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State Aid to Business in the European Union: a Focus on the Car Sector

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State Aid to Business in the European Union: a Focus on the Car Sector[*]

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Abstract

Making use of an original dataset we empirically investigate the determinants of state aid to the car industry in the European Union. The EU regulatory system on state aids and the long history of governments' grants to this industry make this an interesting case study. Our findings show that in the period 1992-2008 -controlling for a number of variables - subsidies to the car sector have shown a decreasing trend, mainly because of the reduction in the aid aimed at increasing the productive capacity of firms. We find a pattern of a dynamic strategic game among EU countries, whereby aiding a firm induces other member states to grant more subsidies; this seems to be mainly driven by rescue and resctruring aid**.** Overall, economic and political variables (industry's value added, country's income per capita, election year, government's political orientation) are found to significantly affect aid to the car industry.

Keywords: car industry, state aid to business, EU competition policy
JEL codes: L52; L62; H25; H50

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1 Introduction

State aid (e.g., any form of assistance by a public body, given to undertakings on a selective basis) is prohibited by the EU Treaty and its ability to benefit national economies is, to say the least, unclear. Despite this, and despite repeated efforts by EU institutions, considerable amounts of public money are spent every year in European countries under this heading. To tackle this problem, the meeting of the European Council in Lisbon in year 2000 has tried to tighten controls and to design a "road map" aimed at reducing state aid and at making it more effective.

These ideas are synthesized in the official statement "less and better aid". What "less aid" means is quite obvious, while "better" refers to a re-orientation of aid towards "horizontal" objectives (regional development, R&D, ...) rather than purely sectoral ones. The rationale is that horizontal aid is supposed to deal with market failures (i.e. too little spending in R&D or training activities) or to favour cohesion, while sector-specific aid is feared to distort the efficient allocation of resources and the competitive process in the integrated market.

This paper carries out an econometric analysis of the determinants of EU state aid in the period 1992-2008, specifically looking at the aid paid to car producers. Using an original database we have built *ad hoc*, we provide a check of whether and how the Lisbon principle has been implemented. In particular, we investigate whether, behind the labels which define the aim of each subsidy granted, aid given to this specific sector has actually decreased over time, controlling for the variables which may reasonably explain state aid provision.

We focus on car producers mainly because it is probably the industrial sector where subsidy races have been most common (Dancet and Rosenstock, 1995). Moreover, it is one of the few sectors where the European Commission (EC) has issued specific documents called "Community Frameworks for state aid", which are repeated attempts to tame the tendency of member states to pay subsidies to car producers. It is thus considered a particularly difficult case, and therefore a relevant test.[1]

The reasons why this is so may be several. The demand for motor vehicles is strongly cyclical, as during economic crises expenses in durable goods are the first ones to be cut by consumers,[2] and this represents a considerable

[1] The automotive industry is heavily regulated. According to the European Automobile Manufacturers' Association (ACEA 2009), it has to comply to more than 80 EU Directives and 115 international framework agreements on safety, emissions standards, and so on.

[2] Looking at the number of new car registrations for EU 15 countries, we observe that the

threat to sector employment. And, being highly capital intensive, this industry is characterized by rigid production decisions, so that sharp cuts in demand entail eother a quick build up of inventories or a massive under-utilization of production plants.

Additionally, the industry is characterized by the dominance of a small group of large firms. According to Eurostat (2008), it displays one of the lowest shares of small and medium-sized enterprises among manufacturing sectors, being second only to utilities and oil and gas: 87% of the industry's value added is generated by firms classified as "large".[3] Most large EU countries host production plants, with a significant presence of historical industrial firms (known as "national champions"), many of which were in public hands, and which anyway maintain strong political ties.[4]

To the best of our knowledge, our work represents the first systematic attempt to test the determinants of aid to a specific industry. Our results highlight that, when one controls for a number of economic and political variables, sectoral aid has decreased over time. This reduction is essentially driven by the decrease in aid measures which aim at increasing productive capacity. Aid to R&D or training activities do not seem to have decreased over time. Our findings also show that the political address "less and better aid" officially stated in 2000 marks no turning point in the outcome of state aid policy to car producers.

According to our findings, aid granted by other countries in the past has a positive effect on decisions to grant new aid by a member state. This suggests that aid decisions display the strategic features of an intertemporal game among member states which the EU policy on state aid control has not been able to eliminate.

As for political variables, our findings confirm previous results in the literature only to some extent. In the years where political elections take place, member states pay higher amounts of state aid and there is some evidence that

1993-1995 period has been critical, showing a drop from 13 millions of new registrations per year to 11.5 millions. In the years which have followed the number of new registrations rose up to around 14.5 million in 2001. After that maximum, the figure has first decreased slightly, to reach a new peak in 2007.

[3] In competition policy, the car sector is given special attention in the field of vertical restraints (see the block exemption regulation BER 1400/2002) because producers' concentration is such, that the concern for competition is particularly acute.

[4] Most of the existing brands have been around since the end of the 19th century (Opel in 1862, Peugeot in 1882, Renault in 1898, Fiat in 1899) or the beginning of the 20th century (Rover in 1904, BMW in 1917, Citroën in 1919, Mercedes-Benz in 1926, Volvo in 1927, Volkswagen in 1937). Thus, these companies have been recognized by governments a leading role in industrial development, and their products have sometimes become symbols of the economic progress of entire nations.

right-wing governments tend to grant firms larger subsidies. Moreover, the existence of an electoral system based on majority representation leads to higher state aid aimed at increasing productive capacity, which usually is motivated by regional development objectives.

The paper is organized as follows. Section 2 presents the economic literature on state aids. Section 3 summarizes the legal framework of state aids in the European Union. Section 4 sketches the econometric model and Section 5 illustrates the data. Section 6 presents our results, and in Section 7 we collect some conclusions and policy implications.

2 Literature Review

The economic literature has first analyzed the unilateral effect of output subsidies to a national firm competing in an international market. Since the seminal model by Brander and Spencer (1985), a number of contributions have shown - under different settings - that subsidies typically lead to an increase in national welfare if other countries do not react, and to a reduction if all countries engage in strategic subsidy races. These studies on independent economies engaged in international competition have then spurred theoretical analyses on the *determinants* and the *effects* of subsidies when market integration is underway, an issue which is particularly relevant in the European Union.[5]

Collie (2000) shows that each national government has the incentives to grant state aids whereas - under the assumptions of symmetric countries and symmetric firms and considering that public spending is normally financed through distortionary taxation - the prohibition of subsidies would increase the welfare of all member states. Martin and Valbonesi (2008) highlight that the incentive to provide state aid is endogenously determined by the process of market integration itself, as the concentration effect due to integration would determine the exit of the less efficient firms. State subsidies, by freezing this exit, would in turn destroy an efficient specialization of production and division of labour in the enlarged market.

As for the *effects* of state aid on market competition, Møllgaard (2007) finds that - in a setting where firms' demand-enhancing investments are relevant - subsidies could be predatory; Garcia and Neven (2005) highlight that the distorting

[5] For a discussion about the effects of state aid in EU, see Besley and Seabright (1999): these authors comments on externalities from the aid's withdrawal and on the inefficiency from the resulting distortion on competition.

effect of state aids increases when the market is segmented or concentrated.

The empirical evidence on the *impact* of state aids focusses mainly on the firm's productivity. Indeed, several papers study the relationship between subsidies and aggregate productivity: Lee (1996) on Korea, Beason and Weinstein (1996) on Japan find that industry subsidies do not enhance productivity, while Gual and Jodar Rosell (2006) find that sectoral aid in the EU increases multifactor productivity. Using firm level data from Sweden, Bergström (2000) finds no impact of subsidies on productivity of firms. Chindooroy *et al.* (2007) and Glowicka (2008) specifically investigate programs of *rescue and restructuring aid* and find high mortality rates among the recipients, suggesting that some bailouts simply delayed exit, without long term effects on the firms' survival.

As such a controversial policy seems to be very popular among governments, it seems quite natural to pose the question of whether this attitude can be explained by the private objective functions of policy makers. This is probably the argument behind the literature which has tried to explain the *determinants* of state aid on the basis of political as well as economic variables. In this respect, Dewatripont and Seabright (2006) show theoretically - and provide some evidence - that wasteful state aid can be granted by national politicians to improve their chances of re-election by signalling their commitment to supplying public good.

Ganoulis and Martin (2001) focus only on macroeconomic variables, showing empirically that state aid is explained by private investment and public deficit. Neven (1994) presents an econometric analysis, showing that the state aid is affected not only by a country's deficit, but also by an index of political fragmentation, by the ideological tendency of the government and the presence of a coalition government. This analysis has been further extended by Neven and Röller (2000) by including a measure of transparency in the allocation of aids, which is however not statistically significant.

The determinants of state aids have also been analyzed in the political science literature. Aydin (2007) finds in the EU that party unity (defined as the extent to which the electoral faith of the candidates is tied to the party or to their individual reputations) negatively affects the granting of state aids, while ideological distance positively affects them; as for the economic controls, immobility of productive factors, unemployment and trade openness all negatively affect the amount of aid. Zahariadis (2010) finds that right-wing governments tend to grant more aids in the Nineties, in line with previous finding by Neven (1994).

As state aid is a part of public spending, the political economics literature which (tries to) explainS public spending as part of the decision process of (somehow self interested) politicians[6] is also relevant. This stream of research suggests that proportional systems favour general redistribution systems and high generic spending, while majority systems where electoral districts have a greater weight in the electoral process favour targeted distribution (Milesi-Ferretti *et al.*, 2002). One gap of this literature, which we try to bridge is that it typically focuses on spending in general and at most considers state aid to firms as a homogeneous category: however it is well known that the different kinds of subsidies paid by EU countries usually follow different kinds of granting aims. Our paper tries to address this point i) by focussing the analysis on a specific sector, and ii) by distinguishing different kinds of aid. This is relevant as some subsidies are explicitly directed towards the strengthening of those sectors, while other forms of aid are "horizontal" and are supposed to pursue broader goals. For instance, regional development aid is meant to favour the convergence in the Union, while aid to R&D or training activities is supposed to compensate companies for the positive externalities they generate. And, as we will see below, the political determinants of these subsidies can be quite different.

3 State aid in the EU

In the EU, differently from other national and supranational contexts where no definition of state aid is provided at all,[7] the policy on state subsidies finds its roots in the Treaty, where article 107 states that government subsidies to business are incompatible with the Treaty. However, the same article lists a number of mandatory and discretional exceptions. The latters are the most relevant for our analysis and confine aid to cases where – having a limited effect on trade and competition among member states – it is aimed at promoting relevant projects of European interest, regional economic development in low income or high unemployment areas, "certain economic activities", or to remedy a serious disturbance in a member state economy. This has typically led to

[6] See Persson and Tabellini (2004) and the by now abundant literature on this point.

[7] Actually, the very notion of state aid is clear in the EU, while it is not even defined in other countries. For a discussion about the approach in USA on state aid control, see Martin and Valbonesi (2006). It is also to be noticed that the WTO has drawn up the "Agreement on subsidies and Countervailing Measures" which defines state aid and attempts to regulate actions countries can take to counter the effects of subsidies. Until now, 91 cases of disputes among States refer to such an agreement. See http://www.wto.org/english/tratop_e/scm_e/scm_e.htm

many soft law provisions which have been developed since the early 1990 in the EU state aid legal framework – e.g., the Community guidelines on state aid for rescuing and restructuring firms in difficulty, Community framework for research and development, risk capital, *de minimis*, etc.[8]

These discretional exemptions leave room *de facto* to a case by case valuation, a costly process – especially after the enlargement – which the Commission has tried to redress over time, in particular reacting to member states' waves of subsidies in periods of economic crisis. This was apparent for the car sector at the beginning of the Eighties, when the oil shock and the subsequent recession gave rise to a real subsidy race (Dancet and Rosenstock, 1995); a similar surge in subsidies took place between 1993 and 1996. The Commission's reactions led to the 1989 "Community framework for state aid to the motor vehicle industry" (OJ C 123, 18.5.1989), the first systematic attempt to organize state aid analysis in a way to make it compatible with a harmonic development of competition in the sector. Coming after a subsidy race, its first aim was to increase the transparency of state aid to the sector, and to specify some conditions, which the EC may impose before allowing specific subsidies. As for transparency, the framework envisages an obligation for member states to notify i) all proposed aid schemes outside already approved schemes, and ii) those subsidies within approved schemes if the total cost of the project is above the threshold of 12 Million Ecu;[9] moreover, the framework includes an *invitation* to inform the Commission about all aid decisions, to be collected in a final annual report.

In this framework, some conditions for allowing state aid are also stated: indeed, it is introduced the idea that the aid to a firm should not help increase its market share, and it is stated that in some cases capacity cuts may be required. As for aid schemes referring to specific objectives, the framework displays a positive attitude towards regional development aid, limits the possibility to use R&D **to subsidize** any technological improvement, and specifies that training aid could be allowed *per se* if not linked to new investments.

After some resistance by Spain and Germany, the framework was adopted, and extended until further review. However, after 1993 a sharp demand drop induced some member states to take a more interventionist stance, and new controls were considered necessary. This led to the second framework, issued in 1997 (OJ C 279/1 15.09.1997), which broadly reflects a general evolution in the

[8] For a discussion on soft law provisions in EU state aid regime, see Cini (2000).

[9] Ecu is a former basket of the currencies of the European Community, precursor to the euro.

EU policy on state aid control, and in many respects simply introduces in the sectoral discipline the new principles which in the meantime had been developed in evaluating different categories of aid. For instance, the evaluation of regional development aid required something reasonably close to a cost-benefit analysis, including the proof that a viable alternative exists, so that – absent the subsidy – the firm would develop the same project elsewhere. Analogously, the definition of training aid had to include what should be considered the "normal" level and characteristic of training activity (which cannot be paid for through state aid), and those extra training activities which would go beyond the normal level, giving workers a broader set of skills than what would be normally justified. And so on.

A potentially major evolution of the general EU policy towards aid is provided by the Lisbon declaration, which can be synthesized – as already mentioned – in the formula "less and better aid". It is important to acknowledge that especially the second part was quite in line with the EC tradition. Albeit the Treaty accepts aid directed towards "certain economic activities" (e.g., certain sectors), the preference for horizontal interventions, aimed at more general objectives such as regional development or better training, was already present in the first framework on the car sector. It will thus come to no surprise that this declaration had an immediate *formal* consequence: while before 2000 a considerable amount of aid was officially aimed at as "sectoral development", this wording disappears since 2000, where state aid is more and more often justified by labels such as "regional development".[10] Whether this is also linked to a more substantial re-orientation of aid, or whether it should be considered a merely cosmetic change, is a theme which we will analyze shortly.

The recent financial crisis has led to a massive increase in state aid already in 2008, and later triggered the Temporary Framework for the years 2009-10 (2009/C 83/01), which allows member states to grant aid with even fewer controls. An often underestimated consequence of these exemptions from the duty to notify aid and to provide details about the implementation of the schemes and the actual beneficiaries is that under this regime it will be possible to calculate the actual amounts of total aid only with considerable approximation and in very aggregate terms. Therefore, extending the current analysis beyond

[10] When a member state requests to pay some state aid, it has to declare its main objective, in a sense "labelling" the measure. This is a kind of self-certification with limited practical effects, but which affects some EU official statistics. Concentrating on these labels, some official EU documents and speeches refer to the decrease of "sectoral aid" as a success of the Lisbon policy.

2008 will probably prove very hard, raising serious issues of comparability of the data.

4 The Empirical Model

As we aim at explaining aid to the car sector, our explanatory variables first of all include the sector's size in each country, measured by its value added: quite naturally, the larger the size of automotive sector, the larger the aid that we expect it to receive. Second, we take into account *the country's income per-capita* for which we normally expect a negative sign. In the common market, poorer countries are allowed to pay larger subsidies under the heading of regional development aid, as areas with income per capita lower than 75% of EU average are subject to laxer constraints.

As discussed in Section 2, the empirical literature on the determinants of state aid is relatively scarce. This cannot be said for the literature on the determinants of (general) public spending: in this respect, a number of papers - belonging to the literature of political economics[11] - has highlighted the crucial role of the political environment and of its institutional aspects. Relying on these contributions, and also following the specific work by Neven (1994), we include in our investigation a number of controls for political and institutional elements.

First, on the basis of a re-election concern argument, one may expect that forthcoming political elections determine an increase in aids. Moreover, we consider how the political orientation of the national government affects state aid. Previous tests found contradictory evidence on this point: indeed, while Neven (1994) finds that right-wing governments tend to subsidize more, Neven and Röller (2000) do not find evidence of a significant effect and Zahariadis (2010) observes that left-wing governments appeared to be more generous in the Eighties, while the opposite holds in the Nineties. Nothwithstanding these unclear effects in previous analyses, including the political orientation of the government among the controls seems to be appropriate.

Similarly, it seems important to control for variables such as the electoral system (proportional or majoritarian) as affecting the economic support to a specific sector. Indeed, The political economics literature stresses that electoral systems and government forms may have an important impact not only on the

[11] Persson and Tabellini (2004).

size of the welfare state, but also on the allocation of government spending among different aims.[12]

In a integrating market, as shown since Brander and Spencer (1985), a country's decision to subsidize its firms can trigger a reaction from other countries, thus starting a subsidy race. A shown by Martin and Valbonesi (2008) this is particularly true for firms which are at risk of exiting and given that governments play a repeated game in subsidising. We control for this strategic interaction among EU countries in the period covered by our database including the total aid paid by all other countries to the car sector in year $t-1$ as an explanatory variable for aid in year t.

Finally, we introduce a time trend, but not only as a formal control. Indeed, we aim to test whether, once the relevant variables have been properly considered, the EU address "less and better aid" has had any effect. If this were the case, we should expect a decrease of aid over time, particularly after the Lisbon declaration of 2000.

We thus estimate the following equation:

$$\begin{aligned} aid_{ct} &= \alpha + \beta economic\ variables_{ct-1} + \gamma political\ variables_{ct} + \delta trend_t \\ &\quad + \phi aid\ by\ others_{ct-1} + \varepsilon_{ct} \end{aligned}$$

where *economic variables* include the industry's value added and income per capita and *political variables* include a dummy for legislative election years, the government's political orientation and the electoral system; *trend* allows to control for the time trend in the amount of subsidies.

Starting from this basic specification, we introduce a number of controls which might affect aid to the car industry. Subsidies in this sector are usually called for in periods where the demand for cars is particularly low. To account for this, we include in the model the yearly change in the number of *new car registration* (per capita): we expect to find a negative sign, as downturn in new car registrations increases the "demand" for aid from firms in the sector and, potentially, to lead to larger/more frequent subsidies.

In the debate among political scientists, it is frequently stressed that governments have often subsidized their *national champions*, the large home firms

[12] Notice that within the EU basically all regimes are classified as parliamentary (Cyprus being the only relevant exception), so that the traditional comparison between parliamentary systems and presidential ones cannot really be carried out within a EU dataset. See Armingeon *et al.* (2008) for details.

which are sometimes considered "strategic" to a country's industrial policy.[13] Although some scholars (Cini and McGowan, 2008) indicate that in recent years the link between governments and traditional firms has substantially weakened, it is still important to consider whether, when and to what extent this has really happened.

As in our analysis we consider subsidies specifically granted to the car sector in EU member states, it is relevant to control for the international competition national firms are exposed to. We thus include in our analysis an industry-specific index of *import penetration*: we expect a positive sign, as foreign competition typically calls for protection or for strategic subsidization *à la* Brander and Spencer (1995).

A recent tool often adopted to support the car sector is demand subsidies, i.e. *scrapping schemes*: these have become increasingly popular among European governments, probably because they are more **easy** to be implemented. Indeed, unless they are unduly selective, they do not count as aid, they give some advantages to consumers as well, and they can also be targeted towards environmental goals.[14] Both state aid and demand incentives come from the same source (they are political decisions by the same bodies), but they affect differently the two sides of the market and their interaction is *a priori* unclear: we may expect a complementarity between two instruments aimed at supporting the same industry. Nonetheless, being different in nature - state aid is a supply side measure, while scrapping schemes increase the gross willingness to pay of the consumers - and subject to different constraints, they may be considered as substitutes by the government. However, while it is possible to quantify the amount of state aid granted to a specific firms, even a specific plant, the same is not true for scrapping schemes: the laws that discipline them do not allow one to identify either the actual amount offered, or the identity of the beneficiary firm. Therefore, these forms of support can not be added to state aids, nor it is possible to estimate an elasticity of substitution between them. In our econometric analysis, we just control for their existence by means of a dummy variable, and we can only comment about the sign and significance of its coefficient.

Finally, public finance variables cannot be neglected when dealing with gov-

[13] "What is good for Fiat is good for Italy" is a traditional Italian say, probably not so specific to Italy.

[14] For an empirical analysis on the effect of scrappage subsidies and alternative policies on demand in the Italian car sector, see Schiraldi (2011).

ernments' choices over public expenditure. It is quite obvious that, other things equal, the sheer availability of money in public hands may affect the amount of subsidies paid, so that we need to introduce an index of the constraints on public spending: we consider that the very decision to enter the *Euro area* has forced countries to have a certain fiscal discipline which should have led to less public spending. Therefore, we have inserted a *Euro* dummy for these countries, and we expect this variable to affect state aid negatively.

The choice of the econometric model adopted is determined by the distribution of the dependent variable and will be discussed in Section 6.

5 Data Description

The definition of state aid. Our dependent variable is the amount of aid granted to the car industry in the EU. Official data on total state aid to industry and services is provided from 1992 onwards by the Directorate General for competition on its web-site. As for aid to the car sector, we collected a considerable amount of data from the state aid register of the DG Competition[15] for cases after 2000, and through a thorough issue-by-issue analysis of the Official Journal and of annual issues of the *Report on competition policy* for previous years.

Notice that aid is classified by objective (e.g., sectoral development or R&D subsidy) but often also by sector eligible for each subsidy. Each decision by the EC on state aid clearly defines whether the aid measure is meant for specific firms only, or whether the money is made available to different firms across a number of sectors. Even if aid is granted towards horizontal objectives (e.g., R&D subsidy), it may be actually earmarked to specific sectors if not individual firms or plants. As sectoral aid, we have only considered aid decisions which explicitly acknowledge that the aid is targeted to the car sector only (or to specific firms belonging to this industry).[16] The car sector is identified by the official NACE Rev. 2 sector 29, labelled "Manufacture of motor vehicles, trailers and semitrailers", which includes also bodies, parts and accessories, electrical and electronic equipment for motor vehicles and so on. The only major component which is not considered in this sector are tires.

[15] See http://ec.europa.eu/competition/state_aid/register/.

[16] For instance, some aid to new car plants in less wealthy regions are justified as "regional aid", but it is meant for a specific car plant. These cases are included in our database. In some cases, aid is earmarked to specific sectors, among which the car industry, but the list of interested sectors is in fact very large; these cases are not considered by our analysis.

Aid may be granted in numerous forms, such as direct grants, tax exemptions, soft loans and so on. In recent years, for each aid case the EC normally calculates and publishes the *Gross Grant Equivalent* of non-grant subsidies.[17] For previous cases, where the *Gross Grant Equivalent* was not published in EC decisions, we have calculated it applying the same methodology.[18] In this way, in the period considered (1992-2008) we have been able to single out 122 cases of aid specifically earmarked to the car sector, for a total amount of around 8,303 Million Euro (constant 2000 values).

The date we consider entails a non obvious choice. The process of granting state aid to private firms in the EU is long and complex. Member states normally notify their intention to subsidize private firms and specify the details of their project. Then the EC - if deemed necessary, after a careful analysis - approves or denies the permission to grant the planned aid. Therefore, one might consider either the amount of proposed aid or the one effectively granted. We focus on the amount *granted*, on the basis of the final decision published in the Official Journal of the European Communities.[19] The main reason to prefer these data on the amount granted is the quality of data: aid which is only proposed is harder to trace, and sometimes the application is withdrawn by the member state leaving only a faint mark in official documents, which may describe the proposal in fairly generic terms.[20]

Decisions normally take few months, and in most cases they are drawn shortly after the member state's communication to the EC. However, occasionally a decision may take longer, but we allocate the amount of the specific case to the year of the final decision, when normally the aid is actually paid. This general principle has an exception for cases in which the aid was granted before the decision: in these cases we attribute the approved aid to the year in which it was paid.[21] The rationale is that we are interested in the time period

[17] The Gross grant equivalent is the present discounted value of the aid given, where grants or tax exemptions are treated as equivalent. For loans the aid component is defined as the difference between ordinary rates and preferentual rates. For guarantees the methodology is explained a few times, e.g. in the Commission Regulation (EC) No 736/2008 of 22 July 2008.

[18] We have computed it on the basis of the spread between the required interest rate (which could be nil) and the interest rate of the ECB for its main financing operations, as reported monthly in the Official Journal.

[19] Notice that the amounts granted often differ from the amounts proposed.

[20] Moreover, some member states may try to propose aid programmes which will certainly be blocked by the Commission with the sole purpose of satisfying the request of some internal lobby, but knowing that the proposal entails no serious financial commitment by the Government. Concentrating on approved aid allows us not to count frivolous requests.

[21] If state aid is declared incompatible with EU rules after it has been paid, member states have to force firms to return these subsidies.

in which the aid has been granted, either with a formal approval or taking for granted that the formal approval would have arrived.[22]

It is only fair to stress that our data are bound to underestimate the public subsidy directly received by car producers, as some firms may have received aid under general programmes which were accessible to many other sectors. Unfortunately, the information on the final beneficiaries of this kind of "general" subsidies is not publicly available for all countries.[23]

Some descriptive statistics. The following Table 1 provides the main aggregate data, actually showing that state aid in EU 12 (or 15) has indeed decreased over time in absolute terms.

Table 1: Total state aid to the car sector, 1992-2008

	EU12	EU15	EU25	EU27
1992	3748.62	-	-	-
1993	388.55	-	-	-
1994	466.10	-	-	-
1995	377.40	377.40	-	-
1996	769.45	779.44	-	-
1997	57.24	57.24	-	-
1998	263.06	264.78	-	-
1999	310.32	310.32	-	-
2000	90.90	90.90	-	-
2001	342.88	342.88	-	-
2002	563.21	563.21	-	-
2003	123.80	154.37	-	-
2004	43.32	52.92	52.92	-
2005	123.43	132.40	132.40	-
2006	13.39	20.02	63.66	-
2007	23.48	23.48	171.21	171.96
2008	80.70	80.70	152.10	248.30

Source: Own elaboration from DG competition and OJEU (Million €, 2000)

While in the Nineties it was not uncommon to see hundreds of Millions paid

[22] Official data on total aid refer to the date of approval and not to the date of request, so that any different choice would face a serious problem of consistency with data on total aid.

[23] On top of this, the European Investment Bank (EIB) is sometimes asked to target its funds to specific sectors. However, these funds do not come from national budgets, and neither do they flow through governmental channels, so that combining them to an analysis of state aid would be inappropriate.

out every year, in the decade which follows total values have rarely reached the previous peaks. Moreover, if one looks at the main cases after 2000, some of the largest ones refer to new accession countries or to former East Germany Länder. Probably, this is partly because new countries are often characterized by a larger presence of areas eligible for regional aid, and partly for an explicit effort to favour the integration of these countries in the EU. Let us now see how different member states have operated in this period, looking at data reported in Table 2.

Table 2: Indices on total state aid and state aid to the car sector by country, 1992-2008

Country	Total aid/GDP	Aid to the car sector/total aid	Value added of the car sector/GDP
Austria	0.295%	0.588%	1.013%
Belgium	0.385%	1.170%	1.316%
Bulgaria	0.133%	0.000%	0.040%
Cyprus	0.938%	0.000%	0.050%
Czech Republic	0.704%	1.711%	2.147%
Denmark	0.637%	0.000%	0.195%
Estonia	0.071%	0.000%	0.362%
Finland	0.330%	0.000%	0.254%
France	0.560%	0.177%	1.065%
Germany	0.943%	0.402%	2.696%
Greece	0.432%	0.000%	0.065%
Hungary	0.682%	1.205%	2.044%
Ireland	0.463%	0.000%	0.152%
Italy	0.631%	3.586%	0.659%
Latvia	0.152%	0.000%	0.057%
Lithuania	0.195%	0.000%	0.056%
Netherlands	0.204%	0.805%	0.431%
Poland	0.485%	0.563%	0.854%
Portugal	0.881%	0.380%	0.514%
Romania	0.665%	2.856%	0.725%
Slovak Republic	0.263%	6.200%	15.083%
Slovenia	0.369%	0.000%	0.718%
Spain	0.597%	1.366%	1.252%
Sweden	0.453%	0.094%	1.913%
United Kingdom	0.207%	1.385%	0.822%

Notes: average values for the 1993-2007 period. Data sourced from Eurostat and own ekaboration from DG Competition and OJ EU information

In terms of total aid to industry and services as a percentage of GDP, the most generous country has been Germany, followed by Cyprus and Portugal. The new EU member countries seem to belong to two different clubs: on the one hand, we have more generous governments, such as Cyprus (0.938% of GDP

devoted to state aid), followed by Czech Republic (0.704%), Hungary, Romania, and Poland. On the other hand, we have (generally) small countries which tend to subsidize little (the Baltic Republics, as well as Bulgaria, Slovenia and Slovak Republic).

However, when we look at the relative weight of the car industry within the general state aid policy, we can see that the propensity to grant aid follows a different pattern. The countries which seem to pay particular attention to the car sector are mainly some accession countries (Slovak and Czech Republics and Hungary). Notice that if we consider the average weight of the car industry relative to each country's GDP, there seems to be quite a tight correspondence between aid granted and the size of the sector, the correlation between the two series being 0.78.

Our explanatory variables. Coming to the explanatory variables, we retrieve them from a number of sources. Country-level economic variables come from Eurostat. We consider GDP and income per capita in real terms and we sourced them from Eurostat and OECD statistics.

The value added of the industry comes from Eurostat and Euklems databases.[24] Indeed, information at sectoral level - from the Structural Business Statistics database - is available on the Eurostat database only from 1995 onwards. We retrieve information on previous years from a comparable database, the Euklems.

Political variables (i.e. *left-wing government, proportional*) are sourced from the Database of Political Institutions by the World Bank (Keefer, 2007) and from the Comparative Political Data Set (Armingeon, *et al.*, 2008). We include a dummy which takes value 1 if there is a legislative election in the year. The political orientation variable ranges from 0 to 5, with 0 corresponding to hegemony of right wing (and center) parties and 5 to hegemony of social-democratic and other left wing parties, and has therefore been labelled *left-wing government*.

Proportional is a categorical variable which describes the electoral system. It ranges from 0 (simple majority formula, as in the United Kingdom) to 3 (list proportional representation, as in Belgium).

Euro is a dummy which is equal to one when a member country is currently a member of the Euro area. This is a proxy for the fiscal discipline which the country is likely to have faced over the period we consider, a proxy which has

[24] For a detailed description of this database, see O'Mahony and Timmer (2009).

the positive feature of being totally exogenous relative to the car sector. As regards the EU political address, since it has steadily pointed to a reduction in the amount of aids granted, and a shift towards horizontal versus vertical aids, we simply control for it by including a time trend and by including a dummy for the period after the Lisbon declaration.

Since the competitive pressure from foreign producers may push member states to distribute larger subsidies, we control for this effect by including an index of *import penetration* specific for this sector. This is defined as the share of domestic demand in each country j in the car industry met by imports: import penetration is thus equal to $M_{jt}/(P_{jt} + M_{jt} - X_{jt})$, where M_{jt} is imports in country j at time t, P is is proxied by the gross output (Euklems) and production value (Eurostat) and X is export. In this way, we are considering the relative pressure that imports exert on the part of domestic production which is meant for the local market. Data on trade flows are sourced from the UN Comtrade database.

Data on *new car registrations* are obtained from Eurostat, and cross-checked with data collected by ACEA.

The definition of *national champions* is normally rather vague, and we had to turn this notion into a more precise concept. In different version of our analysis we have defined as national champion the largest national producer, or any large national producer, or an historical brand (whether or not still in the hands of "national" shareholders). In the latter case, for instance, a company such as Opel, a German brand which is owned by the American GM, is still considered a "national champion". For each definition, we distinguish the amount of aid given to the selected category. Then, in the estimates we include a dummy which is equal to one if in a given country and year some aid has been granted to a national "champion". The qualitative results do not depend on the specific definition adopted.

Notice that if we adopt the latter definition (as we have in the version we present here), we have no one-to-one relationship between aid and these historical firms. There are countries whose sole national producer is labelled as a national champion (Sweden), which however is now in foreign hands. We have countries which have been quite generous without having national champions (e.g., Austria, Belgium, Poland or Romania). Finally, other countries have national champions but have given generous amounts of money to other firms too: France has subsidized Renault, but Toyota and Saab too, most subsidies given

by Spain have been targeted to foreign firms, and so on.[25]

Finally, concerning the *scrapping incentives* sometimes provided by governments[26] to the sector, we include in our econometric analysis a dummy which is equal to 1 if a scrapping program was active in a given country in a given year, and zero otherwise. The information on scrapping schemes is sourced from Global Insight (2010).

6 Results

As our dependent variable displays a large number of zeros, the assumption of normality required by OLS is not respected. Santos Silva and Tenreyro (2006) suggest to adopt a Poisson estimator to deal with this issue. The latter estimator however assumes identical mean and variance values for the distribution of the dependent variable. As this does not occur in our case (i.e. the dependent variable presents overdispersion), we prefer a Negative Binomial estimator, which accounts for this feature. This specification is supported by the large and statistically different from zero value estimated for $\ln(\alpha)$, which are reported in the bottom panel of each table.[27]

First, we present several specifications considering aid to the car industry in general as dependent variable. We then consider alternative versions which distinguish different types of aid. Table 3 reports the first set of results.

The control variables have the expected signs: aid increases with the *industry's value added*, while *income per capita* has a negative and significant impact, which suggests that the car industry is more heavily subsidized in lower income countries.

The time trend is generally negative and significant, providing some evidence that - even considering other explanatory variables - the amount of aid granted has decreased over time. This suggests that the EC attempts to reduce sectoral aid over time seem have yielded some results in the car sector.

[25] The following companies have been classified as national champions and have been granted some aid in their own country over the 1992-2007 period. France: Renault; Germany: Audi, BMW, Mercedes Benz, Opel, Volkswagen; Italy: Fiat; Spain: Seat; Sweden: Volvo; United Kingdom: Jaguar, Rover.

[26] Demand subsidies for the purchase of new "green" cars while scrapping old ones have been adopted for instance by France, Germany, Italy, Spain and the UK, and although they are considered subsidies to consumers and not to firms, they anyway entailed public resources devoted to boosting demand in this specific sector.

[27] The parameter α is the overdispersion parameter in the Negative Binomial model: larger value corresponds to greater overdispersion. In the Poisson model the assumed lack of overdispersion corresponds to imposing $\alpha = 0$.

Table 3: Determinants of total aid to the car sector, 1992-2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) EU 15	(11)
industry's value added$_{c,t-1}$	1.551***	1.542***	1.606***	1.550***	1.988***	1.573***	1.554***	1.848***	1.594***	1.514***	1.642***
	(0.216)	(0.215)	(0.231)	(0.271)	(0.268)	(0.227)	(0.216)	(0.235)	(0.219)	(0.235)	(0.236)
income per capita$_{c,t-1}$	-2.886***	-2.866***	-3.011***	-2.886***	-2.486***	-2.814***	-2.950***	-2.762***	-4.308***	-4.249***	-2.783***
	(0.513)	(0.517)	(0.548)	(0.513)	(0.590)	(0.554)	(0.518)	(0.530)	(1.026)	(1.106)	(0.554)
trend	-0.114**	-0.118**	-0.114**	-0.114**	-0.021	-0.104*	-0.176*	-0.045	-0.023	-0.018	0.134
	(0.046)	(0.048)	(0.045)	(0.047)	(0.056)	(0.054)	(0.102)	(0.050)	(0.072)	(0.075)	(1.093)
election year$_{c,t}$	1.790***	1.761***	1.751***	1.791***	1.489***	1.802***	1.695***	1.373***	1.770***	1.914***	1.367**
	(0.579)	(0.582)	(0.573)	(0.579)	(0.537)	(0.574)	(0.600)	(0.508)	(0.591)	(0.608)	(0.596)
left-wing government$_{c,t}$	-0.308**	-0.311**	-0.322**	-0.308*	-0.097	-0.357*	-0.277*	-0.144	-0.241	-0.223	-0.111
	(0.154)	(0.154)	(0.152)	(0.158)	(0.158)	(0.201)	(0.161)	(0.157)	(0.162)	(0.162)	(0.180)
proportional$_{c,t}$	-0.180	-0.179	-0.151	-0.179	0.127	-0.150	-0.219	0.001	-0.178	-0.218	-0.299
	(0.257)	(0.258)	(0.260)	(0.262)	(0.275)	(0.272)	(0.266)	(0.268)	(0.259)	(0.259)	(0.290)
aid by other countries$_{c,t-1}$	0.001**	0.001*	0.001**	0.001**	0.001***	0.001**	0.001**	0.001***	0.001**	0.001**	0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
change in new car registrations per capita$_{c,(t-(t-1))}$		-0.236									
		(1.648)									
scrapping scheme$_{c,t}$			-0.506								
			(0.654)								
aid to national champion$_{c,t}$				0.003							
				(0.747)							
industry's import penetration$_{c,t}$					0.548						
					(0.840)						
euro$_{c,t}$						-0.270					
						(0.719)					
post Lisbon$_{t}$							0.755				
							(1.117)				
Total aid(%)$_{c,t}$								-0.443			
								(0.887)			
New member$_{c,t}$									-2.720*		
									(1.627)		
Constant	-19.732***	-19.504***	-20.624***	-19.729***	-25.034***	-19.594***	-19.598***	-23.624***	-27.019***	-26.212***	-25.512
	(3.595)	(3.643)	(3.854)	(3.653)	(4.318)	(3.644)	(3.589)	(3.769)	(5.874)	(6.246)	(23.448)
Ln(α)	2.386***	2.384***	2.384***	2.386***	2.271***	2.386***	2.383***	2.198***	2.369***	2.319***	2.248***
	(0.129)	(0.129)	(0.129)	(0.129)	(0.137)	(0.129)	(0.129)	(0.133)	(0.129)	(0.136)	(0.130)
Time dummies	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Log likelihood	-555.7	-555.6	-555.5	-555.7	-486.6	-555.7	-555.5	-515.2	-554.3	-498.6	-545.6
Observations	300	297	300	300	268	300	300	278	300	249	300

Notes: dependent variable is aid to the car industry in country c at time t (constant values). Estimates obtained with Negative binomial estimator. Standard errors in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

Among political variables, the election year shows a positive and highly significant coefficient. We also find some evidence that the government's political orientation is statistically significant: right wing governments seem to grant more state aid to the car industry. However, this result is not robust to the inclusion of some additional controls. The political economics literature stresses that proportional electoral systems lead to larger governments than majority ones; our findings on total aid to the sector do not provide evidence in support of this view, at least for the specific category of spending.

The coefficient attached to the *aid by other countries* is always positive and significant. This suggests that some kind of dynamic strategic game exists among EU member states, so that state aid in one country today leads to more state aid in other countries tomorrow.

Columns (2) to (5) report the results including some controls which are specific to the industry considered: the dynamics of new car registrations, the presence of scrapping schemes, aid granted to national champions and industry's import penetration, which proxies the competitive pressure from abroad. However, none of the latter controls turns out significant. In particular, this indicates that neither demand conditions nor the competitive pressure from foreign producers appear to affect the granting of state aid in EU countries.

The fiscal discipline associated to the participation to the monetary system, introduced in column (6), does not result to determine effects on the amount of subsidies granted.

As the Lisbon declaration in 2000 is sometimes considered a turning point in state aid policy in the EU, we include a dummy to distinguish the two periods. The results reported in column (7) suggest that there has not been a statistically significant change in the pace of reduction of aid before and after the declaration.[28]

In order to check how aid to the car sector relates to the general aid policy of each member state we have introduced as explanatory variable the amount of aid granted to industry and services as a percentage of GDP. As this variable is not significant, as reported in column (8), granting behaviour relatively to car industry does not immediately reflect the general behaviour towards industry and services. This, in turn, confirms that an analysis of state aid at sector level is relevant, as the approach to the car sector is quite different from general state aid.

[28] See Nicolini, Scarpa and Valbonesi (2012) for a detailed analysis of state aid to the car sector since 2000.

As new member states, seeking to give a spur to their industrialization, and using the fact that many of their regions are "objective 1" regions,[29] might be more generous towards the car industry, we include in column (9) a dummy to control for them. We find instead that - if one considers objective conditions such as income per capita - new member countries tend to subsidize less this industry.[30] Analogously, one could suspect that the results found are affected by the changes in the geography of the area considered.[31] We therefore replicate our estimate on the sub-sample of EU 15 countries in column (10), obtaining - qualitatively - the same results.

A last check is present in column (11), where the baseline specification presented in column (1) has been enriched by including a set of time dummies. Our main results are only marginally affected by this change.

6.1 The objectives of aid

The general analysis carried out so far provides some evidence on the factors affecting total aid to the sector. However, this total amount is actually the sum of subsidies granted for different reasons, and these different categories are analysed by the EC with different criteria. In particular, exploiting the richness of the database we have built, it seems meaningful to distinguish three different categories of aid, corresponding to different economic rationales.

The first category refers to aid aimed at increasing productive capacity, either expanding existing plants or establishing new ones (greenfield investments). This *capacity increasing aid* is typically targeted to less developed areas of the EC, where this support to employment is compatible with the Treaty. In the description of the aid programme, it is usually labelled as regional development aid and is subject to the joint scrutiny of DG Competition and of DG Regional Policy, which looks at aid in the perspective of cohesion and regional development. Indeed, this kind of aid does not increase the competitiveness of existing plants, but it is rather aimed at increasing production and employment.

Aid measures justified as a contribution to R&D or training programmes follow quite a different logic, in particular as they do not directly affect productive capacity. They are meant to support certain "deserving" activities, i.e. activi-

[29] Namely, they are regions for which Convergence (the first objective) towards the richer regions is an issue. In the EU practice this justifies a less strict attitude towards state aid.

[30] This might be the result of a compositional effect, where only few countries heavily subsidize the industry (i.e. Slovak Republic).

[31] Notice that in the period we consider the number of EU member states has changed a few times.

ties supposed to generate positive externalities or to entail a larger commitment of resources than what is justified by pure profit maximization. However, distinguishing between normal or abnormal levels of these activities (such as R&D spending, training or measures to protect the environment) or between choices undertaken to protect the environment rather than to improve a firm's image is extremely difficult.

Despite the EC scrutiny and its attempt to distinguish between ordinary levels of these activities and those which call for a particular incentive, these subsidies end up helping a firm decrease its variable cost or improving its product, that is, increasing the firm's competitiveness. Therefore, it seems appropriate to label these subsidies as "*aid to competitiveness*" and to treat them separately.

Finally, while the former two categories represent fairly ordinary aid measures, *rescue and restructuring aid* is a totally different issue, as it is meant to help firms in situations of financial distress. It is incompatible with capacity increases, it is not linked to specific R&D or training investments, and it refers only to companies in a situation of definite financial difficulty. Again, it seems appropriate to treat these aids as a separate category.

In what follows, we consider aid granted according to these different objectives as different things, as their impact on firms and on the competitive process, and thus the motives which drive these decisions, might be very different. As reported in Table 4, aid to competitiveness engages about 9%, aid for capacity increasing corresponds to 83%, while aid for rescue and restructuring are 8% of the total amount granted. Notice that the same case may grant sums under different objectives.

Table 4: State aid according to the aim

	nr of cases	cumulated amount of nominal aid (Million euro, 2000)	aid as a share of total aid to the car sector
aid to competitiveness	54	739	9%
capacity increasing aid	69	6908	83%
rescue and restructuring aid	7	653	8%
total aid to the car sector	122	8303	

Notes: data refer to the 1992-2008 period.

We have thus estimated a negative binomial model, considering the different objectives of aid as dependent variables in turn. Table 5 reports the results considering as dependent variable alternatively total aid to the car industry and each of three above categories of aid to the car sector. The results on total

aid in column (1) are the same ones of of Table 3 and are reported here for convenience only.

Columns (2) to (4) in Table 5 show the results of our basic regression analysis. The effect of *income per capita* is negative and significant when considering both capacity increasing aid an aid to competitiveness. Additionally, it seems that rescue and restructuring aid has been granted more generously by (relatively) lower income countries.

The breakdown by objective shows that the time trend observed in total aid is significant only for capacity increasing aid: the decrease observed in general is essentially driven by a reduction in this category of aid. Aid to increase firms' competitiveness has not decreased over time, while subsidies to new capacity have.

As for the political variables, we find evidence of a positive effect of elections, apart when considering aid for rescue and restructuring (whose relatively exceptional nature normally explains the non significant result).

It is particularly interesting to stress that our results show that while the presence of a proportional electoral system does not seem to affect total aid to the sector, it has a negative effect on capacity increasing aid. This is partially in line with the literature, which - as already mentioned - suggests that proportional systems favour general redistribution systems and high generic spending, while majority systems favour targeted distribution (Milesi-Ferretti *et al.*, 2002). This prediction is confirmed as for capacity increasing aid, which typically consists of relatively large subsidies which accrue to a very well defined constituency (where the plant is located).

This analysis shows that the result on the relationship between current aid and the aid granted by other countries in previous years - shown in Table 3 - seems to be entirely driven by rescue and restructuring aid. This corresponds to the intuition that this type of aid, rather than having a regular and predictable relationship with any feature which somehow affects other categories of subsidy, seems to be allowed as a response to other countries' aid policy. This suggests that subsidizing a firm in a country makes it more likely that other firms will soon be in financial distress, or that the EC will more likely accept further claims by other member states.[32]

Moreover, notice that the analysis shows that rescue and restructuring aid does not seem to depend on short term demand fluctuations: changes in the

[32] It is only fair to stress that the limited number of aid cases which fall within this category calls for some caution in interpreting these results.

Table 5: Determinants of different types of aid to the car industry - 1992-2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total aid	***Capacity increasing aid***	***Aid to competitiveness***	***Rescue and restructuring aid***	***Total aid***	***Capacity increasing aid***	***Aid to competitiveness***
industry's value added$_{c,t-1}$	1.551***	1.786***	1.392***	5.280*	1.554***	1.785***	1.416***
	(0.216)	(0.294)	(0.313)	(2.822)	(0.216)	(0.298)	(0.323)
income per capita$_{c,t-1}$	-2.886***	-4.163***	-1.044**	-9.500*	-2.950***	-4.281***	-1.010*
	(0.513)	(0.764)	(0.532)	(5.304)	(0.518)	(0.775)	(0.542)
trend	-0.114**	-0.142**	0.074	-0.769	-0.176*	-0.242*	0.124
	(0.046)	(0.059)	(0.065)	(0.479)	(0.102)	(0.144)	(0.145)
election year$_{c,t}$	1.790***	2.437***	1.645**	3.531	1.695***	2.263***	1.695**
	(0.579)	(0.695)	(0.699)	(2.724)	(0.600)	(0.747)	(0.710)
left-wing government$_{c,t}$	-0.308**	-0.663***	-0.172	1.043	-0.277*	-0.594**	-0.189
	(0.154)	(0.230)	(0.233)	(0.951)	(0.161)	(0.249)	(0.237)
proportional$_{c,t}$	-0.180	-0.733*	0.208	4.170	-0.219	-0.789*	0.251
	(0.257)	(0.393)	(0.347)	(2.646)	(0.266)	(0.412)	(0.364)
aid by other countries$_{c,t-1}$	0.001**	-0.000	0.000	0.005**	0.001**	-0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.003)	(0.000)	(0.001)	(0.001)
post Lisbon$_{t}$					0.755	1.132	-0.548
					(1.117)	(1.469)	(1.405)
Constant	-19.732***	-24.782***	-16.502***	-99.221**	-19.598***	-24.600***	-17.005***
	(3.595)	(4.860)	(4.681)	(49.112)	(3.589)	(4.882)	(4.901)
ln(α)	2.386***	2.819***	2.841***	3.587***	2.383***	2.814***	2.841***
	(0.129)	(0.159)	(0.184)	(0.455)	(0.129)	(0.158)	(0.184)
Log likelihood	-555.7	-403.4	-252.7	-51.41	-555.5	-403.1	-252.7
Observations	300	300	300	300	300	300	300

Notes: dependent variables are aid to the car industry either total, or divided according to their aim, in country c at time t. Estimates obtained with Negative binomial estimator. Standard errors in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

number of car registrations are never significant in explaining any category of aid.

Estimates in columns (5) to (7) integrate the above analysis including the post-Lisbon dummy: we do this to investigate whether the Lisbon declaration "less and better aid" affected the amount and the objective of grants. The result is somehow disappointing, as the Lisbon dummy does not appear significant in any specification; the inclusion of this dummy variable does not affect the results obtained either for capacity increasing aid, or aid to competitiveness.

However, as rescue and restructuring aid has been granted only before the year 2000, the inclusion of the post-Lisbon dummy prevents the estimates from achieving convergence. We interpret this as a mainly technical problem: although it is true that no such exceptional cases have occurred between 2000 and 2008, we doubt that this is due to the Lisbon statement.

Notice that this dummy is (obviously) highly correlated with the time trend, which partially loses significance. (compare columns (1) and (5) and also (2) and (6) in Table 5 above). However, if one drops the time trend and leaves the post-Lisbon dummy, one can see that this dummy remains non significant. Therefore, we can confirm that over the period of our analysis state aid has decreased, mainly because of a reduction in capacity increasing aid (i.e. regional aid). However, the Lisbon declaration *per se* has had no sizeable affect on state aid. The only major difference between the pre-Lisbon and the post-Lisbon period is that rescue and restructuring aid has disappeared in the car sector. Whether this depends on the Lisbon declaration or (more likely) to specific events related to the sector, is an open issue which would call for further analysis.

7 Conclusions

Investigating the determinants of state aid in the EU to the car industry is a interesting task which - to the best of our knowledge - has not been empirically implemented. The car sector has represented, since the end of the Eighties, one of the main receivers, being characterised by national champions and mostly by large firms. We have thus built an unique database, collecting data on aid granted from 1992 onwards, to study the determinants of subsidies to national firms in the car sector in the EU.

General results from previous empirical investigations on the determinants of state aids to manufacture have highlighted that income per capita, election years

and electoral systems matter. We confirm most of them. Moreover, our findings highlight that the car sector is more supported by right wing governments.

Our estimates suggest that - on the one hand - the EC state aid policy has had an impact on the car industry, as aid to firm in this sector decreases over time; on the other hand, the Lisbon declaration seems to record no sizeable impact.

We have also shown that alternative aims of aids are very different in their determinants. Interestingly, "normal" aid measures (i.e. aid to competitiveness, increasing capacity aid) do respond to political factors (elections, political orientation of the governments, etc.) while aid for rescue and restructuring does not. Our results show that a strategic dynamic game takes place among member states which undermines the EU design on state aid policy: this finding is mainly driven by rescue and restructuring aid. State aid in one country today leads to higher aid in other countries, for a combination of two factors. On the one hand, the approval of each state aid is part of a repeated game: accepting a member state's intervention makes it more likely that analogous subsidies by other member states will have to be accepted. On the other hand, in decades where excess capacity has been indicated as a recurring problem for the sector, any support to a firm in distress may make other firms' situations more critical, increasing the demand for aid.

Our analysis allows us to draw some interesting policy implications. The presence of a negative trend (controlling for other variables) indicates that the general attempt to reduce state aid to specific sectors seems to have had some effect. This is probably the result of several policies.

First of all, the scrutiny by the EC to specific subsidies has become more severe. R&D projects clearly distinguish between new research projects and the simple implementation of new technologies, and training programmes have to clarify whether the firm is engaged in efforts which really go beyond what could be justified by normal commercial practices. Regional projects are now evaluated on a comparative basis: for a subsidy to a project in a specific location to be allowed, States must prove that the firm would have viable alternatives elsewhere. All this seems to have deterred futile requests.

However, the fact that upcoming elections are associated to larger subsidies indicates that the member states' requests are still somehow distorted. The generosity of the member states is not only linked to objective factors, as the re-election concern matters. This is hardly an element which the EC can seriously hope to eliminate. As long as the projects to be subsidized are reasonable, the

fact that governments are less worried about budget constraints in certain years is physiological.

Another element which has probably played an important role is privatization. Since the Eighties, the governments of France, Italy and Great Britain have sold almost all of their shares in car producers, and this has gradually broken the link with the "national champions". However, when car producers are in financial distress, even after privatization, governments intervene. Our findings on the interdependence between the rescue and restructuring aid paid in one year and the aid paid in previous years by other countries raises a significant concern. Subsidy races have been common in the past and the EC has to be careful not to revive them.

Although it is true that no rescue and restructuring aids have been paid between 2000 and 2008, massive analogous interventions have been recorded during the crisis (2009-2010).[33] Although these recent years are hardly comparable with the previous ones, the feeling of *déjà vu* has been very strong. In particular, we still have situations in which the EC authorizes some member states to support firms which want to survive despite their excess capacity, while at the same time authorizes expanding productive capacity elsewhere.

The fact that this creates some problems comes to no surprise. Merely controlling *individual* aid decisions by member states is not sufficient. The EU simply *reacts* to member states decisions and lacks a consistent policy towards industrial sectors. Unless this is changed, aid decisions are bound to increase the requests (ans possibly the need) for more aid.

[33] See Nicolini,Scarpa and Valbonesi (2012) for more details on these issues.

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