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OUTLINING POLICY RESPONSES TO
STIMULATE AUTOMOTIVE CAR DEMAND
BY ENVIRONMENTAL IMPACT REDUCTION

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Outlining policy responses to stimulate automotive car demand by environmental impact reduction

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ABSTRACT: The aim of this paper is to propose an alternative approach for outlining policy responses to stimulate the automotive industry. The scientific community has been involved by the Delphi method in order to collect and convey perspectives and impressions and define a number of financially viable proposals. The panel of experts takes the view that traditional industrial policy measures denote limited effects to stimulate car demand, in a context of macro-economic downturn. By contrast, the panel also believe incentives for car demand are important for environmental purposes, for safety and for the diversification of energy sources. The policy measures proposed are fundamental from the viewpoint of overturning path dependencies in the automotive industry which impede the diffusion of alternative vehicles, with respect to business models and consumer attitudes.

KEYWORDS: automotive, industrial policy, air pollution reduction, alternative fuel vehicles.

JEL CODES: L52, L62

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1. INTRODUCTION

In 2008, car sales around the world crashed with a level of synchronisation that had never been seen previously. Passenger sales had fallen across the European Union 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 with radically deep cuts in vehicle assembly, plant shutdowns, and extensive lay-offs. In 2012 the crisis in the automotive industry is mainly focused in the European Union, but data shows a non-homogeneous evolution between member countries (European Union, with respect to 2011, -6.3%; Italy -19.7%; France-14.4%; Spain -8.2%; Germany +0.7%; UK +2.7%).

In spite of the difficult situation, the crisis brings with it a unique historical opportunity to break the existing path dependency of the industry (Wells, 2010). Three main chances for change can be detected:

- the financialisation of economies has prompted a pattern of accumulation in which profit making occurs increasingly through financial channels rather than through trade and commodity production (Krippner, 2005; Epstein, 2005; Froud *et alii*, 2006). Many carmakers kept up their mainstream business operations, but the dramatic slump was mainly due to a collapse in consumer and business confidence, compounded by difficult access to consumer and corporate finance and serious concerns about the stability of the global financial system. The evidence is in that the financialisation view of the world is coming unstuck (Freyssenet and Jetin, 2011).

- automotive has been accused of affecting environment and public health and the question of how the industry is integrating the demands of sustainable development is still fundamentally

tied to the question of how this activity is positioned in societies that produce and use cars (Jullien, 2008). Carmakers and countries have experimented with specific historical trajectories in terms of the strategies and production policies that create trade-offs in the interpretation of the requirements of sustainable development.

- increasing competitive pressures resulting from globalisation, and excess capacity in the old industrial economies, have been changing relationships both between continents and at regional levels (Bailey, Coffey and MacNeill, 2010), with the result of reducing profit margins in those areas unable to restructure the industry.

These radical transformations require a return to questions of policy and the importance of regulation and taxation. These issues are likely to play a major role in determining outcomes for the whole automotive supply chain and regions.

Whereas countering financialisation calls for the restoration of policy controls to reduce the increasing importance of financial markets in the operation of the economy and its governing institutions, both at the national and international levels (Palley, 2008; King *et alii*, 2012), the diffusion of sustainable development and the restructuring of the sector is more a matter of industrial policies to stimulate and promote structural change.

In periods of crisis vigorous and costly intervention has been usually undertaken by many governments to strengthen domestic demand for cars, whereas measures to engender sustainable development have usually followed a contrasting path, with the institution of regulatory requirements that increasingly restrict the sale of new vehicles, the setting of specific limits on emissions, and the provision of direct support to basic research (Calabrese, 2009).

In the European Union today main policy interventions must tackle the reduction of

overcapacity and accelerate the substitution of the vehicles on the road. The only promising “new” car demand able to increase investments and counterbalance plant closure seems to be alternative vehicles, that is: gas - Compressed Natural Gas¹ (CNG) or Liquefied Petroleum Gas (LPG) -, biofuel, hybrid electric, full electric or fuel cell vehicles. However, rather than achieving a continental reach, policy responses to these issues have remained for the most part at a resolutely national level, with the peculiarity that governments are reluctant to close plants because of the inevitable social impacts while measures to support domestic car demand must be technology neutral and guarantee that competition is not distorted in the internal market (European Union competition policy).

For these reasons the focus of this paper is on the measures that can be adopted by an European Union country state, specifically Italy, to foster domestic car demand, and as a consequence national production. The aim is to outline a process of industrial policy responses in the belief that the Italian automotive industry faces deeply structural problems, and that the key to recovery lies in encouraging growth by long-term stimulus programmes.

The methodology adopted follows the Delphi method. Instead of highlighting and proposing a contextualisation of different policy responses, the approach taken has been to involve the Italian scientific community, collecting and conveying perspectives and evaluations from those who have been analysing the industry, even from an abroad institution.

This chapter is organised as follows. Section 2 briefly describes the automotive policy framework with regards to sustainable development at the European Union level and for country members; in particular some

assessments of scrapping schemes are reported. Section 3 illustrates the Delphi method adopted as the methodology of investigation in this paper, to outline policy responses to stimulate automotive industry, and section 4 reports the results of the first round of the Delphi method. Section 5 proposes some policy measures based on environmental impact reduction, and section 6 reports the results of the second round of the Delphi method. A final section presents conclusions and recommendations for further investigations.

2. SUSTAINABLE DEVELOPMENT POLICY FRAMEWORK IN AUTOMOTIVE

At the European Union level, three major policy areas impact on sustainable development in the automotive industry. The first two involve common standard regulations on emissions (EURO IV, EURO V, late 2009 and EURO VI, 2015) and safety (EURO NCAP tests), which are compulsory in all member states. The third important policy area concerns re-cycling and the End-of-Life Vehicle Directive, which came into force at the beginning of 2007. This barrage of increasingly stiff regulations is driving substantial changes and presents a challenge for the global auto industry, although regulatory regimes for cars around the world remain differentiated. Some markets have specific safety tests and others distinct cycles for the testing of emissions (Ryan and Turton, 2007; Sperling and Cannon 2007). Even more pronounced are the differences in the fiscal regimes.

At the national level, it is worth pointing out that by the end of the 20th century France and Italy were still the only countries in Europe involved in alternative vehicles: other European

¹ CNG is made by compressing natural gas which is mainly composed of methane.

countries were practically absent. In the last few years, however, these other countries have begun to concentrate their efforts, based on their own specific carmakers and energy strategies.

The most likely short-term scenario more globally seems to be one of diversity (Freysenet, 2011). Italy is mainly focused on LPG and CNG vehicles and the same is true for Russia, which counts on its large amount of natural gas reserves. Outside of Europe, Brazil is the traditional leader in biofuel. The large amount of nuclear power it produces has led France to concentrate on electric vehicles, whereas Germany has moved from LPG to electric vehicles and biofuel solutions.

Denmark, France and Israel, which are now establishing attractive incentive schemes for electric vehicles, could potentially generate a huge competitive edge for their domestic automotive and power industries. But, unless other governments act promptly to provide adequate incentives for consumers and the necessary infrastructure, alternative vehicles may be off to a false start. The isolated and top-down experience of California is particularly significant².

Most of the considerations related to the development of electric vehicles, and their successful placement on the market undoubtedly depend on fuel prices. If the oil price is low, customers will tend to buy internal combustion engine vehicles; whereas, in the contrary case, and provided that other conditions are met as well (battery prices decrease, public utilities provide suitable infrastructures, and the European Union sticks to its 95 g/km CO₂ emissions target for 2020), the future of electric vehicles will be much brighter. In this context,

² California implemented a legislation that made it compulsory for carmakers to sell at least 2 per cent Zero Emission Vehicles by 1997, and then 15 per cent in 2003, but the mandate was gradually reduced until it disappeared in 1998.

the proposal to add extra excise taxes on oil prices to reach a lasting and fixed level seems sensible. In fact, according to simulation by the Boston Consulting Group (2009), hybrid electric vehicles are more attractive than petrol vehicles when the price of oil reaches about \$70 per barrel, and then advanced diesel vehicles when it reaches about \$170 per barrel. However, electric vehicles remain relatively unattractive unless they are subsidised or unless battery costs drop sharply (\$500 per KWh assuming an oil price at about \$120 per barrel). Another aspect that must be considered in the comparison between traditional vehicles and electric vehicles is usage cost. Prices show an apparent competitiveness for electricity with respect of gasoline, but the gap does not yet seem to be appealing enough if excises are equalised (Calabrese, 2012). Nevertheless, the main obstacle is the dependence of electric vehicles on hefty infrastructural investments to foster green technologies, which only state planning can afford (Volpato and Zirpoli, 2011).

For this reason, in the short run the most promising alternative vehicle able to reduce local pollution seem to be the CNG type, in particular when old vehicles are equipped with CNG devices (Stocchetti and Volpato, 2011). Policy makers should intervene by implementing regulations (exploiting environmental and safety benefits as opposed to supporting traditional vehicles), through technology (improving energy performance, and incorporating CNG into hybrid cars), and by supporting car demand (not adjusting excises and promoting the conversion of cars already in use). The fundamental issue involves expanding the distribution network, which is limited in Italy³ and almost non-existent in other European countries. This will break the vicious circle that has been created between

³ Recently, Italy has allowed CNG filling through the home network.

CNG distributors, which do not want to expand the network due to scarce car demand, and consumers, who are not willing to buy CNG cars due to the lack of filling stations.

Besides, the transition to safer and more eco-friendly automotive systems often evokes a new vision of mobility. Policy response to sustainable development should aim at the implementation of measures capable of (Ceschin and Vezzoli, 2010):

- encouraging companies to shift their business models by adopting use-oriented (e.g. leasing, sharing, pooling) and result-oriented (e.g. pay per service unit schemes, integrated mobility schemes) services;
- changing agents' behaviours (e.g. public procurements, consumer awareness);
- supporting demonstrative pilot projects (e.g. promising business models without direct market pressure);
- involving universities and research centres in supporting knowledge transfer and disseminating information.

In this context, a number of noteworthy public policies are being put forward by local authorities (Calabrese, 2012). More and more city councils are promoting electric urban mobility systems, renewing their fleets with electric vehicles, and installing charging stations. Just to name a few: Better Place in Israel, Denmark and Australia; E-mobility in Berlin; Zen.car in Brussels; E-vai in Milan; Car2go in Ulm and in Austin, Connected car in Galicia, and so on.

The most promising initiative seems to be the "Autolib" electric car-sharing system in greater Paris, that is marking a step in the diffusion of a new mobility system by the quantity of electric vehicles made available to urban users (3,000) and the number of cities (46) associated with the project.

One of the most popular schemes pursued by industrial policies is to launch fleet renewal programmes, including market incentives and car scrapping schemes.

In 2009 the most extensive and highest density of market support measures was adopted. Scrapping incentives have been temporary enacted in 13 European Union member states, which together represent 85% of total vehicle sales. The primary objective was to provide general economic stimulus; the secondary was renewal of the European car park and benefits for road safety.

According to IHS Global Insight (2010), scrapping schemes have been remarkably successful for all three targets. The €7.9 billion of funding, less €5.6 billion of tax return, supported 4.443 million cars, of which without incentives 2.164 million cars would not have been sold in Europe. IHS Global Insight (2010) also estimated GDP growth of between 0.15 and 0.2 %.

Scholars and practitioners have different opinions on the matter. Scrapping incentives are seen as a measure to modify customer requirements and distort the market, leading only to limited short-term benefits, due to pull forward effects.

However, a pull forward effect depends on many variables such as the type of scheme, the economic cycle, and the subsequent trade policies of car makers. For example, the 1994-96 French scheme showed a pull forward rate of 87% (Adda e Cooper, 1997) nearly wiping out the incentives, whereas in the case of the 1994-95 Spanish scheme the pull forward rate was of 20% (Licandro and Sampayo, 1997); and for the 1997-98 and 2002-03 Italian schemes the pull forward rates were respectively of 10% and of 25% (IHS Global Insight, 2010).

Based on these estimations IHS Global Insight (2010) has estimated the pull forward effect in Europe as being equal to 0.695 million cars, which therefore implies a real increase of 1.469 million cars.

In addition, the scrapping incentives:

- avoided the loss of about 120,000 direct jobs in the automotive supply chain and the failure of many small medium suppliers;
- ensured that the use of plants did not fall below the critical capacity limit of 60% for a prolonged period of time;
- assisted the application of other forms of support for public finance in crisis situations, by giving more time to possible restructuring;
- helped reduce CO₂ emission in 2009 by 1.05 million tonnes, with cumulative effects in the following years, and with a reduction of NO_x and PM as well. This was due to rejuvenation of the fleet, segments downsizing and the enhanced possibilities for buying alternative vehicles. Significant incentives for alternative vehicles in Italy notably increased the percentage of green vehicles over total new passenger car registrations from 3.8 per cent in 2007 to 22.1 per cent in 2009.

The distortion of the market is, on the other hand, the main negative effect, with the incidental impact of having disproportionately supported some of the weaker players in the European industry. Despite seeing the deepest crisis in the European automotive industry for decades, only three assembly plants were closed (1.7% of European Union capacity)⁴. As a result, there has been no net improvement in the problem of long-term excesses in installed

⁴ 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). Nowadays, PSA announced the closure of Aulnay in France and General Motors in Bochum (Germany).

industry capacity, and the resulting long-term pressure on sustainable operating margins.

The French scheme is worthwhile mentioning due to the innovative bonus/malus proposal, in which cars are taxed (malus) or credited (bonus) if their carbon emissions are above or below certain targets. It has three objectives: reducing CO₂ emissions, especially those generated by the transportation sector; supporting a large economic impact on the car industry, since most of the vehicles produced by French manufacturers are small and environmentally-friendly; and finally, because the law was supposed to be financially neutral for the State budget, remaining fiscally balanced. Regarding the first two objectives, the scheme has been a success. On the contrary, the intended financial neutrality was not achieved and the total cost was, for the period 2008-2010, more than 1.200 M€.

3. METHODOLOGY

The assessments listed in the above section highlight the question as to why it is necessary to identify instruments and measures, including innovative ones, which can support the automotive market in Italy. For this purpose, instead of highlighting and propose a contextualisation of different policy responses, the Italian scientific community has been involved, through the Delphi method⁵; this is so as to collect and convey perspectives and evaluations from those who have been analysing the industry, even from an abroad institution. The panel of expert respondents is composed solely of Italian academics and researchers

⁵ The Delphi method is a structured technique developed as a systematic and interactive forecasting method which relies on a panel of experts with the objective to achieve an exhaustive representation of opinions relating to a theme. In the standard version, the experts answer questionnaires in two or more rounds (Lippi, 2007).

belonging to state and private institutes, not connected to professional associations or trade unions.

To be more precise, the method adopted was 'Policy Delphi', which is more suitable for normative and explorative use and particularly in the area of social and public policy (Turoff, 1972). In Europe, more recent web-based experiments have used the Delphi method as a communication technique for interactive decision-making and e-democracy (Bolognini, 2001).

Specifically, the panel of experts was asked to participate in two rounds aiming to collect opinions on the demand slump in the Italian car market, and possible public interventions. As a whole, 30 Italian scholars were contacted, of which 26 gave their availability and with 22 responding to both rounds of the Delphi process.

The series of questions has followed a path of progressive insights proceeding from general comparisons looking at the need to intervene with economic policies (labour market, fiscal policy, trade policy, etc.) and/or industrial policies. Specifically, the focus has been on measures that can indirectly favour car demand (improvement of infrastructure, reduction of taxes on car use and change of regulations) or measures that can directly increase the demand for conventional and alternative vehicles through short or long term incentives. It has also focused attention on some of the peculiarities of car demand, such as that coming from companies or used cars or inherent new forms of use such as car sharing or mini car.

A key characteristic of the Delphi method is the structuring of information flow. The contributions are collected in the form of open answers to questionnaires and their comments to these answers. The experts are not compelled to respond to each question. The person

coordinating the Delphi method controls the interactions among participants by processing the information and filtering out irrelevant content.

4. FIRST ROUND OF THE DELPHI METHOD

Table 1 shows the responses obtained for each specific topic, the number of positive responses and the respective percentages when measured against the total for responses and the total for the panel of experts.

Given the nature of the survey, more related to industrial organization and structured with open questions, the questions about economic policy have been in part ignored, while the personal contribution of the experts was ample for the remaining questions.

The panel of experts considers that industrial policy measures to stimulate car demand can have extremely limited effect in a perspective of macro-economic downturn. In addition, these tools denote certainly greater effectiveness within the context of a policy of concerted action at European level, as happened in 2009.

At the same time, the panel believe incentives for car demand are important for environmental purposes, for safety and for the diversification of energy sources.

In fact, as can be seen from table 1, 72.7 % of the panel of experts believes that incentives for car demand are a valuable tool. But 81.3 % of the total answers suggest that incentives be directed only to alternative vehicles (59.1 % of the panel); and panellists who also take traditional vehicles into consideration suggest that scrapping scheme incentives must reward the outcomes with best environmental balance (e.g. downsizing) and exclude vehicles that due to their weight, consumption and size exceed certain parameters.

Table 1: First round responses

Measures	Total answers	Total positive answers	Positive answers % total answers	Positive answers % total panel
Economic policies	10	8	80,0%	36,4%
Industrial policies	22	22	100,0%	100,0%
Support demand	22	16	72,7%	72,7%
Support demand of AV	16	13	81,3%	59,1%
Structural support demand	10	9	90,0%	40,9%
For business fleets	16	9	56,3%	40,9%
For car sharing	16	6	37,5%	27,3%
For minicar	16	3	18,8%	13,6%
For used cars	16	8	50,0%	36,4%
For infrastructures	22	12	54,5%	54,5%
For CNG infrastructures	16	11	68,8%	50,0%
Reduction of taxes	22	9	40,9%	40,9%
Regulation	22	11	50,0%	50,0%

The outlook suggested is one of change in the paradigm of individual mobility, with the aim not only to reduce polluting factors and increase safety, but also to promote the development of new industrial activities. Industrial policy should influence carmakers' strategies with a mix of tools based on emission standards, energy efficiency, R&D supports and scrapping schemes. This is intended to direct the industry toward alternative forms of motorization and the production also of single purpose vehicles (e.g. for downtown), as is happening in France.

In this sense the panel of experts encourage, and specifically for Italy, a further development of the CNG chain and, more generally, the purchase of this class of alternative vehicles (68.8 % on total answers, and 50.0 on total panel). The benchmark could be the French scheme for the electric car put in place to support Renault strategy. Moreover, the introduction of new technologies for methane extraction should shortly allow a further reduction of prices which are today still related

to oil, without forgetting the development of technologies for the local production of bio-methane from organic waste or through processes of biomass conversion.

The focus on alternative vehicles needs long-term measures to create a path of change by helping businesses to reorganize the supply chain, and to avoid temporal distortions in car demand that could generate situations of moral hazard (90.0% on total answers, and 40.9% on total panel).

As regards specific targets the panel of experts placed its focus specifically on:

- business fleets (56.3 % on total answers, and 40.9 % on total panel). It has been observed that a public policy focused on public and private fleets can increase production volumes that are essential for encouraging investment in key areas, for all alternative vehicles. Companies should be more likely than private individuals to adopt new technology; in particular, it is crucial to target initiatives aimed at the reconversion of light vehicles for the transport of goods. The

number of such vehicles is particularly large, with a range of particularly polluting emissions.

- used cars (50.0 % on total answers, and 36.4 % on total panel). Objectives relating to the reduction of polluting emissions and to improving safety standards can be obtained by also intervening on used cars, above all by eliminating old cars that pollute by their presence in the environment. A significant role could be played by dealers in the relocation in the market of at least Euro 4 and 5 models, with the scrapping of up to 3 Euro models. If the transactions of the used car market are locked, as is the case in Italy by huge taxes, the consequence is an impasse in the new car market (Coffey and Thornley, 2012).

- car sharing to a lesser extent (37.5 % on total answers, and 27.3 % on total panel). This solution, as well as encouraging a different organization of urban space, can be configured as a possible response to the need to reduce the cost impact of cars on personal income. In addition, if the measure will be linked to the supply of single purpose cars or electric mini cars, the effect could be multiplied by enabling producers to expand in this market.

Finally, as regards the tools for intervention, particular attention was paid to the French systems bonus/malus, with its target of setting a parallel policy of disincentives vis-à-vis the use of more polluting vehicles, whose tax revenue may then be used for supporting the use of less polluting vehicles.

5. TOWARDS POLICY RESPONSES BASED ON ENVIRONMENTAL IMPACT REDUCTION

According to Onida (2010), while there does not exist in the automobile industry a single industrial policy intervention with the role of

"panacea", it is possible to identify numerous targeted measures, also in supporting car demand.

The evidence reported in the previous section has highlighted the need to suggest measures to support the Italian automotive industry. There is a risk that the whole supply chain becomes too lean and thereby compromises production levels and technology. Simultaneously the panel of experts has suggested that policy interventions should intently encourage the emergence of a paradigm shift on individual mobility, and thereby break with traditional measures to support car demand.

On the basis of the contributions emerging from the panel of experts, four "financially viable" measures were proposed that could in various ways support the Italian automotive industry, addressing the necessary changes. Financial viability, in this context, refers to the kind of fiscal procedures already adopted in Italian public policies. These could be applied in the automotive field in much the same way as the bonus/malus in electricity tariffs for the benefit of the photovoltaic⁶.

The objective is twofold, both to encourage environmentally friendly and safer vehicles and to rejuvenate the vehicle fleet. The four measures in question were submitted to the panel of experts for the second round. While the whole assessment will be shown in the next section, these measures were as follows.

- *Cash-for-replacement of business fleets with new alternative vehicles.*

The voucher is aimed only at companies, and with the intention of delimiting this policy measure to those actors that in this economic cycle have greater financial resources and are better able to assess and realise the potential

⁶ Who converts solar radiation into electricity is credited (bonus), while who uses traditional electricity is taxed (malus).

economic advantages of replacing their vehicles with alternatives that are less polluting (LPG, CNG, hybrid or pure electric).

The incentive should be long-term and reward progressive solutions to best environmental balance on the basis of the differential between emissions for vehicles scrapped/replaced and emissions for vehicles purchased.

At the same time, by following the French bonus/malus scheme, the financial coverage of this tool could be designed so as to act as a disincentive for the purchase and use of more polluting vehicles.

- *Cash-for-scrapping of private individual cars and replacement with less polluting used vehicles.*

The voucher is aimed only at private individuals, with the intention of fostering the scrapping of more polluting and unsafe vehicles by replacing them with less polluting used vehicles, which require less financial resources to obtain than the purchase of a new vehicle would.

The incentive should be long-term and reward progressive solutions to best environmental balance on the basis of the differential between emissions for vehicles scrapped and the emissions of the used vehicles purchased.

On the basis of this measure, by following the French bonus/malus scheme the financial coverage could again be introduced in a way that would act as a disincentive for the purchase and use of more polluting vehicles.

- *Incentives for home filling systems for CNG vehicles.*

The main obstacle to the diffusion of CNG vehicles is due to the poor and not widespread number of filling stations (about 900 in Italy). In addition, they operate basically during working hours and self-service is forbidden. The home filling systems for CNG vehicles allow cars to

be refuelled directly in home garages, so to avoid the problems caused by lack of filling stations and the queues that frequently occur. The same reasoning is applicable as for business fleets where fleet drivers have the chance of refuelling vehicles at their own base. The natural gas price for household use is broadly the same as at filling stations, although companies can benefit from significant price discounts, paying as much as 40-50% less, depending on the supplier company.

- *Car sharing of experimental electric vehicles.*

Italy is experiencing a significant delay in the development of pure electric vehicles and hybrids. The delay is due more to the architectural content of sharing schemes than to individual electric vehicle components, as many Italian suppliers are positioning themselves on this supply chain. At the moment only two electric car sharing systems are running in Italy (Milan and Pordenone). This policy measure could extend these experiences to other urban areas, with the constraint of prototype experimentation so to encourage R&D projects in Italian companies in cooperation with universities, and the exploitation of European Union funds.

6. SECOND ROUND OF THE DELPHI METHOD

As specified in the methodology section, the Delphi method requires that the panel of experts be involved in at least two phases of inquiry, through the administration of questionnaires. With respect to building on the first phase of interviews, the second round Delphi was required only to make an assessment of the four policy proposals to emerge from the first round, as described above.

Table 2: Second round responses

	Against	Favourable	Very against	Less against	Less favourable	Very favourable
Cash-for-replacement of business fleets with new alternative vehicles	19,0%	81,0%	4,8%	14,3%	23,8%	57,1%
Cash-for-scraping of private individual cars and replacement with less polluting used vehicles	38,1%	61,9%	19,0%	19,0%	38,1%	23,8%
Incentives for home filling systems for CNG vehicles	19,0%	81,0%	14,3%	4,8%	38,1%	42,9%
Car sharing of experimental electric vehicles	23,8%	76,2%	14,3%	9,5%	14,3%	61,9%

Ultimately, every expert had to express their greater or lesser appreciation or

disappointment with respect to these hypothesised policy interventions.

Table 2 reports response rates. The results are reported both in the bivalent mode, in favour or against, and in the disaggregated mode, where previous comments are divided into evaluations with greater or lesser importance.

It is possible to infer that the panel of expert expressed significantly favourable opinion for all the policy proposals. But in order, the measures which obtained more positive opinions in favour were: eco-incentives for businesses fleets (81.0 %), home filling systems for CNG vehicles (81.0 %), electric car sharing (76.2 %) and incentives for used car of private individuals (61.9 %).

The analysis of the extreme assessments, “very favourable” versus “very against”, finds a partial differentiation of opinions. The policy measures “Cash-for-replacement of business fleets with new alternative vehicles” and “Car sharing of experimental electric vehicles” show the larger gaps, at 52.4 and 47.6 percentage points respectively; there is thus evidence of a greater

preference for these tools. On the contrary, the proposed “Incentives for home filling systems of CNG vehicles” and “Cash-for-scraping of private individual cars and replacement with less polluting used vehicles” recorded a more uniform distribution; here, the gaps are 28.6 and 4.8 percentage points respectively, a sign of more attenuated opinion.

It is noteworthy that the policy proposal to obtain the highest percentage of “very favourable” assessments was diffusion of “Car sharing of experimental electric vehicles” (61.9 %).

By observing the individual responses of participants in the second round Delphi it is also interesting to find that only one of the panel members expressed an opinion against all of the policy proposals, and always with the more extreme evaluation. On the contrary nine respondents always pronounced favourably on all the measures, although only one of them always displayed the maximum approval.

Finally, it was reiterated by the panel that isolated policies will not solve the structural factors that are problematic for the Italian automotive industry. A coherent ecological

policy set must be defined in order to encourage a rapid renewal of the 'car park' or existing vehicle fleet, with unfavourable taxation for the more polluting vehicles, in particular for private fleets, and active support for the development of CGN. The spectrum of action must be broad, including policies for access to urban centres and traffic lines according to the types of vehicles.

In particular, eco-incentives should be built on a long-term basis and with a level of progressively increasing environmental performance. This is to give to carmakers and customers a framework that allows rational decision making.

7. CONCLUSIONS

This paper has proposed an alternative approach for outlining policy responses to stimulate the automotive industry that constitutes the backbone of the world's economy and employs a very significant share of the working population, even in Italy.

Generally, government intervention is characterized by a traditional approach that privileges scrapping schemes, but mainly to prevent companies in the whole supply chain from facing financial crisis or bankruptcy. Only recently, and as a secondary issue, has the renewal of the car park with alternative vehicles been taken into account.

In this paper, instead of highlighting the state of the art and assessing the effectiveness of all-round policies adopted to support the automotive industry, the approach has been to involve the scientific community in order to collect and convey perspectives and impressions and define a number of "financially viable" proposals.

The Delphi method has been the methodology adopted, and the accompanying panel of experts takes the view that traditional industrial policy

measures denote limited effects to stimulate car demand, in a context of macro-economic downturn. In addition, these tools certainly possess greater effectiveness within the context of a policy of concerted action at European level, as happened in 2009.

By contrast, the panel also believe incentives for car demand are important for environmental purposes, for safety and for the diversification of energy sources.

The panel of experts describes a list of possible interventions: measures to support environmentally friendly vehicles, and in particular CNG; measures, with a longer or more prolonged time frame, to change the productive structure and avoid short period effects; measures in favour of companies that might be most interested in alternative vehicles; measures for experimentation with electrical car sharing; infrastructure projects in favour of environmentally friendly vehicles; measures that discourage the use and the purchase of the more polluting vehicles.

The policy measures proposed are fundamental from the viewpoint of overturning path dependencies in the automotive industry which impede the diffusion of alternative vehicles, with respect to business models and consumer attitudes.

Carmakers' business models are generally characterized by risk aversion and by return optimization through continuous improvement and cost cutting. But the industry is characterized by a lack of profitability (Nieuwenhuis and Wells, 2003), given that profits come mainly from the sale of automobiles and not from the use of them. The traditional automotive business model should be changed and the relationship between producers and users should not end after purchase but continue over time (Ceschin and Vezzoli, 2010), through the offer of services.

Most consumers are satisfied with the fact that the internal combustion engine performs as they expect it to, and at a predictable cost. Those who prefer clean and fuel-efficient engines and are willing to pay slightly higher purchase prices represent only a niche market. In sum, consumers favour internal combustion engine innovations over alternative vehicles, and in particular over electric engines (Dijk and Kemp, 2010). Consumers care a great deal about fuel consumption but very little about vehicle emissions.

For this reason consumer attitudes as well as business models must be tackled by means of carefully design and properly targeted policy measures.

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