions of vehicles relative to the decay in average distances travelled. Careful analysis of this for each country will help in fine-tuning scheme design specifically aimed at emissions reduction. In other words, an older minimum age requirement means a larger per unit CO_2 reduction will be achieved on its replacement, which also has a lower weighting.

5.2.5 Estimates from Used Car Schemes

Fig. 118 ADDITIONAL CO_2 ABATEMENT FROM USED CAR REPLACEMENT ELEMENTS OF SCRAPPING SCHEMES

	CO_2 ABATEMENT (Tonnes CO_2)	2009	2010	2011
Germany	Total CO_2 Reduction—Annual	-78,993	-54,191	-44,046
NL	Total CO_2 Reduction—Annual	-3,622	-3,089	-1,524
Greece	Total CO_2 Reduction—Annual	-3162	-1,897	-1,138
	Used Car Sub-Total	-85,776	-59,178	-46,708
EU Total (Including New & Used Cars)				
EU	Total CO_2 Reduction—Annual	-1,136,077	-803,995	-564,112
EU	Cumulative $C0_2$ Abatement	-1136077	-1,940,072	-2,504,184

Source: IHS Global Insight.

Although more tentative in providing estimates (which were based on very incomplete data), we also include those schemes with a replacement used car element (Fig. 118). Used car schemes are less 'unit volume' efficient at reducing emissions.

The used cars purchased most often have higher CO_2 output than that found in a completely new car, even if there are, for example, specific requirements for a Euro-4 replacement car. In addition, there is no real downsizing effect since by definition the used cars are already in the parc with a predetermined segment structure.

Structured analysis of the used car market is extremely complex and detailed effects of each scheme on changes in the transactions of used cars were too involved to be incorporated in this study. The impact on residual value has been reported recently by Eurotax.

The analysis of CO_2 and pollutants that we present here could actually understate the abatement being achieved. It is generally accepted that over time vehicle powertrains suffer degradation in performance relative to their 'as new' condition; this can be modelled but was not included in this particular analysis.

5.2.6 Used Car Flow to New Member States

Another source of EU-wide underestimation of the emissions' abatement potential calculated here comes from significant export of older used cars from the large markets in Western Europe to newer member states, and in particular to Poland. Incoming evidence suggests a sharp reduction in used car imports into Poland and the Czech Republic, both of which have dropped significantly in 2009.

We estimate that this flow may have been reduced to the tune of as many as 490,000 used cars over the period the European scrapping schemes were in place—(a reduction of almost 40%).— Some of this will have been due to economic conditions but the data suggest that the proportion of used cars being imported into these countries that are over 10 years of age (the age requirement for most scrapping schemes) has also fallen. Neither of these two countries has scrapping schemes of their own. In other words, the true reduction in CO_2 emissions on an EU-wide basis cannot be measured purely by the aggregate of the CO_2 abatement of the countries implementing the schemes.

5.3 EURO NORMS AND OTHER ENVIRONMENTAL IMPACTS

The agreement of Euro-5 regulations, scheduled for introduction on new-type approvals from September 2009, saw the PM emissions for new diesel vehicles reduced to five milligrams per kilometre (mg/km) and so has promoted the need for standard fitting of DPFs so that vehicles can achieve this target satisfactorily. With current generation light vehicles complying with the Euro-5 regulations, it is likely that any future development of DPF technology will focus on making the components smaller and cheaper rather than on its effectiveness.

The Euro-5 emissions regulations, which require mandatory fitting of DPFs throughout Europe, have consequently led to an increased level in the fitting rates of DPFs during the last few years, and will ultimately be tied to the sale of diesel vehicles in the region.

It was not until late 1999 that the first true DPF application destined for European markets made its debut, in time for the Euro-3 emissions regulation. It is worthwhile to note that this technology was still not required to meet the then standing emissions regulation, but that it was already being envisioned as a future requirement. By 2005, the incoming Euro-4 emissions legislation started accelerating both product development and usage, as larger and heavier light vehicles were now required to utilise DPF technology in order to satisfy the regulatory requirements. The mass-market phase-in period then accelerated when the Euro-5 draft legislation was agreed upon around 2005/2006.

Fig. 119 EURO NORMS

	Type Approval	In Force
Euro-1	Jul-92	Jan-93
Euro-2	Jan-96	Jan-97
Euro-3	Jan-00	Jan-01
Euro-4	Jan-05	Jan-06
Euro-5	Sep-09	Jan-11

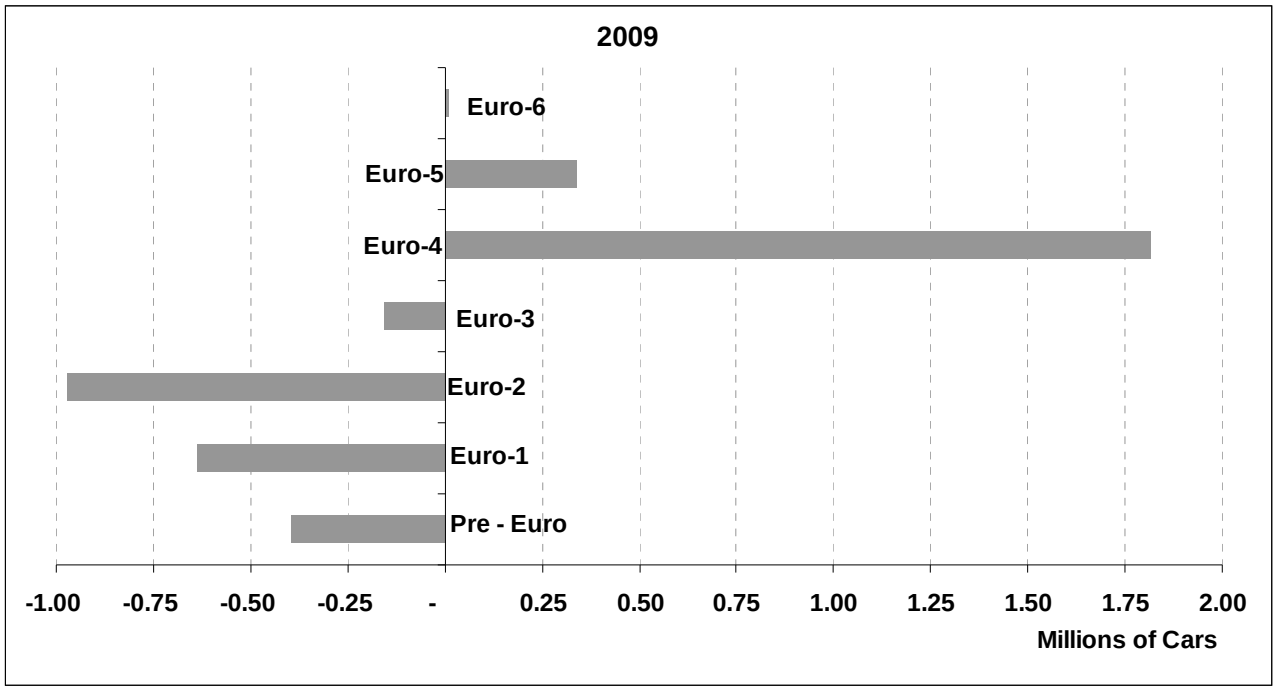
Source: IHS Global Insight.

With the knowledge of the Euro-5 emissions regulation arriving later on in 2009, manufacturers embarked on an intensified period of development effort with regards to DPF technology, in order to continue offering diesel-powered light vehicles in the European market. The stricter demands that would be required from Euro-4, particularly concerning diesel PM emission, meant that by 2005 the larger and heavier light vehicles were already required to utilise DPF technology in order to satisfy the regulatory requirements. Therefore, by September 2009, effectively all new diesel-powered cars were forced to comply with these stricter criteria.

5.3.1 Emissions Changes in the Near Future Are Important for Maximising Impact—Scheme Design

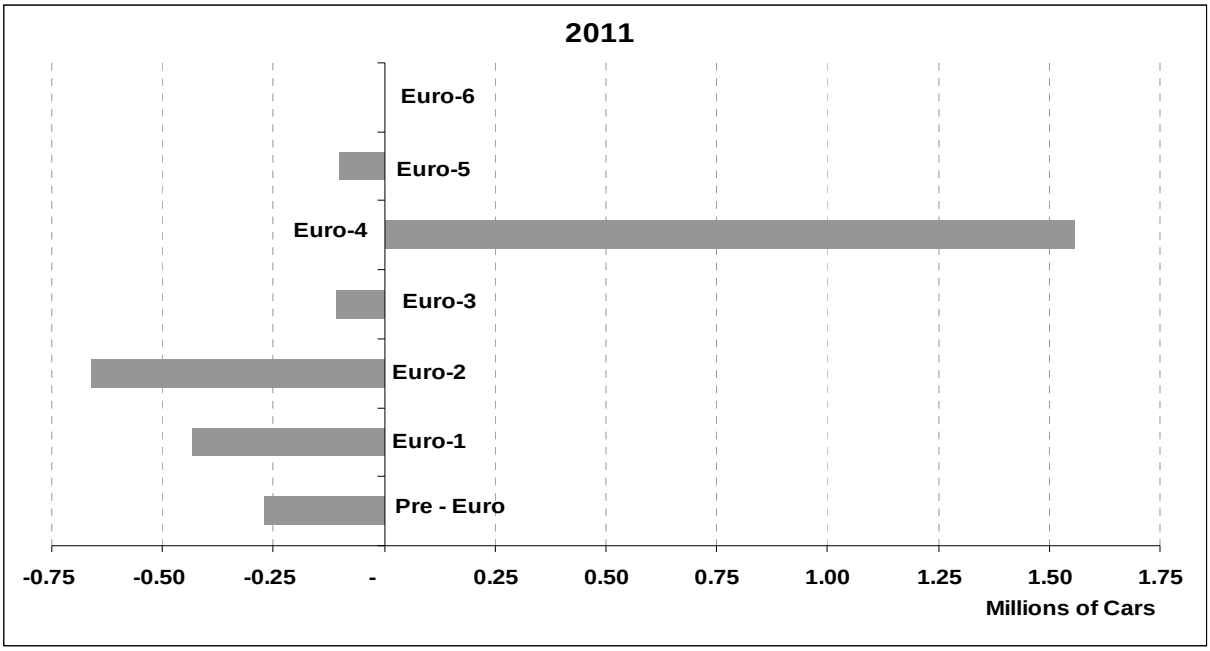
The impending changeover to Euro-5 was unfortunate from the perspective of the high density of launches of scrapping schemes in 2009. This has diluted the emissions reduction potential of the schemes measured over the next few years notably in terms of PM reduction from the schemes. This can be seen clearly when comparing figures 119 and 120.

Fig. 120 NET IMPACT OF SCRAPPING SCHEME ON THE DISTRIBUTION OF EMISSIONS STANDARDS FOR 2009, EU LEVEL



Source: IHS Global Insight.

Fig. 121 NET IMPACT OF SCRAPPING SCHEME ON THE DISTRIBUTION OF EMISSIONS STANDARDS FOR 2011, EU LEVEL



Source: IHS Global Insight.

Fig. 121 shows the net incremental changes to distribution of cars complying with each emission standard in 2009 purely as a result of the scrapping schemes. The schemes retired more than an extra one million units of Euro-1 and pre-Euro-1 standard, and almost one million cars of Euro-2 compliance vehicles, and replaced them with a mix of 84% Euro-4 and 16% Euro-5 cars. This in turn results in abatement of both NOx and PM(see below).

By the end of 2011, there will actually be fewer Euro-5 cars on the road than there would have been in the absence of scrapping schemes. The reason is that the scrapping schemes retired vehicles that would have been replaced anyway during the period of 2010 to 2011. The payback then means that there will be fewer cars that would have been replaced with Euro-5 cars during this period. From a positive impact recorded in 2009, the net effect on Euro-5 cars eventually becomes negative in 2011 to the tune of 260,000 units.

Given the impending changeover to Euro-5 emissions (see table in section 5.3), vehicle replacement pulled forward by scrapping schemes into 2009 has only a small chance of being a Euro-5 compliant car. This is because type approval only started in September 2009 and is not in full force until January 2011. Based on admittedly incomplete data at the time, we estimated that no more than 15% of the incremental scrapping scheme demand in 2009 was Euro-5 compliant. (Apart from the general roll out, it was previously noted that it was lower priced cars, typically without pre-compliance to Euro-5, which were the biggest scrapping scheme winners).

At the same time, if the vehicles pulled forward by the scrapping scheme would otherwise have been registered in 2010, then it is clear that a far higher percentage would have been registered with Euro-5, and in 2011 all vehicles would have been Euro-5. The impact on the cumulative incremental number of cars of Euro-5 compliance then depends on the assumptions of payback rates. These were discussed in section 2.4. (see also Fig. 48). Higher assumed payback rates and or payback rates over a longer rather than shorter period would mean that the negative long-term impact on the vehicle parc of Euro-5 would be worse.

The impact of this is to dilute or lower the potential benefit from the reduction in PM over time as a direct result of the schemes. In this case, the dilution effect is fortunately lower than might otherwise have been the case. The reason for this is the much lower diesel penetration of the incentive scheme cars than in the rest of the market and the voluntary agreement for fitting of DPFs in Germany.

This clearly demonstrates, however, an important design principle of scrapping schemes. Notably, to be deliberate in the introduction dates of scrapping schemes so as not to be implementing immediately ahead of significant prospective improvements in emissions standards. (This also applies to accelerations in the rate of expected reduction of CO_2).

If adverse timing is unavoidable, as in the case of the crisis-initiated 2009 schemes, then the inclusion of specific requirements for the new replacement car—such as the mandatory fitting of a DPF or a maximum allowable PM emissions—can help significantly. The Luxembourg scheme, for example, included a maximum PM output of 5mg for diesel cars, and the Netherlands specifically required a DPF to be fitted.

The same principle can be applied to CO_2. For example, by adding a requirement that the CO_2 output of the replacement car is say equal to the current average less the regulatory trajectory projected two or three years forward. Several, but not all, schemes introduced in 2009 included a maximum CO_2 requirement.

5.3.2 Car Pollutant Abatement Levels

Fig. 122 ABATEMENT NOX AND PM, 2009–11

Abatement	2009	2010	2011
Annual Abatement			
NOx	-8,643.90	-7,046.46	-5,985.95
PM	-491.43	-396.88	-333.66
Cumulative Abatement			
NOx	-8,643.90	-15,690.36	-21,676.31
PM	-491.43	-888.32	-1,221.98

Source: IHS Global Insight.

On a single unit basis, the average NOx emission level is more than three times lower for diesel and around five times lower for gasoline (petrol) from Euro-1 and Euro-2 to Euro-4. The average PM is more than three times for diesel cars from Euro-1 and Euro-2 to Euro 4, whilst it is assumed to remain marginal and identical for gasoline (petrol) cars. Fig. 121 shows the reduction of NOx and PM that can be expected as a direct result of the scrapping schemes.

Once again, the impact on NOx and PM emission reduction is positive but the annual abatement falls over time. For NOx emissions, the gasoline (petrol) parc is predominant for Euro-1/Euro-2 cars and NOx emission is on average twice as high on spark ignition engines than on compression engines. Consequently, the removal of Euro-1 and Euro-2 gasoline (petrol) cars is the main source of NOx improvement and is guiding the annual abatement results.

As discussed earlier, the significant PM compliance is three times more stringent from Euro-4 to Euro-5. In that sense, it has a negative effect on PM annual abatement in 2011. This negative effect is diluted, however, by the large drop in the diesel share of EU passenger car sales in 2009.

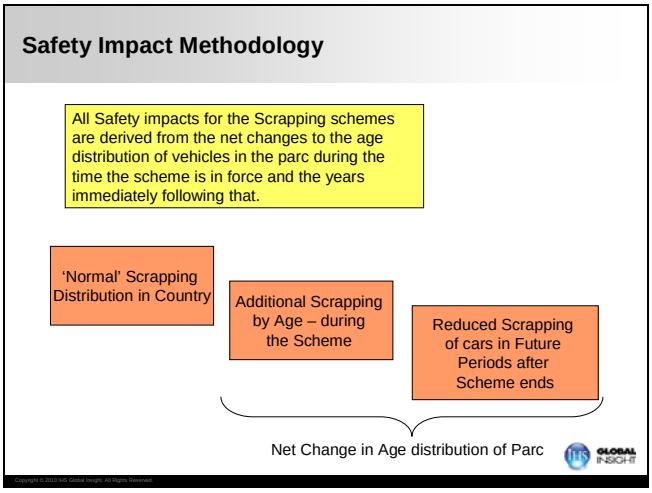
The net impact of scrapping schemes on emissions standards at country level can be found in the Annexes.

6 Evaluation of Scrapping Scheme against Safety Effectiveness

6.1 METHODOLOGY FOR ASSESSING THE IMPACT ON SAFETY

The present chapter will take a high-level view of the impact of scrapping schemes against the wider safety context. A starting point to try to assess the impact on safety is to derive the changes to the age distribution in the parc during the period of the scrapping scheme and hence the impact immediately following the scrapping scheme. By calculating the net change in the age distribution of the parc, it is then possible to calculate, for example, the addition of new vehicles to the parc with higher levels of active and passive safety equipment, such as ABS, multiple airbags, seat belt indicators, and ESC, and by their EuroNCap[8] ratings. Although not addressed in this study, it would then be possible to relate the higher levels of safety equipment of cars in the parc to their impact upon safety, and to produce a value of external costs saved. See Fig. 123 below, Safety Impact Methodology, which explains the concept of the methodology.

Fig. 123 SAFETY IMPACT METHODOLOGY



Source: IHS GLOBAL INSIGHT,

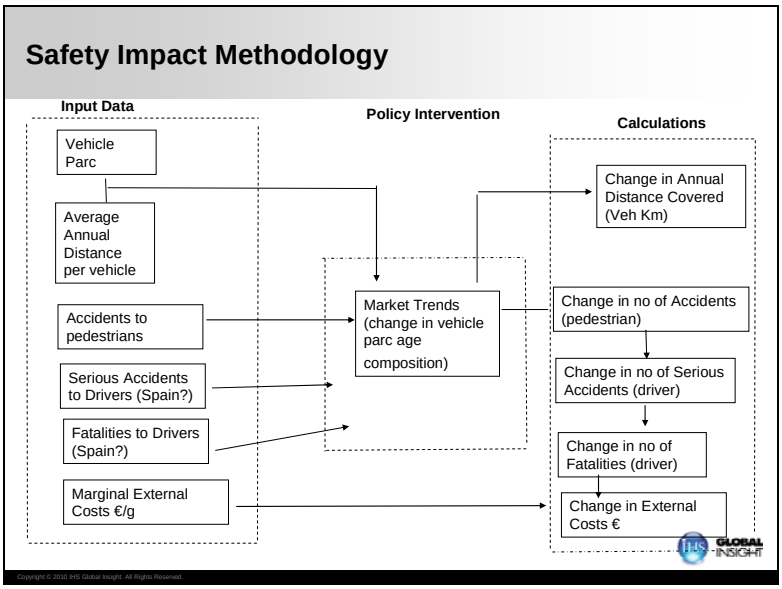
6.2 SAFETY SIMULATION MODEL

The model defined for quantifying and monetising the changes, due to the impact of scrapping schemes upon safety is presented below in Fig. 124.

The interrelations between variables and the process to calculate the impact of scrapping schemes on safety is shown in the flowchart simulation model in Fig. 124. It is clear from the flow chart that both costs and benefits arising from safety regulations (and national/European-level road safety improvement policy) can be assessed in monetary terms. If the change in external costs is calculated via the process in the flow chart of the simulation model, one can then calculate a societal benefit in monetary terms from the reduction of accidents and fatalities.

[8] EuroNCAP members: ADAC (Allgemeiner Deutscher Automobil-Club e V). Alemania. - Bundesministerium für Verkehr,Bau–und Wohnungswesen. Alemania. - Department for Transport. Reino Unido - Dutch Ministry of Transport, Public Works, and Water Management. Holanda. - Comisión Europea. Dirección General de Transporte y Energía. - FIA, Foundation for the Automobile and Society. - Generalitat de Catalunya. Departamento de Trabajo e Industria. Cataluña. - ICRT (International Consumer Research and Testing). Reino Unido. - Sécurité Routière. Ministère de l'Equipement. Francia. - SNRA (Swedish National Road Administration). Suecia. - Thatcham. Reino Unido.

Fig. 124 SAFETY IMPACT METHODOLOGY—FLOW CHART MODEL



Source: IHS GLOBAL INSIGHT.

6.2.1 Scrapping Schemes 2009—Ill-Timed to Maximise Penetration of New Safety Features?

ESC, regarded as an important safety feature by the European Commission, is one of the recent technical safety devices where the European Commission is keen to increase its penetration. ESC offers benefits to driving in hazardous conditions, when roads can be wet, snowy, or icy. It can reduce the number or severity of crashes arising from skidding or overturning. The programme compares the driver's steering input with the actual direction in which the vehicle is moving. If the vehicle understeers or oversteers, ESC reacts immediately by directing specific braking pressure at individual wheels allowing the car to steer as the driver intends.

Due to the effectiveness of ESC at reducing road accidents, the EU has mandated in its regulation, dated July 2009, *Regulation EC No 661/2009,* for ESC technology to be a compulsory fitment for all new-type light vehicles from November 2011, and from November 2014 for all new vehicles, which will mean effectively 100% fitting of ESC from January 2015. See Fig. 125 below. It is perhaps notable that the majority of scrapping schemes in place in 2009 did not feature any specific criteria to link the purchase of new vehicles with mandatory safety equipment, which could help cause a faster adoption or penetration of specific safety features. A criticism of the current scrapping schemes can be made at the timing of the current implementation of schemes, which fail to complement the regulation that requires obligatory fitting of ESC in 2011, for instance, relying instead on supplementary safety schemes such as the EuroNCap star rating scheme to provide an external push to ensure the wider proliferation of safety features. It would certainly be interesting to examine how many of the vehicles on sale in 2009 were already equipped with ESC. Later in this chapter, and in the Country Annexes, we provide tables showing the incremental change to vehicles on the road fitted with ESC in 2009, 2010, and 2011. It is worth noting that our forecast for ESC fitting rates rises from 66% to 77% by 2011.

Spain is a notable exception within European scrapping programmes since it incorporated a specific requirement to stimulate the purchase of vehicles with specific safety features. Of the three conditions that a buyer must meet when buying a new vehicle and scrapping their old vehicle (> 10 years old), one features a

key safety condition; the emissions of the new vehicle must be less than or equal to 149g/km and the vehicle must benefit from ESC and seat belt indicators for the front seats. By 31 December 2009, we estimate that circa 240,000 vehicles had been purchased under the scheme in 2009. Based on data released by MITYC in its Balance 2009 Plan2000e on 28 December, 55% of all vehicles purchased fell into the 120–149g/km segment. Thus, one can calculate that a potential 129,360 units were equipped with ESC and seat belt indicators. Clearly, there is a possibility that within the new vehicles purchased that benefited from either a three-way catalyst or EGR, these same vehicles might not have been equipped with ESC or seat belt indicators, but we can assume that that this margin could be small. Similarly, of the vehicles falling into the <120g/km segment, it is possible that some of these vehicles, being of the most recent vehicle model, could also come equipped with seat belt indicators

Fig. 125 EUROPEAN ESC TIMELINE

European ESC Timeline	
1995	ESC Introduced into the market.
2005	ESC well accepted in the market, but not for small vehicle segments.
2007	EU eSafety platform launches ChooseESC campaign.
2008	**ESC targeted for legislative activity to become compulsory in EU during 2010–12.**
2009	EU MEPs vote for mandatory ESC.
2011—November	ESC to be compulsory for new-type approval.
2014—November	ESC to be compulsory for all vehicles.

Source: IHS GLOBAL INSIGHT.

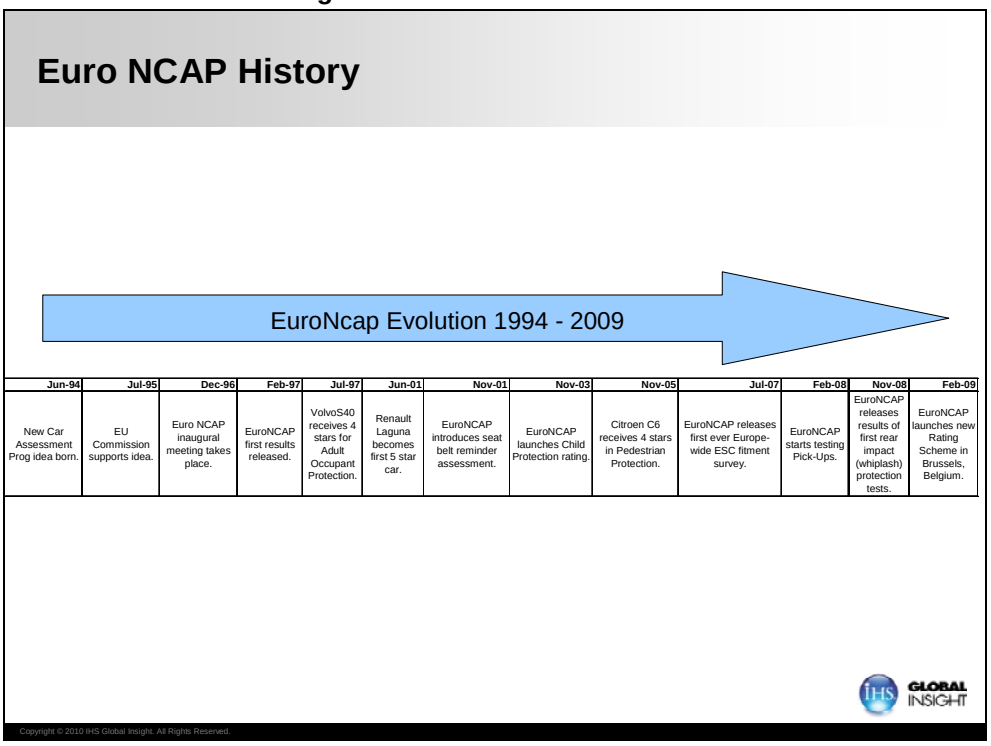
As the automotive industry proceeds with other safety features such as the new generation of airbag restraint systems, adaptive cruise control, lane departure warning, and ESC, perhaps industry and policy makers should work more closely to provide a more cohesive approach to stimulating their penetration and adoption across the vehicle fleet.

Where regulations exist or are known to be expected in the short to medium term, better coordination should be invoked, to ensure that scrapping and incentive schemes work to hasten the penetration in time for when regulations become law. For example, the uptake of ESC, which will become mandatory from 2011, will receive a push from the scrapping schemes in place in 2009. Such new safety improvements can help ensure still safer roads, minimising accidents and fatalities, if they are directed at the renewal of the aging vehicle parc, where many vehicles are still being used without the benefit of features like seat belt warning indicators, multiple airbags, or ABS.

6.2.2 Euro NCap

The EuroNCAP programme, which performs a test-crash on all new cars, has made a massive contribution towards improving new car safety levels. EuroNCAP was first established in 1996, and met with initial dismay from the car industry. The EuroNCAP scheme awards a star rating based on the outcome of the test-crash, with a potential five-star rating available to the safest cars. Initially, the crash test results were resisted by the manufacturers until some areas of the industry realised the star rating could be used as a selling point for their cars. According to EuroNCAP, in 1997, carmakers said 'The assessment criteria are so severe, no car will ever be able to achieve four stars in Adult Occupant Protection'.

Fig. 126 HISTORY OF EURONCAP



Source: IHS GLOBAL INSIGHT.

The design improvements that have followed since the arrival of the EuroNCap rating system have contributed towards reducing annual death and injury tolls. In February 2009, the EuroNCap star rating system received a revision—the first update since its 1997 launch. The new rating scheme has one overall star rating per vehicle tested and includes an extra element specifically for safety assistance. From 2009 onwards, vehicles will need to have ESC as standard to receive a top rating. This will effectively allow market forces to speed up the penetration of ESC safety systems.

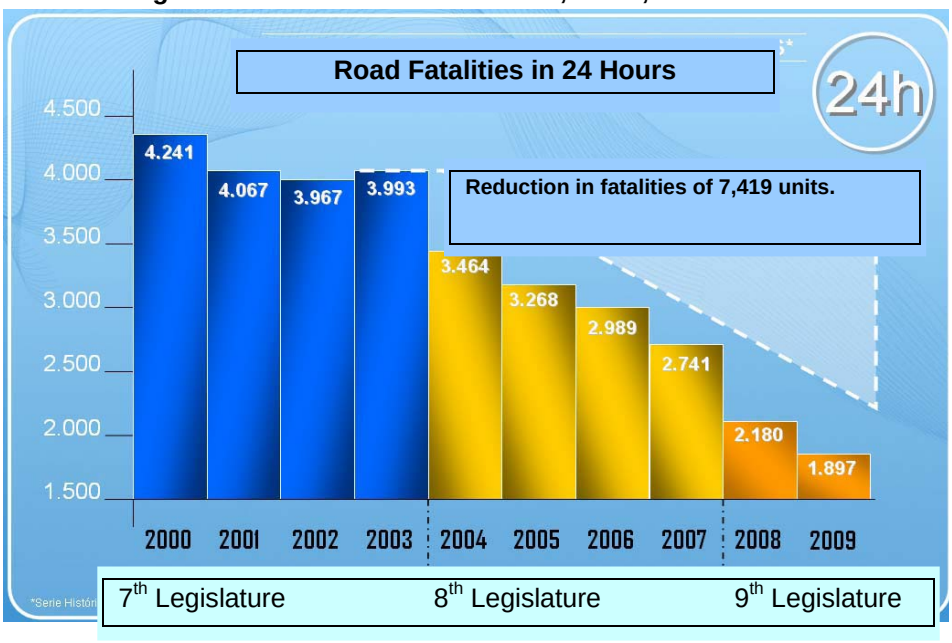
6.2.3 The Link Between EuroNCAp and Safety Levels

While the United Kingdom introduced mandatory seat belt wearing in 1983, other European member states introduced national laws far later. In the United Kingdom, this policy is estimated to have saved around 50,000 lives. Spain has suffered from a historically poor road safety record and has battled to reduce deaths caused by dangerous driving with a series of policy actions over the last decade. In early January 2010, the Spanish Ministry for the Interior published their 2009 Review of Road Safety Balance 2009 de Seguridad Vial[9], which indicated that Spain had met, one year ahead of schedule, the EU's wider policy objective of reducing road deaths by half between 2000 and 2010. For the first time in 45 years, the number of road deaths had fallen to below 2,000 units, less than the figure recorded in 1964. Fig. 127 below shows the declining rate of road deaths in the last decade. It is worth noting the last decade coincides with a period of

[9] Balance 2009 de Seguridad Vial, Spanish Ministry for the Interior.

continued vehicle renewal programmes, such as the Plan Prever, which have preceded the recent ViVe and Plan2000e scrapping plans.

Fig. 127 SUMMARY OF ROAD SAFETY, SPAIN, 2000–09



Source: Balance de Seguridad Vial 2009, Ministerio del Interior, 02.01.20 (Summary of Road Safety 2009).

6.2.4 Assessing the Impact of the Scrapping Scheme on Safety

In order to fully assess the true impact of scrapping schemes on safety, we would need to carry out a full Cost Benefit Analysis similar to the process adopted in the Cumulative Cost of Regulation study carried out by us in 2009. Given time constraints, we have therefore sought to show instead the improved penetration of safety technologies as a result of the scrapping schemes.

6.2.5 Impact of Scrapping Schemes on Safety Penetration

As expected, the widespread implementation of scrapping schemes in 2009 has meant a faster renewal of the vehicle stock than we would have normally hoped to see. This has meant a rapid increase in the penetration of certain types of safety equipment. By using the data generated to calculate the incremental demand caused by the scrapping schemes and the impact of that on the vehicle parc, we can also calculate and demonstrate the effect the scrapping schemes will have on fitting of safety features.

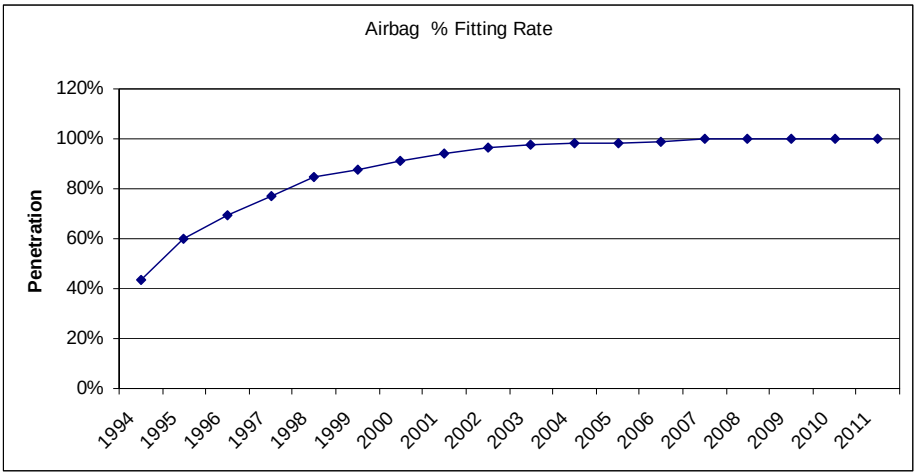
6.2.6 EU level—Safety Penetration

Clearly, there is a positive impact on the vehicle fleet (on the road) from the increased boost to the fitting of safety devices, as a result of retiring older vehicles >10 years old that were fitted with a poorer level of safety equipment.

This point is very pertinent when examining airbag fitting rates as shown in Fig. 128. While fitting rates for airbags reached 100% from 2007, if one examines the fitting level pre-1999, correlating with the average minimum age of vehicles for scrapping, a different picture emerges. Passenger cars registered in 1994

featured a fitting rate of just over 40%. This rose gradually throughout that decade to reach 87% by 1999. Hence, one can see the substantial improvement that would be provided to the parc just from renewing the scrapped vehicles registered between 1994 and 1999 with the latest passive safety technology. Furthermore, while we may have reached 100% fitting levels since 2007, there are still considerable advances being made in terms of the type of airbag fitment (front, side, rear, curtain airbag), and the number of airbags now fitted. In addition, with the arrival of EuroNCAP standards from 1997, this also sped up the standard fitting of airbags. It's worth then noting that the scrapping of vehicles registered between 1994 and 1997 would again provide a further benefit in terms of the number of airbags per vehicle being pumped into the vehicle parc.

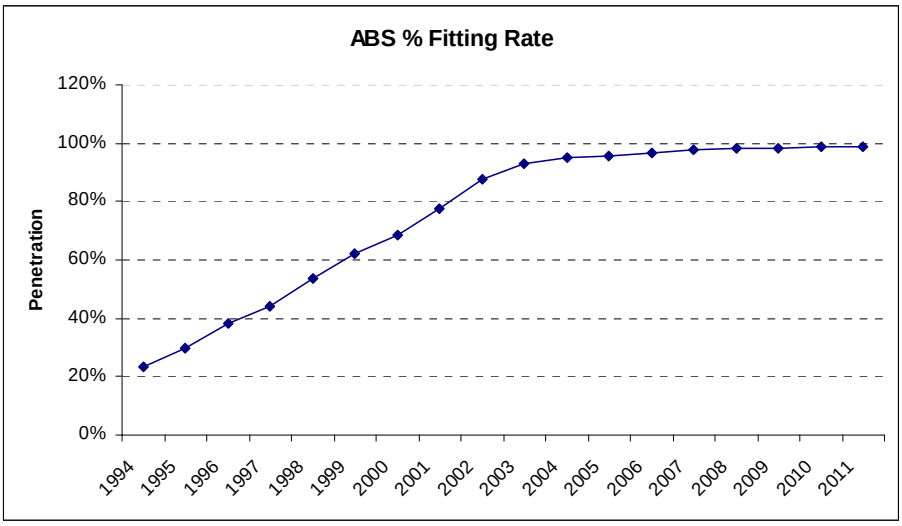
Fig. 128 AIRBAG FITTING RATE 1994–2011



Source: IHS GLOBAL INSIGHT.

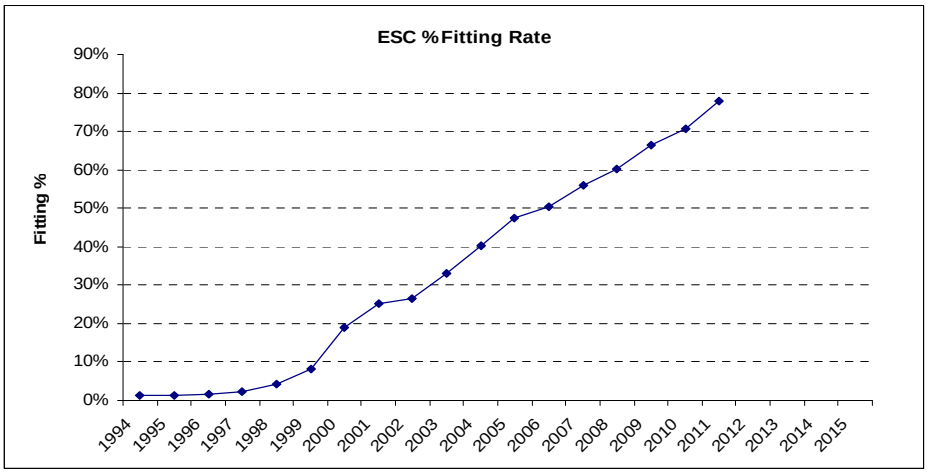
If one looks at the ABS fitting rate in 2009, as shown in Fig. 129, this had approached 98.4%. If one looks, however, at the fitting rate of ABS for the period preceding 1999—correlating with the age of the vehicles that have typically been scrapped under the schemes in operation the fitting rate of ABS was far lower, around 62% in 1999, and decreases to around 22.3% in 1994. Looking ahead to the improved penetration forecast for the periods 2010 and 2011, we expect to see ABS levels rise to 98.6% and 98.8%, respectively.

Fig. 129 ABS FITTING RATE 1994–2011



Source: IHS GLOBAL INSIGHT.

Fig. 130 ESC FITTING RATE 1994–2011



Source: IHS GLOBAL INSIGHT.

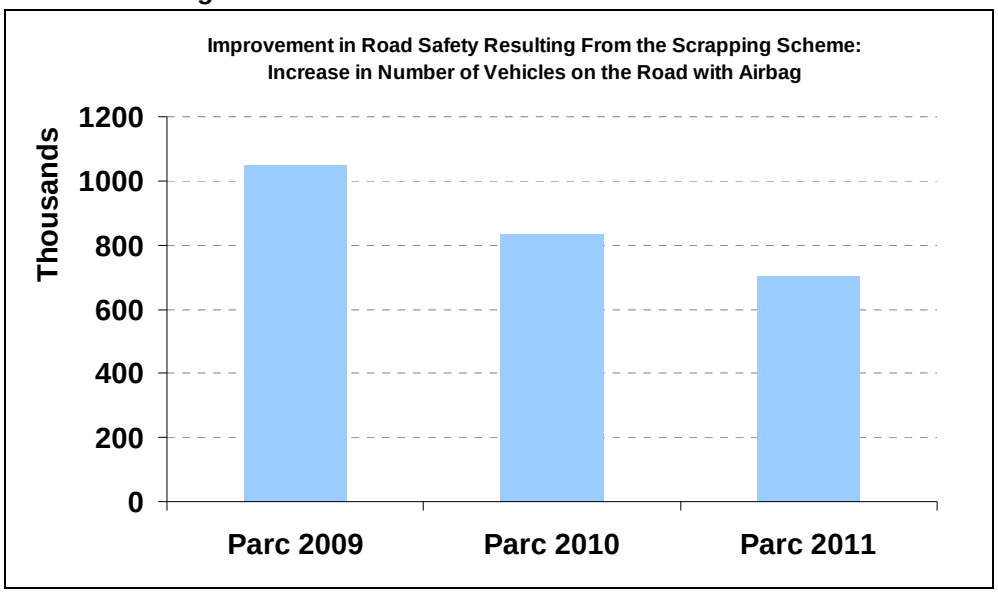
One can observe a much more pronounced impact on the fitting rate for ESC than for ABS. Looking at the chart in Fig. 130, which shows the fitting rate for ESC for the period 1994–2011, we can see that typical ESC fitting rates in the period 1994 to 1999 were very low, rising from a near-zero rate in 1994 to around the 8% mark by 1999. Hence, the retirement of older vehicles under the scrapping schemes (those registered between 1994 and 1999) will have a much greater relative impact with regards to the wider penetration of ESC in the current vehicle market, and clearly an impact that would not have occurred in such magnitude without the imposition of a widespread scrapping scheme policy. ESC fitting rates in 2009 have climbed to 66.4%, with a further jump expected in 2010 and 2011. For 2010, we expect the ESC fitting rate to rise to 70.8%, while 2011 sees an ESC fitting rate of 77.6% This is an increase of 11 percentage points, and comparing growth rates for 2011 with those of 2009, we can see a 17% y/y increase, a reasonable increase

in the space of three years. ESC penetration rates clearly need to maintain this trajectory to reach the 100% fitting level needed under the mandatory requirements set by the EU for 2014.

6.2.7 EU level—Incremental Demand

Looking at the actual incremental net change in the volume of units with safety technology fitments, we can again see a sizeable impact in the three safety technologies we have examined: airbags, ABS, and ESC. The three following charts demonstrate the change in the volume of vehicles on the road now fitted with these technologies.

Fig. 131 AIRBAG—INCREMENTAL NET CHANGE 2009–11

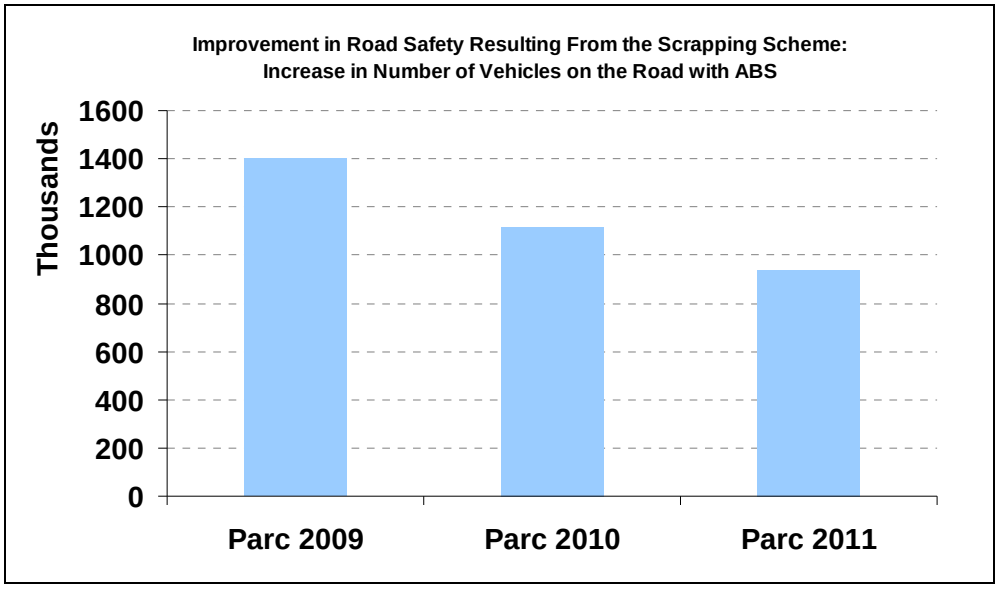


Source: IHS GLOBAL INSIGHT.

These charts show the impact of the increased number of vehicles on the road with better safety equipment fitting levels, compared with the fitting levels that we would see without the occurrence of a scrapping scheme, where older vehicles (e.g. those registered between 1994 and 1999) would not have been retired in 2009. The on-the-road vehicle fleet receives an increased boost to the penetration of safety devices, as a result of retiring older vehicles >10-years-old that were not equipped with such high levels of safety features. Hence, there is also a knock-on impact in 2010 and 2011 but at a lower level, due to the fact that vehicle sales have been pulled forward from 2010 and 2011 into 2009 as a result of the scrapping scheme.

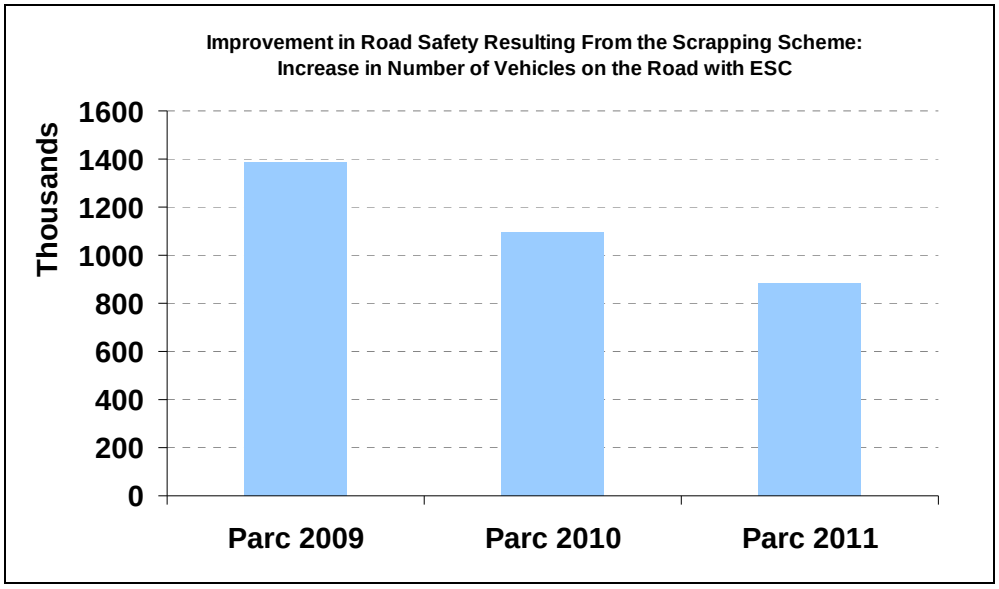
Of the three safety technologies chosen, airbags and ABS see an incremental change of around one million and 1.4 million units respectively in 2009, with ESC also demonstrating incremental change of just under the 1.4 million mark. ABS and ESC make greater progress in terms of boosting the number of vehicles on the road with these safety features, due to the fact that their fitting levels were far lower on the vehicles being scrapped that were registered pre-1999. Whereas, with regards to airbag fitting levels, these were already being fitted at a higher rate by 1999, and therefore there is less of an incremental boost to vehicles on the road now fitted with airbags as a result of the scrapping schemes.

Fig. 132 ABS INCREMENTAL NET CHANGE 2009–11



Source: IHS GLOBAL INSIGHT.

Fig. 133 ESC INCREMENTAL NET CHANGE 2009–11



Source: IHS GLOBAL INSIGHT.

6.2.8 Member State Level

To provide a broad indication of the impact of the replacement of cars older than 10-years-old, and the replacement with newer cars equipped with better safety technologies, we have examined the effect on ESC penetration. We have computed the impact at member state level by calculating the increased number of vehicles on the road equipped with ESC as a result of the scrapping scheme. This is calculated using known and forecast ESC fitting rates and the net incremental change to the vehicle parc as a result of the scrapping schemes in Europe.

In Fig. 134, we present the results for the markets affected by the scrapping schemes. We can note a larger impact in 2009, as a result of pull-forward demand from 2010 and 2011, when fewer vehicles are replaced in the market having already been replaced in 2009.

Fig. 134 INCREASED LEVEL OF ESC IN VEHICLES ON THE ROAD 2009–11

	2009	2010	2011
Germany	707,211	524,878	451,695
Italy	184,930	158,381	117,629
France	212,784	147,187	110,743
United Kingdom	113,887	122,545	95,456
Spain	85,845	68,982	47,143
Austria	32,165	24,253	20,433
Slovakia	15,841	12,596	11,246
Romania	11,761	9,501	8,859
Portugal	9,321	6,643	5,513
The Netherlands	7,710	8,973	9,368
Greece	4,810	9,409	7,928
Total EU	**1,386,267**	**1,093,348**	**886,013**

Source: IHS GLOBAL INSIGHT.

Clearly, the larger markets have seen the greatest impact from the scrapping schemes on ESC fitting levels. The one market in Fig. 134 where the fitting level appears lower than expected is Spain, which of course included a specific ESC incentive. This will have a distortion effect on the assumed ESC fitment rate in the market, which our safety equipment database would not yet have incorporated given the lag of national level data from the scrapping scheme.

6.2.9 Conclusion

We can show through the increased levels of penetration or fitting rate of the three safety technologies detailed in this chapter—airbags, ABS, and ESC—that there follows a positive impact through the new replacement vehicles in the parc. There would be merit in taking this approach one step further and carrying out a Cost Benefit Analysis to assess the fatalities and accidents avoided, as well as developing a more in-depth model to assess the impact on safety and accidents avoided due to an upgrading of the parc thanks to the wider penetration of vehicles with a minimum EuroNCAP four or five star rating. Both these exercises would, however, require additional time and more resources than are available for this study.

7 Conclusions and Recommendations

7.1 CONCLUSIONS ADDRESSING KEY OBJECTIVES

In 2009, we saw by far the most extensive and highest density of market support measures (some might say 'interventionist' measures) ever seen in the automotive industry. Scrapping incentives have been enacted in thirteen member states of the EU during 2009. These scrappage programmes were in operation in markets that typically represent 85% of total vehicle sales in the EU.

The 'typical' scheme required the scrapping of a vehicle with a minimum age of 10 years, and provided an incentive of €1,500 for the purchase of a new car.

In total, scrapping schemes have cost European governments a total of €7.9 billion in outlay plus the cost of administration.

In return for this they promised:

- Economic Stimulus;
- Targeted Automotive Industry Support;
- Reduction in Vehicle Emissions;
- Improvements in Safety.

7.2 ECONOMIC STIMULUS

Our aggregate calculation for 2009 is that vehicle scrapping schemes added a net 0.16–0.2% to EU-wide GDP.

In particular, there are unconfirmed estimations that this may have reached as high as 0.26% of GDP in the third quarter of 2009, implying that the stimulus for the scrapping schemes was one of the key drivers behind the Eurozone emerging from recession then, with 0.4% growth in GDP for the third quarter.

7.3 AUTOMOTIVE INDUSTRY SUPPORT

The €7.9 billion of funding from the 2009 scrapping schemes would theoretically support a maximum of 4.44 million units over the scheme period. Of this, 4.1 million new passenger cars were actually incentivized during the 2009 calendar year, leaving a spillover volume of 355,000 units for 2010.

Not all of this was net additional demand; we estimate 2.16 million incremental new car sales were generated during the year. This has helped to support activity in the retail dealer network and provide a much-needed cash flow injection for a large number of vehicle manufacturers. Vehicle assembly volumes responded to the stimulus (in the midst of the sharpest and largest contraction in output every witnessed) to the extent that we believe their response forestalled, and possibly prevented, the loss of up to 120,000 direct jobs in the industry.

In the absence of European scrapping schemes, we estimate that light vehicle production would have fallen by an additional two million units to little more than 13 million units, and thus would have recorded a collapse of 26% on 2008 vehicle output. There have been far fewer bankruptcies of component and parts manufacturers than was generally expected at the depth of the crisis.

7.4 REDUCTION IN VEHICLE EMISSIONS

The average car bought new as part of the scrapping schemes in 2009 is estimated to have a CO_2 output of just 135.9g/km, a very substantial 18g/km below the EU market average in 2008. Although based on very partial data at the time of this report, we estimate that the scrapping schemes will have helped pull down the average emissions of the whole market to around 145g/km.

At the EU level, 1.05 million tonnes of CO_2 were saved during the year as a direct result of the scrapping schemes launched in 2009; this represents an average saving of 0.27 tonnes per car funded by governments or 0.49 tonnes per incremental car sold.

Although the annual reduction of CO_2 from the scrapping schemes, launched in 2009, decays after the scheme ends, it still delivers an improving cumulative reduction. By the end of 2010, a total of 1.79 million tonnes of CO_2 emissions will have been saved, rising to 2.3 million tonnes by the end of 2011.

The schemes retired over one million Euro-1 and pre-Euro-1 standard cars, almost one million Euro-2 cars, and replaced them with a mix of 84% Euro-4 and 16% Euro-5 cars. This results in abatement of both NOx and PM.

7.5 IMPROVEMENTS IN SAFETY

The scrapping schemes have unambiguously improved the normalised 'safety quality' of the European vehicle fleet.

They have directly increased the number of cars on European roads fitted with passenger airbags (1.05 million cars during 2009); the number with ABS (over 1.4 million cars); and the number of cars fitted with ESC (around 1.38 million cars).

The net impact of this annual improvement will decay over time but, by the end of 2011, there will still be 700,000 more cars fitted with airbags; 930,000 more cars with ABS; and 890,000 more cars with ESC. Based on the incidence of road accidents and the reported reduction in serious injury attributable to these features, the 2009 scrapping schemes will undoubtedly continue to save lives for many years—even without factoring in improvements in design for pedestrian safety, and the reduction in fatalities as a result of these improvements. (An overall quantification of this was not attempted).

At this high level then, European scrapping schemes in 2009 have delivered positive net benefits for each of these four key objectives. This is the case for the short run (during 2009 itself) and will continue to be the case over the next few years (2010–11).

Of course, this does not mean that the scrapping schemes are necessarily efficient in terms of the financial cost of delivering these results, or in relation to other policy tools or mechanisms available. In addition, the indirect and side-effects of these schemes may generate unwanted distortions to automotive market structure and even to the wider economy.

We shall now review some of the potential issues with, and distortions created by, scrapping schemes.

7.6 REVIEW OF POTENTIAL ISSUES CREATED BY SCRAPPING SCHEMES

7.6.1 Economic Stimulus

Recent reports by the OECD and the European Investment Bank (in line with several other previous studies) point out that the wider economic impact of car scrapping schemes will be offset by the negative substitution effect on other consumer sectors.

A detailed analysis of the 13 European scrapping schemes launched in 2009 leads us to the conclusion that this issue has been substantially overstated, and that the economic impact will be stronger than expected, particularly in the short run.

For those consumers who would have replaced a car, even without a scheme, the discount becomes a substantial increase in consumer surplus. In simple terms, it becomes a substantial transfer payment to these consumers. Around two million households in the EU (total funded through schemes less incremental demand) will receive an average 'one-off bonus' of €1,500. This provides as much as €3 billion potentially to spend on other goods and services, or to save. In other words, the leakage or inefficiency of schemes in their specific aim of generation of additional sales actually has an unintended side-effect by becoming another element of expansionary government fiscal policy.

Cars provide transport services over time and to the extent that consumers may rationally amortise their expenditure equivalently, the potential for substitution of expenditure in the near term, is not reflected by the initial purchase price.

- Similarly, for those cars bought on finance or credit, only the increase in monthly payments is problematic in the short term—although it will be felt throughout the term of the financing.
- The closest 'substitute' of a new car is actually a used car.
- Even where there is substitution away from other durable goods, many of these have higher import leakages than passenger cars.

A specific psychology seems to be associated with scrapping schemes, which increases elasticities. Scrapping schemes help to increase transparency, reduce search costs, and reduce consumer uncertainty.

The combination of all these factors contributes towards making scrapping schemes a powerful fiscal tool for governments, specifically when economic stimulus is required. Under normal economic conditions, the high transfer payment required to generate incremental sales becomes problematic, particularly as European public expenditure deficits will be under considerable pressure in coming years.

7.6.2 Automotive Industry

The amazing success of the schemes, in completely turning around what was going to be a slump of crisis proportions, rippled through to most parts of the industry. We find that import penetration did grow as a result of the scrapping schemes, but the increase was quite small, and resulted in low overall leakages for the European production base and the economy in general.

As a result, the net positive impact of domestic scrapping schemes on EU production volumes in 2009 is estimated to be close to two million units (or 15% higher than would have been the case), with its highest impact in the third and fourth quarters of 2009.

Scrapping schemes meant that European plants saw capacity utilisation rates fall below the critical limit of 60% for a period of five months, before eventually reaching generally accepted break-even levels for the last two or three months of the year. Likely capacity utilisation rates in the absence of scrapping schemes would have prolonged this critical period to nearer to 10 months, without reaching break-even therefore in any month in 2009.

These conclusions will provide ammunition for both sides in the debate on industry restructuring.

- On the one hand, scrapping schemes were enormously effective in providing direct stimulus to the automotive industry, preventing an untold number of companies in the supply chain from facing bankruptcy. In addition, they probably reduced other forms of government financial support that would have been eventually offered as the financial condition of key industry players deteriorated still further, and in terms of wider restructuring, they allowed time for managed, and not enforced, rightsizing of industrial capacity.

- On the other hand, sufficient stimulus reached the car manufacturers early enough, such that, it can be said, they did not take significant steps to reduce installed capacity. No manufacturer has actually exited the market during the crisis. The concern may be that with the most critical period past, even if vehicle manufacturers act at a later date, they may not take restructuring far enough for the longer term.

7.6.3 The Credit Crisis—Scrapping Schemes Reach the Parts Other Support Measures Can't Reach?

We find that the specific nature of the global recession, initiated by a very deep credit and financial crisis, had a substantially magnified impact on the automotive industry in Europe, where between 60% and 80% of new cars are (under normal conditions) bought using some form of credit financing.

For more than a decade, vehicle sales in the EU have oscillated within a relatively narrow trading range (16.7 million to 17.7 million). Starting in the summer of 2008, sales decisively dropped out of the floor of this range and then crashed further in the final quarter of the year. By early 2009, vehicle sales were running 3.5 million units lower than these trend rates. The shock of this, combined with a synchronized crash in key automotive export markets, pushed the situation beyond the worst-case pre-crisis contingency planning of even the most cautious manufacturers.

At the same time, the lock-down in access to corporate finance also hit automotive companyies ability to raise finance to fund potential crisis-induced shortfalls. In strict free-market theory, those least efficient (pre-crises) manufacturers will have had larger gap financing and may have failed first. There was also a certain randomness introduced into the market, however, which depended on the incidence of major long-term roll-over debt financing.

In this environment, European governments (in common with what was seen in other countries, notably the United States) began to provide emergency loan financing. The problem at this time was that thousands of other companies down the supply chain were also in need of similar—probably greater—financing.

In this context, scrapping schemes have provided an unusually efficient mechanism for supporting vehicle manufacturers and, eventually, the automotive supply chain in this particular crisis. With access to corporate financing limited in the early phase of the financial crisis, OEMs were able to generate their own cash financing by selling out of inventory and shutting down production (which was observed at a much higher rate than had been seen before).

Scrapping schemes enabled an accelerated burn of inventory and generation of cash-flow financing for the car manufacturers who would otherwise have seen far longer and deeper production stoppages. While the OEMs were generating cash in this process, the supply chain of component parts manufacturers was not delivering and their financial situation was deteriorating by the month.

With the scrapping schemes, the car manufacturers were able to increase production at an earlier stage and at a stronger rate—helping the supply chain—while at the same time continuing to benefit from the improvement in cash-flow generation.

In summary, the scrapping schemes probably helped remove some of the randomness of the Darwinian survival model during this unique crisis period, while providing a mechanism for support across the supply chain and retail network. Given the historic government support for the industry, and the assumption of government intervention in any case, debate in effect moves on to question whether scrapping schemes are an appropriate or efficient mechanism for crisis management and industry support.

7.6.4 Scrapping Schemes Pick Winners and Losers

The 2009 schemes have had few incidents that can be associated with home country protectionism. (This also applies to regional protectionism as well). Nevertheless, some of the scheme conditions observed do prejudge, to some extent, which brands, models, or powertrains may gain the most, or lose out completely.

For example, we have shown that larger cars, premium and luxury brands, and light commercial vehicles have been only marginal beneficiaries of these schemes. A few schemes have conditions that may overtly exclude some players—for example, Slovakia has a maximum €25,000 price cap.

The other main discriminatory scheme mechanism is the widespread use of maximum CO_2 targets, which are often explained and rationalised in terms of targeting environmental benefits. In addition, a technology bias is also in evidence in some schemes, with discrimination against diesel, for example, taking place.

Some of the schemes specifically limit their scrapping scheme incentives to 'private individuals'. This means that significant parts of the European new vehicle market are officially excluded and have not benefited directly from the stimulus. Even where they are not excluded from the schemes, other conditions effectively bar them from participating—in particular, the typical minimum age condition for the scrapped vehicle, which means that virtually no company fleet or rental businesses can participate, other than some small, private businesses. In addition, recent duty-of-care legislation that applies to vehicle transport may limit this tendency still further in the future.

Importantly, while the 'designed-in' discrimination elements are not very widespread, scrapping schemes do pick winners and losers via the price and income constraint mechanism.

In Chapter 3, we outlined how 2009 witnessed some of the most significant annual changes that have been seen in European market segmentation. We use the term 'downsizing' as shorthand for these changes, although we want to be clear that the specific mechanism by which this occurs is more probably because of a change in the propensity to purchase lower-priced cars than because of the propensity to purchase smaller cars. The physical downsizing is thought to be primarily a side-effect of the down-pricing.

Two-thirds of the 2.16 million units of estimated additional demand generated by scrapping schemes were in the lowest price segments (A and B, and Utility Vans). Only 4.7% of additional customers bought SUVs compared with 6% buying MPVs and 20% buying compact cars (C1). The 'other' segments combined (including medium and large cars, and premium and luxury vehicles) only benefited from 1.4% of the incremental incentivized sales.

The incidental impact of some of the scrapping schemes, via these market distortions, may then have disproportionately supported some of the (assumed in the long term) weaker players in the European industry.

In fact, there is probably not much disagreement that scrapping schemes have provided a mechanism that impedes the prospects for wider industry restructuring.

Despite seeing the deepest crisis in the European automotive industry for decades, we have only seen the announced closure of three assembly plants—worth about 1.7% of EU capacity. In addition, there has been announced restructuring of four or five plants worth another 1.8%, taking out a total of 3.5% of capacity. In fact, the structural changes to the long-term prospects for the European car market, initiated by the financial and economic crisis, are likely to have reduced trend volumes by more than this amount. As a result, there has been no net improvement to the problem of long-term excess installed capacity and the resulting long-term pressure on sustainable operating margins.

We reiterate the point that while scrapping schemes on the scale seen in 2009 helped provide a mechanism for industry support, this does not mean that scrapping schemes in themselves naturally prevent wider industry restructuring, just that they postponed the need for further restructuring, at that precise point in time, during 2009. It is perhaps too easy now to forget that back at the end of 2008 the crisis was of such severity that perhaps even the majority of the industry, and not just a few marginal players, were facing substantial losses, cash burn, and the need to access capital markets at a time when they were virtually closed.

As a result, we do not find it appropriate to put forward recommendations on the use of scrapping schemes for industrial policy or industry restructuring. We do make suggestions, however, regarding the way future scheme design could avoid or reduce some of the recent market distortions caused by the schemes.

7.6.5 Efficiency at Reducing Vehicle Emissions

Detailed analysis of the 2009 European scrapping schemes allows us to model the net impact on vehicle emissions over a three-year cycle.

In general, if the sole reason for scrapping schemes was for emissions reduction alone, then we would have to conclude (as do most other studies) that they are an expensive mechanism for emissions abatement—at least in terms of the general 2009 scheme design parameters. For example, the net financial cost to governments (after recouping direct vehicle taxes) is likely to come out at around €1,000 per tonne of CO_2 abatement. This is exaggerated by the very generous German scheme, and fails to allocate the financial cost to other emissions and pollutant reduction. We do note that some schemes can be virtually self-funding. It may also be possible that where a full indirect effect on public finances is included, emissions reduction can actually be achieved at no overall cost.

We find that there are two specific mechanisms by which scrapping schemes help reduce emissions: the rejuvenation effect and the downsizing and mix effect.

At the EU level, an estimated 1.05 million tonnes of CO_2 were saved during the year by the scrapping schemes launched in 2009. This represents an average saving of 0.29 tonnes per car funded by governments, or 0.49 tonnes per incremental car sold.

Initially, the most important contribution to this overall reduction is the rejuvenation effect worth 0.66 million tonnes of the 1.05 million tonne total (or 63%). The other 0.38 tonnes (37%) of reduction is due to the overall mix effect, 85% of which is attributable to the pure downsizing into A and B segment vehicles.

The impact of the 2009 scrapping schemes is still positive during 2010 and 2011, although the annual abatement falls to 0.74 million tonnes and 0.52 tonnes, respectively. There are two reasons for this.

1) Some of the accelerated scrapping of vehicles in 2009 would have occurred naturally in near future periods and so the net rejuvenation effect decays over time.

2) Any brought-forward sales into 2009, which would otherwise have been bought in the near future, would have a higher, on average, CO_2 emission because of continuous industry efforts to improve fuel efficiency.

The decay in the rejuvenation effect means that by the end of 2011 it contributes just less than 50% to the total annual CO_2 reduction. Over the same period, the relative importance of the downsizing effect increases. The surge in small car sales in 2009 will still represent an abnormal small car weighting in the parc of that vintage for many years—in fact until they themselves are scrapped.

We find that the significance of this downsizing effect of scrapping schemes has been largely neglected in previous assessments of the emissions abatement potential of scrapping schemes.

Although the annual reduction of CO_2 from the scrapping schemes decays after they end, it is still a cumulative effect. By the end of 2010, a total of 1.79 million tonnes of CO_2 emissions will have been saved—rising to 2.3 million tonnes by the end of 2011.

7.6.6 Used Car Flow to New Member States

One reason for an underestimation of the emissions' abatement potential calculated here comes from significant export of older used cars from the large markets in Western Europe to newer member states and, in particular, to Poland. Incoming evidence suggests that there has been a sharp reduction in used car imports into Poland and the Czech Republic, with imports having dropped significantly in 2009.

We estimate that this flow may have been reduced to the tune of 490,000 used cars over the period that the European scrapping schemes were in place (a reduction of almost 40%). It is likely that some of this will have been due to economic conditions, but the data suggest that the proportion of used cars being imported into these countries that are over 10 years of age (the age requirement for most scrapping schemes) has also fallen significantly. Neither of these two countries has scrapping schemes of their own. In other words, the true reduction in CO_2 emissions on an EU-wide basis cannot be measured purely by the aggregate of the CO_2 abatement of the countries implementing the schemes.

There appears to be a strong skew to a younger age distribution of vehicles being scrapped under schemes compared with the general distribution. This implies that there may be an additional direct cost to society, as vehicles still with economic life may be being scrapped, and simplistic analysis suggests that the environmental benefits from scrapping-scheme-induced rejuvenation may be weaker than expected due to the smaller gap between emissions of the scrapped and replacement car. The observation reinforces our view, however, that there is a strong psychological element to car scrapping schemes, over and above rational economic behaviour. For example, consumers may feel a benefit from a perception of increased convenience in disposing of their car, or some may even feel that they are doing an environmentally reasonable transaction. As a result, the amount of pull-forward is likely to be delayed, and spread several periods into the future and not just concentrated into 2010. This, counter-intuitively, means that up to a point there is a stronger 'over cycle' abatement potential from the scrapping rejuvenation effect of younger cars. An analysis of gross vehicle emissions and per unit emissions (Chapter 5) leads to a similar conclusion.

7.6.7 Emissions Changes in the Near Future Are Important for Maximising Impact Through Scheme Design

The impending changeover to Euro-5 was unfortunate from the perspective of the high density of launches of scrapping schemes in 2009. This has diluted the emissions reduction potential of the schemes measured over the next few years, notably in terms of PM reduction from the schemes.

The schemes retired more than an extra one million units of Euro-1 and pre-Euro-1 standard, and almost one million cars of Euro-2 compliance vehicles, and replaced them with a mix of 84% Euro-4 and 16% Euro-5 cars. This, in turn, results in abatement of both NOx and PM(see below).

By the end of 2011, however, there will actually be fewer Euro-5 cars on the road than there would have been in the absence of scrapping schemes. The reason is that the scrapping schemes retired vehicles that would have been replaced anyway during the periods of 2010 and 2011. The payback means that there will be fewer cars that would have been replaced with Euro-5 cars during this period. From a positive impact in 2009, the incremental number of Euro-5 cars eventually becomes negative in 2011 to the tune of 260,000 units.

This clearly demonstrates an important design principle for scrapping schemes. Governments should be advised and deliberate regarding the introduction dates of scrapping schemes. This will avoid the poorly timed implementation of schemes ahead of significant prospective improvements in emissions standards. This also applies to accelerations in the rate of expected reduction of CO_2.

7.6.8 In conclusion, vehicle scrapping schemes launched by EU member states in 2009 were launched with the primary objective of providing general economic stimulus and/or targeted support for the automotive industry, at a critical time. Judged against these objectives, we find that scrapping schemes have been remarkably successful.

Some of the impacts derived may have been uniquely beneficial to the specific situation of the global financial and economic crisis of 2008/9, while the net change in terms of the environmental and safety quality of the European vehicle fleet have also been universally positive and tangible.

7.7 RECOMMENDATIONS

7.7.1 Specific recommendations for the European Commission to consider will depend on the context for, and primary objective of, future schemes:

- Contingency for any future global economic crisis;
- Economic stimulus of individual member states (not part of a widespread region-wide crisis);
- Engineering emissions reduction;
- Provide complementary and consistent measures as part of the integrated approach to the mandatory framework for CO_2.

1) Timing of Future Schemes: Those member states with high purchase or new registration taxes, other than VAT, see lower net public financing costs (in some cases even positive) for implementing scrapping schemes. In part, because of this, they also exhibit high average vehicle life expectancy as cars are kept for longer and the decay in average distance travelled by age is also less pronounced. To the extent that general EU policy objectives are to lower purchase taxes over time, in these countries it would be better to implement schemes at an earlier rather than later date.

2) In order to increase the efficiency of scheme emissions abatement (over the cycle), we suggest that scheme conditions on new car replacement should be forward looking to minimise the forward loss as a result of the payback.

    a. Deliberate and advised introduction dates for scrapping schemes would avoid the poorly timed implementation of schemes ahead of significant prospective improvements in emissions standards

    b. If adverse timing is unavoidable, (as in the case of the crisis-initiated 2009 schemes), then we advise the inclusion of specific requirements for the new replacement car—such as pre-compliance of emission standards or specific key upcoming elements of such schemes. For example, a maximum allowable PM clause in current schemes could have helped simulate the introduction of Euro-5, reducing the forward loss from vehicles that would otherwise have been bought with higher emissions standards.

    c. This also applies to the acceleration in the rate of expected reduction of CO_2. Thus, CO_2 conditions for new replacement cars, should be set in line with a target rate that is expected to be achieved in, say, two or three years in the future.

    d. Introduce a variable incentive discount for 'accelerated compliance' of vehicles to future standards or CO_2 outputs.

3) Set consistent scheme thresholds to promote environmental objectives and provide consistent signals to manufacturers across the EU. For example, schemes observed in 2009 variously introduced thresholds of 120g, 130g, 140g, 149g, or 160g.

4) Minimise market distortions: The setting of a single maximum CO_2 threshold or a single incentive value are 'designed in' elements that help contribute to pre-determining 'winners and losers' of schemes. Some schemes also introduce a technology bias rather than being technology neutral.

5) Examine the introduction of an incentive based on a percentage of the purchase price of the new car. This will help to reduce bias towards cheaper cars and brands, and possibly instead increase bias towards those with better loaded environmental technology. A discount on the VAT system could be used for example. This has been tried in South Korea where the boost to sales has been seen across the market and not just in the smaller/lower price segments.

6) The EU already has a mechanism in place that can be used to fulfil objectives of minimising distortions and avoiding pitfalls of single or multiple threshold settings. We strongly suggest examining the use of the mass-based limit value curve in order to determine eligible new car replacement vehicles under a scheme. This has many benefits:

   a. It will help remove 'designed in' distortion to market choice, which may also be counter to industrial policy;

   b. It will promote choice of best in class (mass) rather than vehicles that may be relatively inefficient for their size;

   c. It provides strong additional incentives for manufacturers and consumers to make that choice;

   d. It supports the 'integrated approach' objective in the support of the mandatory emissions framework.

7) A comprehensive design solution could incorporate elements of points 1, 4, 5, and 6, thus setting the CO_2 target of eligible scheme vehicles to be initially at the target limit allowance for its mass, (i.e. forward looking) and over time accelerating the CO_2 target below the target by a given percentage. The value of the incentive could also then be based on a discount to the VAT applicable in the country.

8) Age requirement of scrapped vehicle: Most schemes have a minimum age for the scrapped cars of around 10-years-old; this appears reasonable based on the previous conclusions reached above. The use of an older age threshold does not necessarily translate into a proportional gap-based reduction in gross vehicle emissions and generally results in a lower take-up rate that has less impact if used as an economic or automotive sales stimulus.

9) EC Policy co-ordination of member state responses: This could also apply to an attempt to assist the synchronisation, phase-in, or phase-out of schemes across member states in order to smooth out potential supply shortages, or smooth out any cycle in European sales.

10) Support for light commercial sector (N1): Although not covered in detail in this report, only a few scrapping schemes included N1 vehicles and those that did saw quite low takeup rates. In fact, the sector is an important feature of the European industry and of road-based emissions, where sales have suffered a major collapse. In view of the wider policy movements that we shall see in the forthcoming years to reduce LCV CO_2 emissions, it would perhaps be timely to encourage a greater focus in future on an LCV-specific scrapping scheme. The encouragement of an LCV-focused scrapping programme would help speed up the rejuvenation of the LCV parc, helping to offset some of the future technology loading costs to reduce commercial vehicle CO_2. Careful design of scheme parameters may be required to target this sector.

11) A range of issues discussed in chapter two related to the administration of schemes should be considered. These may help form a basic practice guide to scheme administration.

12) The long-term legacy of the 2008/9 crisis may be that we see structurally lower long-term car sales, and higher consumer sensitivity to price increases, as manufacturers load new fuel efficiency technologies. (There could also be concerns about manufacturers' ability to subsidise these new technologies or finance future investment to help achieve future emissions reductions). To the extent that this lowers the rate at which the European parc will be replaced with new, more fuel-efficient cars, European commitments to greenhouse gas reduction could be in danger (parc churn or rejuvenation effect). In this longer term context, EU scrapping schemes may take on a new importance in their utilisation as a policy response.