Unclassified **ECO/WKP(2010)1**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **26-Jan-2010**

English - Or. English

ECONOMICS DEPARTMENT

ECO/WKP(2010)1
Unclassified

THE AUTOMOBILE INDUSTRY IN AND BEYOND THE CRISIS

ECONOMICS DEPARTMENT WORKING PAPERS No. 745

By
David Haugh, Annabelle Mourougane and Olivier Chatal

Document only available in PDF.

JT03277464

English - Or. English

ABSTRACT/RESUMÉ

The automobile industry in and beyond the crisis

This paper considers the role of the automobile industry in the current cycle. It shows that the industry is economically important and its cycle is intertwined with business cycles. After casting some light on the sources of the collapse in car sales at the start of the crisis, the policy measures, in particular car scrapping programmes, put in place to support the automobile industry are discussed. The paper also derives short and medium term projections of car sales. While a rebound in car sales is likely in North America, Japan and the United Kingdom, car sales in Germany have been pushed significantly above trend and may weaken going forward. Over the medium term, in mature markets such as Europe and North America, trend sales are likely to remain stagnant. By contrast, rapid increases are foreseen in China and to a lesser extent in India. Medium-term projections suggest that capacity exceeds trend sales by around 20% in the five largest Western European markets considered as a whole. Without an adjustment in capacity, these countries would need to ensure an ongoing strong export performance. By contrast, automakers in the NAFTA area would need to halt their decline in domestic market share or to rely increasingly on exports in order to avoid excess capacity. In order to maintain their high levels of capacity utilisation, Korean and Japanese manufacturers will need to keep up their strong export performance.

JEL Classification: E3, H2, L62.

Keywords: Automobile crisis; car scrapping schemes ; car sales.

****

L'industrie automobile dans et après la crise

Ce papier examine le rôle de l'industrie automobile dans le cycle économique en cours. Il montre que l'industrie a une importance économique certaine et est interconnectée avec le cycle économique. A Après avoir quelque peu détaillé l'origine de l'effondrement des ventes automobiles en début de crise, les mesures publiques mises en œuvre pour soutenir l'industrie automobile, et notamment celles concernant les dispositifs de prime à la casse sont détaillées. Le papier aussi présente des perspectives à court et moyen terme pour les ventes de voitures. Alors que l'on peut s'attendre à un rebond en Amérique du Nord, au Japon et au Royaume-Uni, les ventes d'automobiles en Allemagne sont nettement supérieures à la tendance, et pourraient de ce fait marquer un fléchissement à l'avenir. À moyen terme sur les marchés parvenus à maturité tels que l'Europe et l'Amérique du Nord, les ventes tendancielles devraient rester étales. À l'inverse, des hausses rapides sont attendues en Chine et dans une moindre mesure en Inde. Selon les projections à moyen terme, les capacités productives du bloc dépassent les ventes tendancielles de quelque 20 % sur l'ensemble des cinq plus grands marchés d'Europe occidentale. À défaut d'ajustement des capacités, il faudrait que ces pays affichent de solides performances continues à l'exportation. À l'opposé, pour éviter les surcapacités, les constructeurs de la zone ALENA devraient mettre un terme au recul qu'ils connaissent sur leur marché intérieur ou s'appuyer de plus en plus sur les exportations. Dans la mesure où les constructeurs coréens et japonais exportent une large part de leur production, leur destin est étroitement lié aux marchés mondiaux. Il leur faudra donc, pour conserver un taux élevé d'utilisation des capacités, continuer d'afficher de solides performances à l'exportation. Conserver des taux d'utilisation élevés en Corée et au Japon nécessitera que ces pays continuent de bénéficier de fortes performances à l'exportation.

Classification JEL: E3, H2, L62

Mots clés : crise de l'automobile ; prime à la casse ; ventes de voitures.

TABLE OF CONTENTS

Boxes

Tables

Figures

THE AUTOMOBILE INDUSTRY IN AND BEYOND THE CRISIS

by

David Haugh, Annabelle Mourougane and Olivier Chatal[1]

1. Introduction and summary

The automobile industry is among the sectors that have been hit most by the recession. Demand for cars fell sharply, accentuating the difficulties of excess production capacity already faced before the crisis and deepening the economic downturn in major car-producing countries. Relative to the general downturn, the decline in car sales was nonetheless not deeper than what was observed in the past.

This paper considers the role of the automobile industry in the current cycle. It first examines the role of the industry in the economy, before analysing the relation between the automobile and business cycles. After casting some light on the sources of the collapse in car sales at the start of the crisis, the paper discusses the policy measures, in particular car scrapping programmes, put in place to support the automobile industry. Finally it investigates the short and medium-term prospects for the automobile industry.

The main results are the following:

- The size of the automobile industry relative to overall activity is small, but because of its strong linkages with other parts of the economy, the final impact of a shock in the industry on the broader economy is sizable.

- The automobile and business cycles usually move in line with each other but the amplitude of the cycle is higher in the automobile industry. The volatility of the automobile industry is also higher than that of the manufacturing industries as a whole.

- Evidence for the United States and Canada suggests that the reduction in car sales since mid-2008 has been magnified by the lack of access to credit, leading many households to postpone their car purchases. This implies that continued improvement in financial market conditions could provide an impetus to car sales.

1. This paper was initially prepared as a chapter of the *Economic Outlook* 86, published in November 2009. The authors are grateful to Jorgen Elmeskov, Jean-Luc Schneider, Sven Blondal, Jonathan Coppel and Douglas Sutherland and Thomas Chalaux for helpful comments and discussions. This work also benefited from the help of Country Desks of the Economics Department. Special thanks to Annette Eggiman, Lise Perreault and Penelope Elghadab for excellent editorial support.

- Government support to the automobile industry has been provided in a variety of forms, including subsidies to firms and direct involvement in industry restructuring plans. These measures are likely to impede the structural changes the industry will need to go through in the years to come.

- Many countries have introduced car scrapping schemes to cushion the overall downturn in economic activity, boosting sales in the short term. However, crowding-out effects whereby the demand for new cars dampens the demand for other products are likely to have lowered their final impact on economic activity. As these programmes are temporary and consist mostly in a shift of purchases from the future to the present, the surge in sales is likely to be reversed after the schemes end. Evidence on the timing and the magnitude of this "payback effect" varies but suggests that over the short term, car sales may be temporarily depressed by the termination of scrapping programmes in many countries. At the same time, these schemes do not appear to be cost-effective instruments to reduce greenhouse gas emissions.

- As actual sales are well below trend, a rebound in car sales is likely in North America, Japan and the United Kingdom. In contrast, car sales in Germany have been pushed significantly above trend and may weaken going forward.

- Over the medium term, regions within and outside the OECD are likely to experience diverse trends in car sales. In mature markets, such as Europe and North America, trend sales are likely to remain stagnant. By contrast, rapid increases are foreseen in China, which is already now the second largest market for cars. A rapid increase is also projected in India. Medium-term projections suggest that capacity exceeds trend sales by around 20% in the five largest Western European markets considered as a whole. Without an adjustment in capacity, these countries would need to ensure an ongoing strong export performance. By contrast, in North America, capacity is projected to be around 65% of trend sales. Automakers in the NAFTA area would thus need to halt their decline in domestic market share or to rely increasingly on exports in order to avoid excess capacity. The fortunes of Korean and Japanese auto firms are heavily tied to world markets as they export a large part of their production. Maintaining their high levels of capacity utilisation will require them to keep up their strong export performance.

2. The importance of the automobile industry in the economy

The automobile industry[2] represents a relatively small share of the overall size of OECD economies in terms of value added and employment (Figure 1). But this hides large variation across countries. The automobile industry accounts for almost 4% of total output in the Czech Republic and Germany, while it is almost non-existent in several countries (Figure 2). Over 2% of employed people work in the industry in the large automobile-producing countries. These numbers understate the size of the automobile-related workforce, as a higher number of people are employed in the automobile value chain *e.g.* both downstream, in services such as car financing, insurance and maintenance, and upstream, in steel and transport.

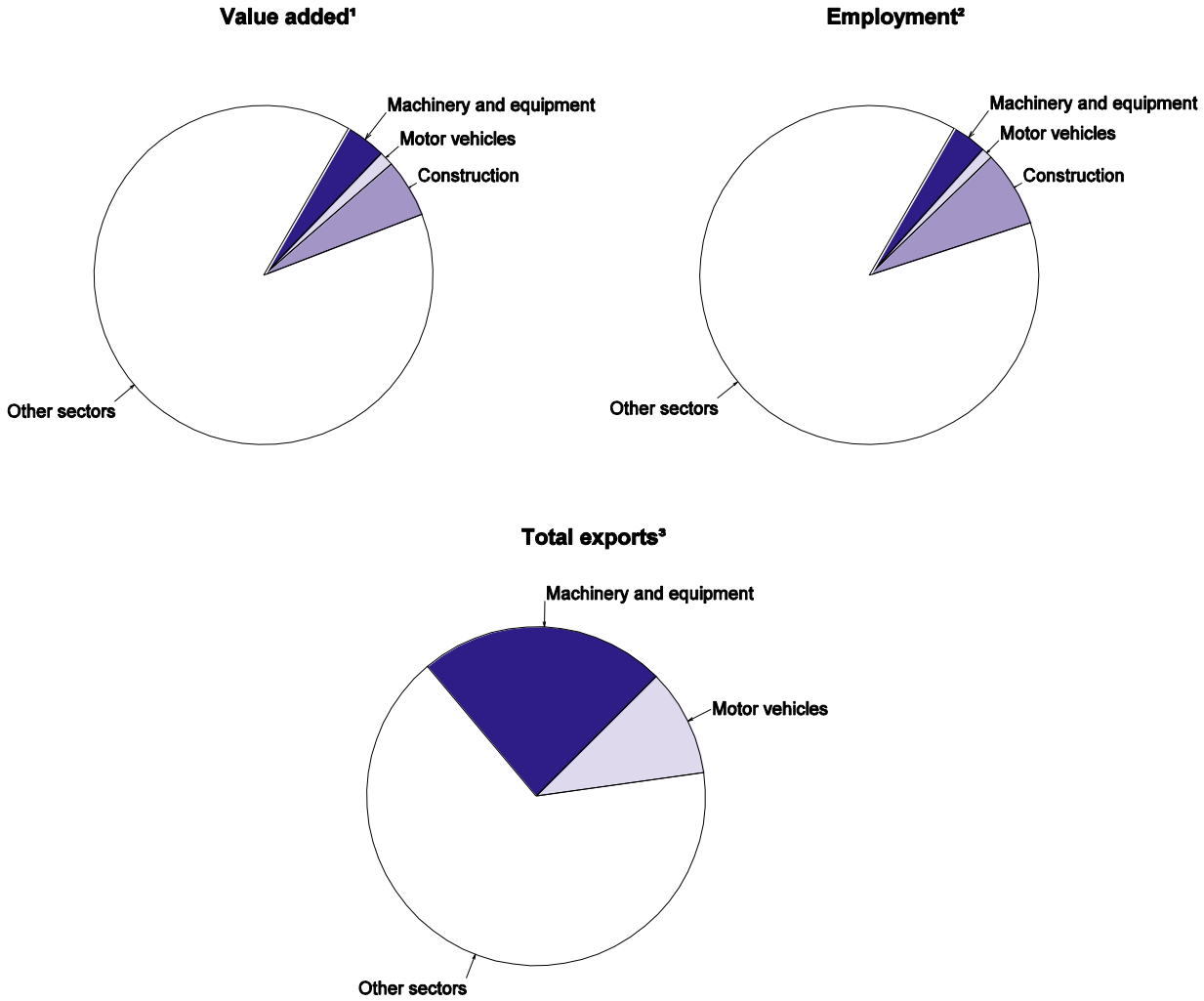
Input-output tables allow the quantification of the size of multiplier effects from the automobile industry to the rest of the economy. These multipliers combine information on both domestic and import inter-sectoral linkages. They are estimated to be close to three in G7 countries, *i.e.* a $1 increase in the

2. For the purposes of this paper the automobile industry includes companies that are involved in production of cars, including their design, testing, manufacturing and sales. In the United States it includes companies producing light vehicles as this series contains vehicles such as SUVs (4x4s) that are defined as cars elsewhere. Definitions vary depending on the series used.

value added delivered by the automobile industry would increase output by $3. This level of multiplier is at or close to the top of what is observed in other industries, and always stronger than the average across industry (which is estimated to be at 2.2). Focusing on domestic linkages would lead to smaller multipliers but, with the exception of the United Kingdom and Canada, the automobile industry would continue to display stronger multipliers than the average across industry.

In many car-producing countries a large share of output is exported. Automobile exports represent more than 20% of manufacturing exports in Japan, the Slovak Republic, Hungary, Canada and Spain, and account for more than or close to 15% of total exports in these countries. The current structure of the industry is the result of a long process of structural change (Box 1), which is likely to have further to go.

Figure 1. Value added, employment, exports by sector in OECD economies, 2006



1. All countries except Australia, Canada, Ireland, Mexico, New Zealand, Turkey.
2. All countries except Australia, Denmark, United Kingdom, Iceland, Luxembourg, Mexico, New Zealand, Poland, Turkey.
3. All countries except Mexico, Slovak Republic and Turkey.

Source: OECD STAN Database; OECD Economic Outlook 86 database.

Box 1. **Some specific features of the automobile industry**

The industry is capital intensive, with a relatively high capital-to-labour ratio, and in many countries a large share of the production is exported.

In recent years, production has been increasingly shifted towards non-OECD regions, in particular Asia. Between 2000 and 2007, the share of the United States and Japan in global production fell from 40 to 30%, while the share of the non-OECD areas increased from producing one car in ten to one car in five (OECD, 2009). The economic crisis may serve to reinforce and accelerate this trend.

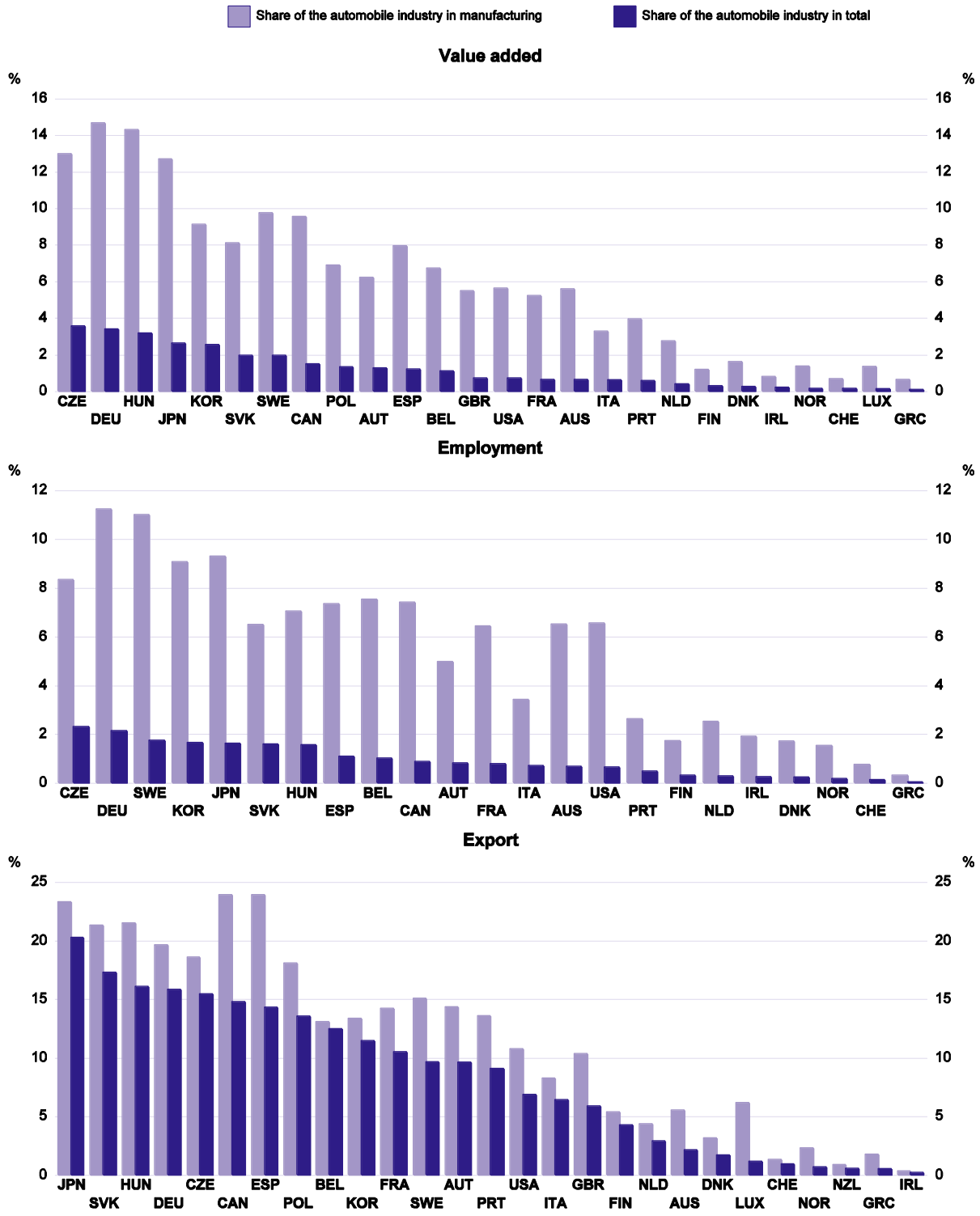
Market saturation in OECD countries, high shipping costs and efforts by automakers to gain market share by locating production where they sell have encouraged these trends. Outsourcing the manufacturing of small automobiles and parts has also been increasing among main car producers. At the same time, the minimum efficient scale of production has increased over time, spurring mergers and acquisitions in order to gain economies of scale.

The resulting economic geography of the industry is complex, with only some segments being fully global (Sturgeon and Van Biesebroeck, 2009). Automakers and part suppliers form buyer-supplier relationships on a global scale. Inter-regional vehicle and parts trade is substantial, but capped by political and operational considerations. Intra-regional trade of finished vehicles and parts is the dominant operational pattern. Domestic production is still very strong in many national markets. Activities such as design or assembly tend to be geographically concentrated in clusters of specialised activity within countries.

The industry has been in a difficult situation for some years, especially the three big American producers that have traditionally been specialised in larger vehicles. The rise in oil prices up to mid-2008 drove material costs higher and also shifted consumer preferences towards smaller vehicles. High debt burdens, huge fixed capital and labour costs, as well as sizable pension and health care commitments to retirees added to their difficulties. Finally, strong vehicle sales in the previous decade, fuelled by discounts, created saturated markets, especially in the United States.

Figure 2. Value added, employment and export share of the automobile industry

2007 or latest available year



Note: The automobile industry covers motor vehicles, trailers and semi-trailers.

Source: OECD STAN Database; OECD Economic Outlook 86 database.

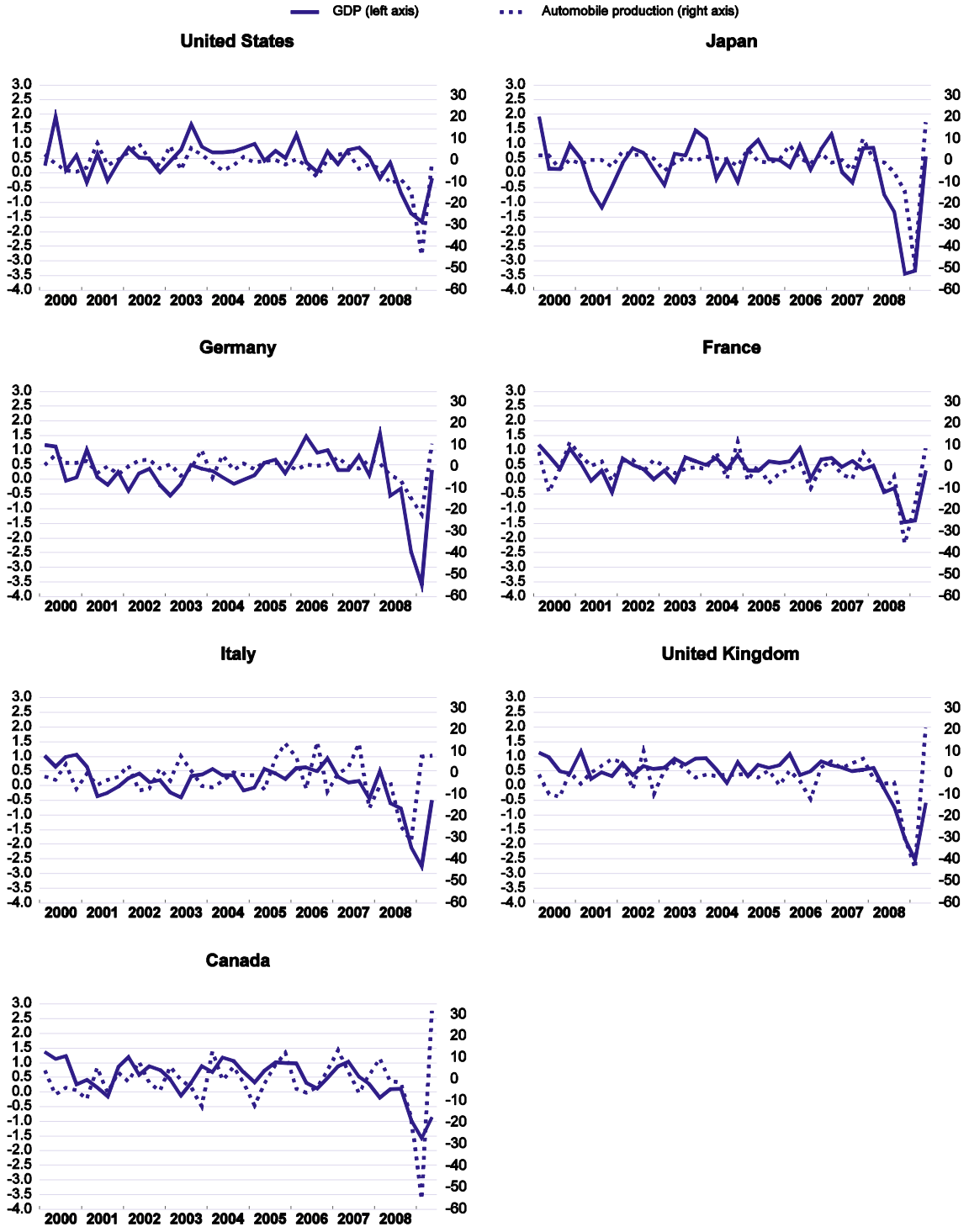
3. How closely related are the automobile and the business cycles?

Economic activity in the automobile industry usually moves in line with the overall business cycle, the relationship being particularly stronger in countries such as the United States, Japan and Germany (Figure 3). The link may even have strengthened in the recent period. That said, the two cycles can become disconnected at times, for instance due to sector-specific developments in the automobile industry.

A high correlation is also found between car sales and private consumption, which in turn accounts for a large part of total output. The relation appears to be particularly robust in the United States, the United Kingdom and Canada and in some smaller OECD countries (Figure 4). The correlation coefficient has increased significantly in the past decade in the United States, Germany and Canada. It was broadly stable in Japan, Italy and the United Kingdom, while it declined markedly in France.

Figure 3. G7 GDP and automobile production growth

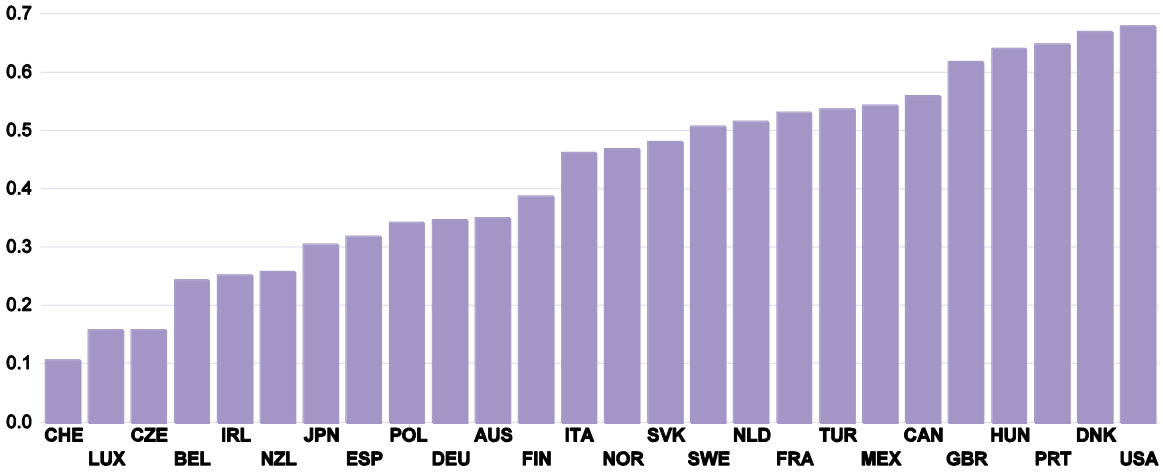
Quarter-on-quarter growth rates



Source: Bundesbank; ISTAT; INSEE; Datastream; OECD Economic Outlook 86 database; OECD, Main Economic Indicators database.

Figure 4. Correlation between private consumption and car sales

Quarter-on-quarter growth rates, 2000-2009



Source: Datastream; OECD Economic Outlook 86 database.

Fluctuations in activity in the automobile industry display a stronger amplitude than the economy-wide and the manufacturing business cycle. The variance of automobile production growth is also larger than the one of business investment growth (Table 1). As in the wider economy, the fluctuations appear to have declined since the 1990s in the automobile industry. This is due, to a large extent, to improved inventory management techniques and more stable automobile sales (Ramey and Vine, 2005).

Table 1. Automobile production is more volatile than GDP and investment

Standard deviation of quarter-on-quarter growth rates

	1960-1980			1980-1990			1990-2000			2000-2007		
	Automobile production	GDP	Invest-ment	Automobile production	GDP	Invest-ment	Automobile production	GDP	Invest-ment	Automobile production	GDP	Invest-ment
United States	10.6	1.0	2.3	10.1	1.0	2.5	6.7	0.5	1.8	3.9	0.5	1.9
Japan	7.7	1.4	4.0	3.1	1.0	2.6	3.5	0.9	3.1	3.2	0.7	2.9
Germany	-	-	-	-	-		3.9	0.7	2.1	2.8	0.5	2.0
France	-	1.3	2.9	5.3	0.5	1.7	5.5	0.5	1.6	4.2	0.4	1.4
United Kingdom	16.7	1.3	3.3	8.3	0.9	4.2	5.4	0.6	2.8	5.4	0.3	10.4
Canada	12.6	0.9	2.7	15.0	1.0	3.2	12.0	0.7	3.2	6.8	0.4	1.9

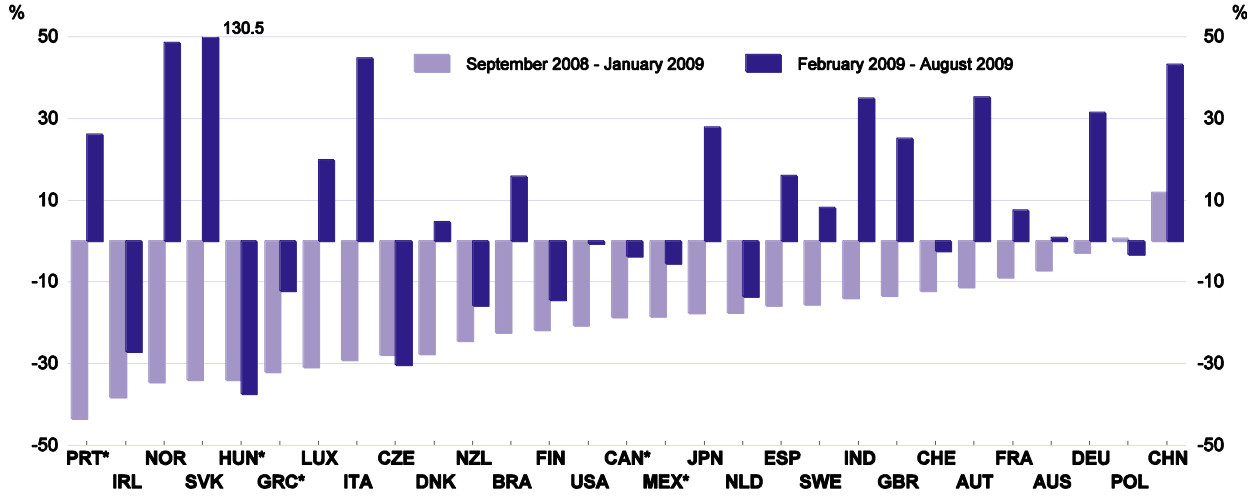
Source : Bundesbank; INSEE; Datastream; OECD Economic Outlook 86 and Main Economic Indicators.

4. The automobile industry has been severely affected by the economic downturn

The downturn in the automobile industry in late 2008 was deep and highly synchronised. Car sales declined markedly in almost all OECD countries (Figure 5), with an average fall of more than 20% from September 2008 to January 2009 (see Annex 1 for more details on data sources). In Europe, not all market segments have been affected in the same way, with sales of small cars falling less than those of other vehicles, thus continuing the trend increase in the share of small cars (Figure 6). At the same time, automobile export volumes plunged steeply at the end of 2008 and into early 2009.

Figure 5. Car sales growth

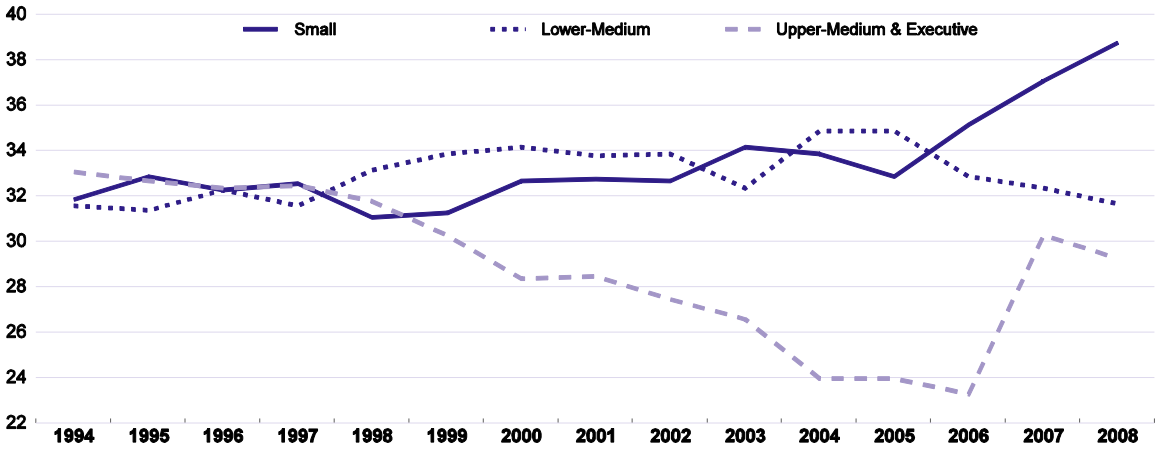
Seasonally adjusted data



Note: Latest available data were used for the period March 2009 - August 2009 for the countries with a star.
Source: Datastream.

Figure 6. New passenger car registrations in Western Europe by type

Share in total



Note: Western Europe includes: EU-15 countries and EFTA countries (Iceland, Norway and Switzerland).

Source: Association Auxiliaire de l'Automobile (AAA).

Automakers have adjusted their production and almost all the vehicle- producing countries experienced sharp drops in production growth in 2008 (Table 2). Falls were particularly dramatic in France, Spain and Italy. In the United States, the fall in durables consumption and business investment in automobiles contributed 20-30% of the decline in total output in the second half of 2008.

Table 2: Passenger vehicle production levels and growth in countries producing one million or more units in 2008

	2007	2008	2007-08	December 2008 to May 2009[1]
	Levels (thousands)		Growth (per cent)	
United States[2]	10 546	8 503	-19.4	-33.4
Japan	9 945	9 916	-0.3	-17.8
Germany	5 709	5 527	-3.2	8.7
France	2 551	2 146	-15.9	2.9
Italy	911	659	-23.4	
United Kingdom	1 535	1 447	-5.7	-8.1
Canada	1 565	1 633	4.3	-13.9
Spain	2 196	1 943	-11.5	
Korea	3 723	3 450	-7.3	1.0
Mexico	1 209	1 241	2.7	
Turkey	635	622	-2.1	
Brazil	2 391	2 561	7.1	
China	6 381	6 738	5.6	
India	1 713	1 830	6.8	
Russia	1 289	1 469	14.0	

1 Monthly and annual data for France, Germany and the United States come from different databases.
2. Light vehicles
Source: International Organization of Motor Vehicle Manufacturers, INSEE, Bundesbank, Main Economic Indicators, WardsAuto.Com, Price Waterhouse Coopers Automotive Institute.

The reduction in car sales appears to have been more pronounced than predicted by fundamentals, such as income growth and real oil prices. This suggests that other factors may have played a role. A simple model of car sales growth has been used to explain the fall in car sales in the last quarter of 2008. For each G7 country the equation is specified as an error-correction model. In the long-term, sales depend on GDP *per capita* (*gdppc*), real oil price (*roil*) and financial market conditions (*fci*):

$$\log(sale) = c_0 + c_1 \log(gdppc) + c_2 \log(roil) + c_3 fci$$

Over the short-term, sales growth is driven by growth of *gdp per capita*, real oil prices and financial market conditions as well as the gradual level adjustment of sales to their long-term trend. The equation is estimated by a two-step procedure for each individual country (Table 3). Data for sales are passenger car sales and are taken from Datastream. Real oil price is the price of Brent oil deflated by core consumer prices and financial market conditions are captured by the financial condition index developed in Guichard *et al.* (2009). Given the lack of data for some individual countries, the euro financial condition index (FCI) has been used for all three European countries and the US FCI has been used for Canada.

Table 3: Error-correction models for car sales growth

Δsales	United States 1996Q1-08Q4		Japan 1996Q1-08Q4		Germany 2000Q3-08Q4		France 1999Q4-08Q4		Italy 1999Q4-08Q4		United Kingdom 1996Q4-08Q4		Canada 1996Q1-08Q4	
	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic
Long run														
gdppc	0.96	4.74					0.74	2.64	2.51	6.44	1.36	7.68	1.36	9.74
gdppc-usa_gdppc			1.20	5.08	0.62	2.20								
roil	-0.16	-5.14					-0.05	-1.61	-0.13	-3.78	-0.19	-6.04	-0.07	-3.16
FCI	0.02	2.98	0.01	1.70							0.01	1.88		
Dynamics														
Δsales(-1)	-0.22	-1.66									0.30	1.83	0.18	1.16
Δsales(-2)	0.16	1.03					0.16	1.73					0.30	1.96
Δsales(-3)	0.28	2.00	0.23	1.71									0.48	3.13
mov2Δsales(-1)							0.23	1.04						
Δgdppc											4.69	3.03		
Δgdppc(-1)											-0.96	-0.43		
Δgdppc(-2)											-3.07	-1.60		
Δgdppc-Δusa_gdppc			2.49	3.52										
ΔFCI	0.04	5.22							0.03	1.98			0.03	3.52
ΔFCI(-1)											0.02	1.81		
mov6(ΔFCI)					0.05	2.59								
Δroil														
Δroil(-1)														
Δroil(-2)									0.13	2.14				
ECM coeff.	-0.23	-2.38	-0.19	-1.88	-0.33	-2.33	-0.47	-4.06	-0.36	-2.43	-0.21	-1.65	-0.47	-3.60
S.E.	0.04		0.05		0.03		0.03		0.05		0.04		0.04	
R2 ADJUSTED	0.57		0.23		0.61		0.41		0.33		0.25		0.35	
CHOW 1Y FCST[1]	0.00		0.03		0.38		0.09		0.50		0.32		0.00	
HETEROSKED.	0.46		0.12		0.74		0.05		0.92		0.05		0.84	
SERIAL COR(1)	0.92		0.87		0.00		0.15		0.80		0.86		0.83	
SERIAL COR(4)	0.15		0.87		0.01		0.15		0.78		0.92		0.86	
NORMALITY	0.92		0.07		0.75		0.88		0.91		0.95		0.00	

Note: Constants and dummies have not been reported. Chow is the forecast one-year test. Heterosked. is the Breuch Pagan test, serial cor. 1 or 4 is Breusch-Godfrey Serial Correlation LM test and Normality is the Jarque-Bera test. Mov2 and mov6 are moving average of order 2 or 6. Coeff. means coefficient.

1. 2007 Q4.

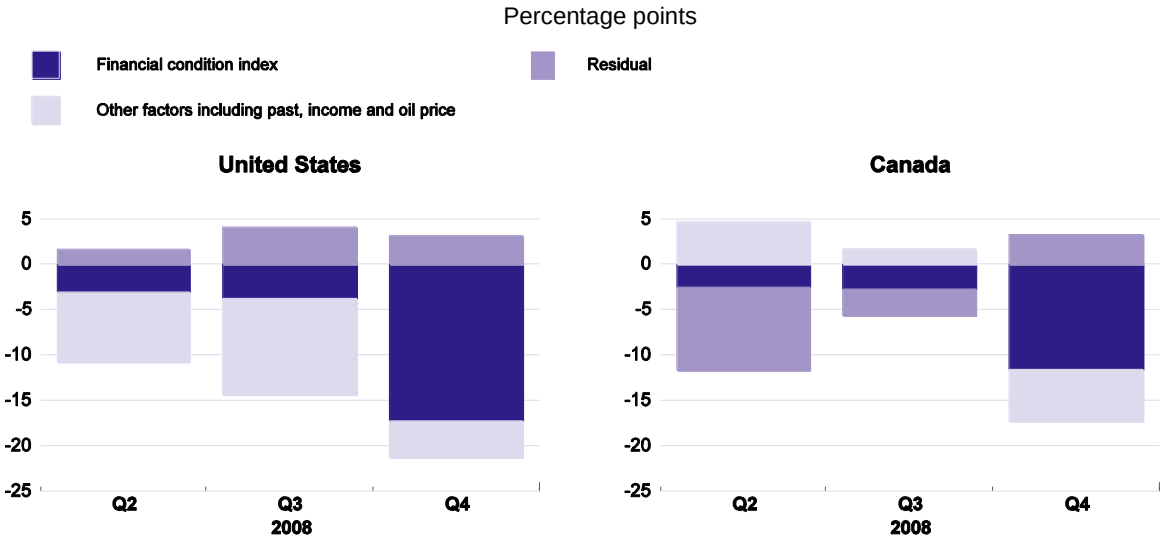
Source : OECD.

A significant effect of financial conditions was found in all G7 countries, except France. The introduction of the unemployment rate in the analysis or the use of a credit-constraint variable in place of the FCI indicator would not modify this result. In the United Kingdom and Japan, tight financial conditions are estimated to influence sales only with a lag. This historical pattern would suggest that the financial aspects of the crisis affected the automobile industry only in the first quarter of 2009, but it is likely that adjustment speeds were faster in the current crisis.

Estimations indicate that tight credit conditions could explain more than 80% of the collapse in car sales at the end of 2008 in the United States and in Canada (Figure 7). Indeed, the high cost of credit and the inability to obtain auto loans on affordable terms prompted buyers to postpone purchases they might have otherwise made. In addition, the growing average longevity of motor vehicles that has been observed in recent years may have favoured this behaviour.

Other factors not captured in the preceding analysis may also have contributed to the fall in car sales. The increase in vehicle registration fees, environmentally motivated in Europe and driven by the need for state governments to balance their budgets in the United States, added to vehicle operating costs. Finally, heightened uncertainty surrounding future economic developments may have encouraged consumers to postpone their car purchases.

Figure 7. Contributions of income and financial market conditions to car sales growth



Note: Contributions have been derived from an error correction model for car sales growth. In the long term car sales depend on income per capita, real oil price and financial market conditions (FCI). The FCI contributions include both the short and the long run impacts.

Source: Datastream; OECD Economic Outlook 86 database.

5. Governments have encouraged car purchases

Because the car industry influences broader economic performance and its employment is geographically concentrated, the response to the crisis has included actions aimed at boosting car sales and measures to directly support the industry. Governments have introduced new, mostly temporary measures, including subsidised credit facilities and bonuses for replacing old cars by new cars as well as loans, loan guarantees or subsidies to firms in difficulty.[3] In return, governments have sometimes required the production of more energy-efficient cars. These measures often complemented or substituted for support measures already in place.

"Cash-for-clunkers" programmes whereby governments subsidise the purchase of a new vehicle to replace old energy-inefficient vehicles have been widely used. The main objective of these programmes is to shift household expenditure from the future to the present. [4] The conditionality and the generosity of the

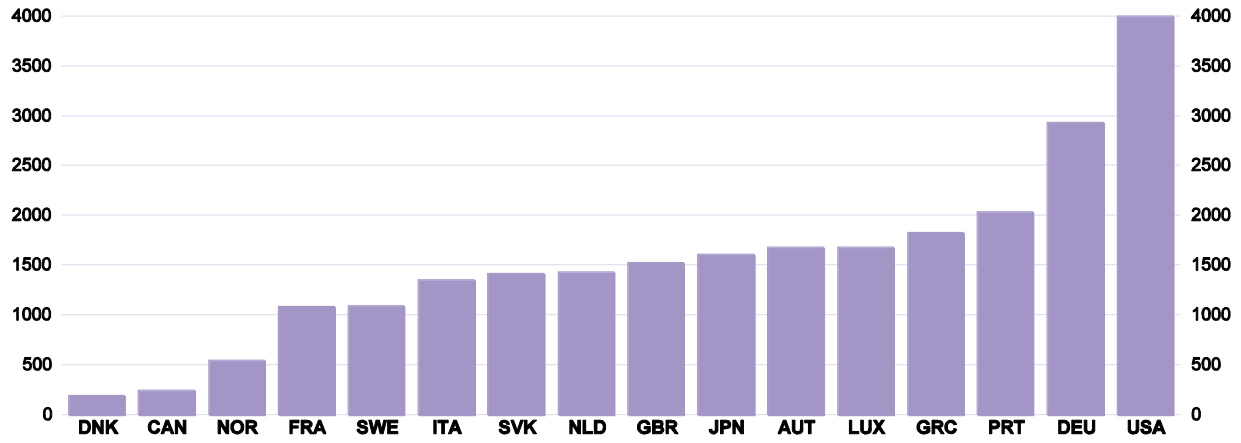
3 . Government interventions can be motivated by a range of factors. As the industry is highly concentrated, intervention is believed to be feasible and manageable. Large and regionally concentrated employment makes the industry politically sensitive. Strong interconnections between the automobile industry and other industries imply that spillover effects are high. Stimulating vehicle demand is seen as an effective way to strengthen aggregate demand by moving purchases forward and potentially has environmental side-benefits. Finally, bailing out automakers can help solve credit problems when automakers have financing companies.

4 . Another objective often put forward is to reduce greenhouse gas emissions. However, these programmes are an expensive way to achieve this goal (Knittel, 2009).

scrapping programmes vary widely across countries (Annex 2). In most OECD economies, the programmes are temporary and set to expire by the end of this year or next year. In Germany and the United States, the total amount of resources allocated to the programme was spent long before the official termination date. In general, subsidies differ according to the type of vehicle, its age or its level of emissions. Subsidies range on average between $1500-2500, but were particularly generous in the United States and Germany (Figure 8). The *ex ante* fiscal costs of these measures are fairly limited, reaching a maximum of 0.2% of GDP in the case of Germany.

Figure 8. Average scrapping subsidy levels in OECD countries

In $, PPPs



Note: Only the federal subsidy is reported for Canada.

Source: OECD calculations based on national sources.

The short-term economic impacts of these measures are difficult to assess, given the lack of information on what would have happened in their absence. A surge in sales was observed in the United States in mid 2009, leading to a sharp decline in inventories. Motor vehicle car sales dropped back to their pre-incentive level in September after the incentive ended. Likewise, new car registrations went up sharply in Europe since the beginning of 2009. Substantial increases were recorded in Germany, Austria, Italy, Portugal, the Slovak Republic and the United Kingdom. There is some evidence that car and parts manufacturing in Poland, which did not introduce any scrapping scheme, benefited from the German programme. Similar spillover effects were also reported in the Slovak Republic, France and Italy that all export small and less expensive cars to Germany. The high import share of car demand and the fact that the German scheme was designed to avoid discrimination against foreign firms explain these spillover effects.

At the macroeconomic level, the car purchase incentive measures appear to have had some success in cushioning the downturn in the short term. Motor vehicle output added 1.7 percentage points to the third-quarter change in real GDP in the United States. The Clash-for-Clunkers ("CARS") programme is officially expected to have boosted the level of GDP for a period and then to be followed by a drop that slightly more than reverses the initial increase. The programme is estimated to have raised GDP growth by 0.1-0.4 percentage points at an annual rate in the third quarter of 2009 (Council of Economic Advisers, 2009).[5] It is also officially estimated to save between 22 and 59 thousand jobs in 2009. In the euro area, the

5 . Other estimates are more optimistic. For instance, Goldman and Sachs estimate that CARS added 0.8 percentage point to GDP growth at an annual rate in the third quarter of 2009, with no effect on growth

impact of the scheme on real GDP growth in the first half of 2009 is estimated to have been positive but relatively small (ECB, 2009). Indeed, crowding-out effects, whereby the purchase of new cars reduces demand for other products through income and relative price effects, is likely to have lowered the final effect of the car purchase incentive schemes on GDP.

As most of the schemes have already expired at the end of 2009, the GDP impact expected for this year will depend on the size of the "payback effect", i.e. to what extent programmes pulled forward sales which will then not occur in the near future. Past experience suggest that the size and the timing of this payback effects is variable (Figure 8). In most episodes, sales appear to have been depressed after the termination of car scrapping schemes. More precisely, evidence from similar measures introduced in the past suggests that:

- Scrapping programmes can markedly boost sales in the short-term (Council of Economic Advisers, 2009).

- There is no clear evidence on the timing and the magnitude of a "payback effect" when the scheme is terminated. The period which followed the Employee Pricing Summer in the United States in 2005 saw a sizable payback effect. By contrast, there was no payback effect after the post-September 2001 incentives, but this may reflect the relatively small size of the scheme which lasted only one month. France, Spain and Italy saw a decline in sales immediately after the end of the scrapping programmes they introduced in the 1990s. However, data are not conclusive about the size and the timing of a "payback effect" beyond a few months after the ending of the schemes.

- Scrapping schemes may have medium-term structural effects, e.g. changing consumer preferences in terms of vehicle choices. Evidence for Spain suggests for instance that programmes implemented in the 1990s accelerated the development of diesel-driven cars (Miravete and Moral, 2009). However, such effects would have not been visible, had the diesel technology not been widespread. These structural changes will take several years to materialise.

Support has also taken the form of direct government loans and subsidies to firms[6] and interference in industry restructuring. Examples include the involvement of the US government in the restructuring of General Motors (GM) and those of the German government, while GM was proposing to sell Opel, in the choice of buyers for GM's Opel subsidiary and in financing the sale. The latter intervention raised concerns that plans concerning factory closures across countries were not entirely based on business considerations.

More generally, the long-term economic effects of support to the automobile industry differ depending on the type of intervention. Temporary support to demand is likely to be the least distortive. However, sometimes such support can distort competition by favouring incumbent firms. As regards more direct support, some measures have sought to step up applied research and may foster innovation and production.[7] But support to producers in distress could impede needed industry restructuring and renewal.

---

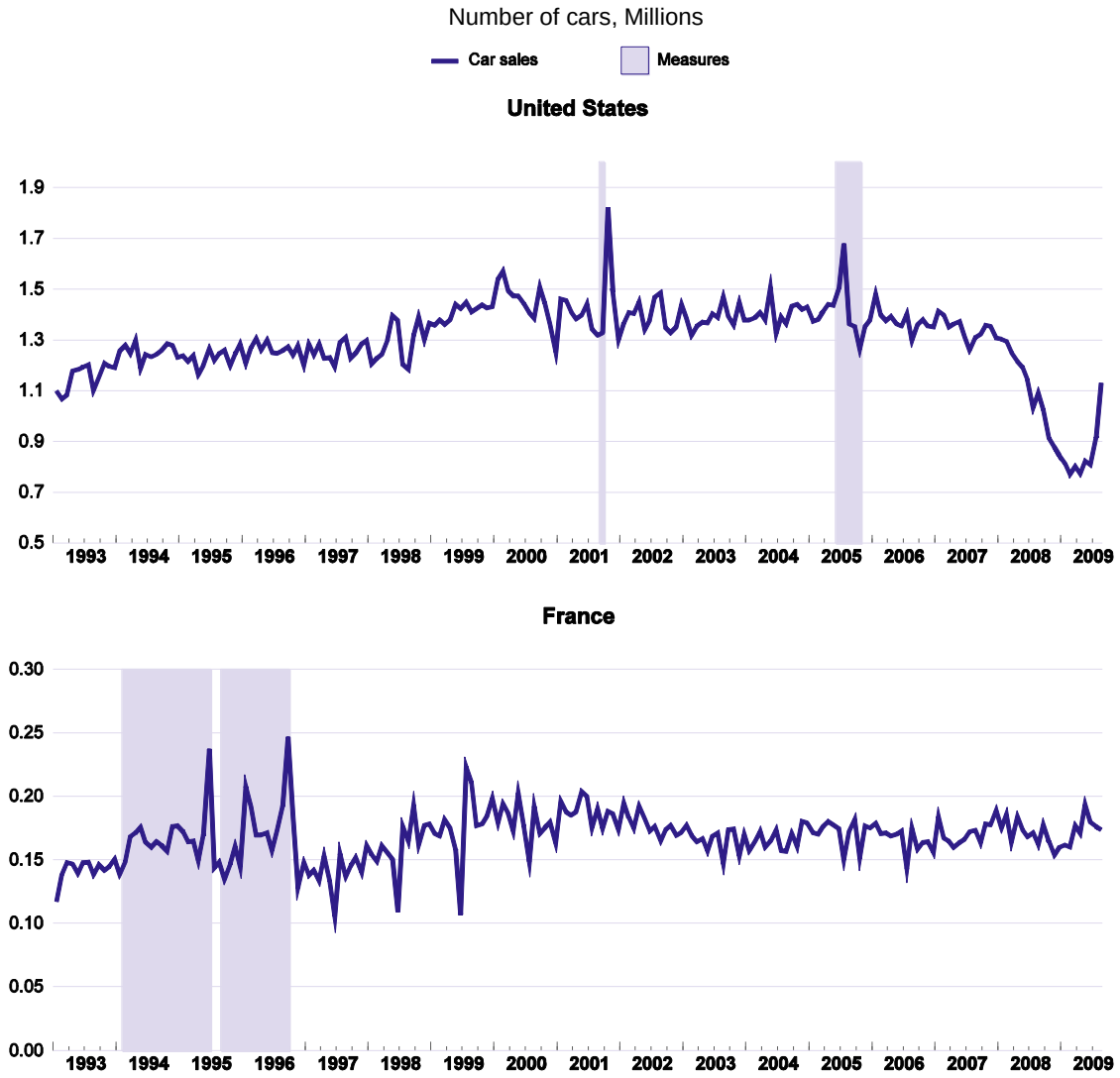
in the fourth quarter. Other studies point to more negative effects. Abramo and Parsons (2009) estimate the cost of the programme would amount to $2 000 per vehicle. Assuming 700 000 vehicles would benefit from the programme, this would lead to a total loss of $1.4 billion.

6 . For example, the Canadian and Ontarian governments provided the Canadian arms of General Motors and Chrysler with a combined $4 billion in loans.

7 . The industry is classified as a medium high-tech manufacturing sector. In some countries, however, the industry invests substantially in R&D and employs a large number of R&D personnel. The share of highly

Moreover, measures perceived as protectionist could trigger retaliation from other countries, damaging both short and long term growth prospects. Finally, the profitability of the industry may suffer not just because excess capacity is left in place but also because demand is shifted towards low-margin segments, as many schemes mainly favour small and cheap cars.

Figure 9: Car sales and past scrapping programmes



Source: Datastream.

6. Prospects for the short and medium term differ across regions

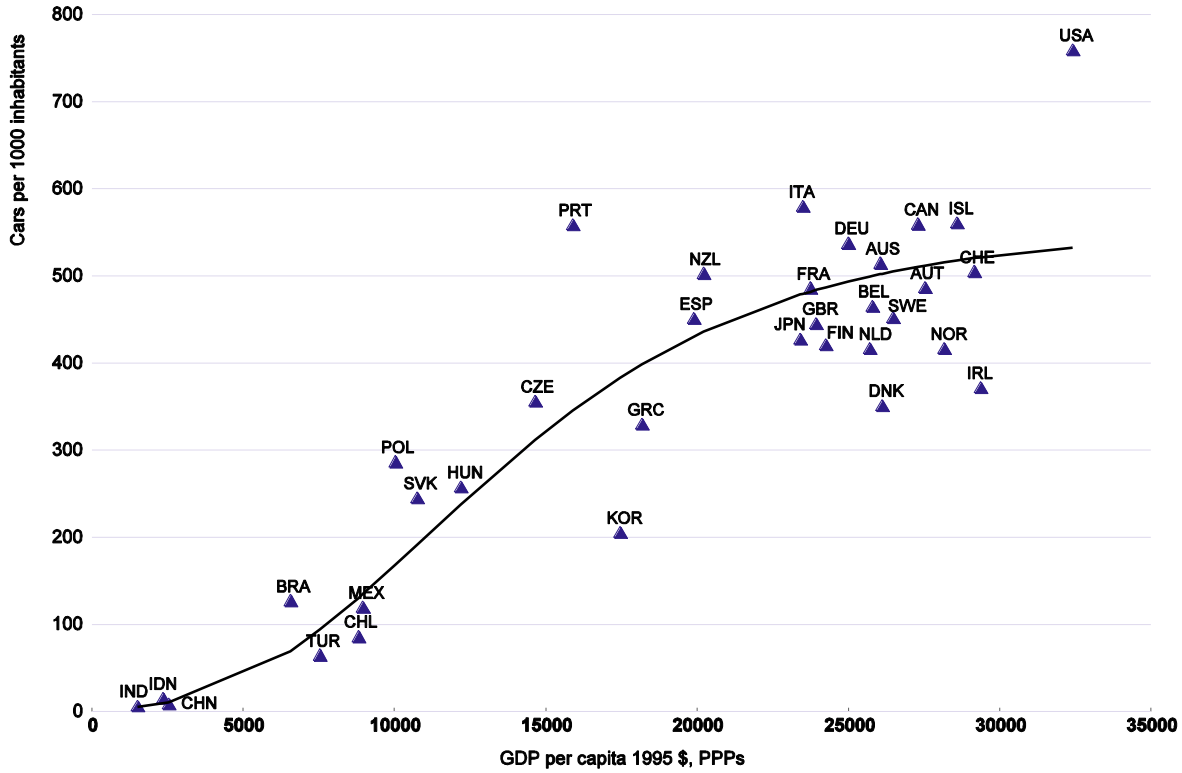
Historical patterns both across countries and time suggest that automobile ownership tends to rise with GDP *per capita* but in a non-linear way. At first, ownership rises slowly with income, then rapidly at middle-income levels, before slowing at higher income levels as saturation levels are reached (Figure 10). Using this relationship combined with data on population, income projections and scrapping rates allows

skilled staff in the industry is particularly large in Spain, Germany, the United Kingdom and France (OECD, 2009).

the estimation of a medium-term trend for automobile sales. This trend can then be compared with current sales to shed light on future demand developments and with production capacity to indicate where the greatest challenges for the industry may lie.

Figure 10. Car ownership and GDP per capita

Number of cars per 1000 population



Source: Denatran Brazil;United Nations; OECD calculations.

Framework

In our framework, trend car sales in country *i* at time *t* is given by:

$$sales_{it} = \Delta stock_{it} + scrappage_{it}$$

where $\Delta stock_{it}$ is the trend change in the stock of cars between period *t* and *t-1* and $scrappage_{it}$ is the trend number of cars scrapped and replaced in each period. Scrappage is in turn a function of the average historical scrappage rate multiplied by the previous year's car stock:

$scrappage_{it} = asr_i * stock_{it-1}$ where the historical average scrap rate , asr_i , is determined by

$$asr_i = \sum_{t=1}^{T} \frac{sales_{it} - \Delta stock_{it}}{stock_{it-1}}$$

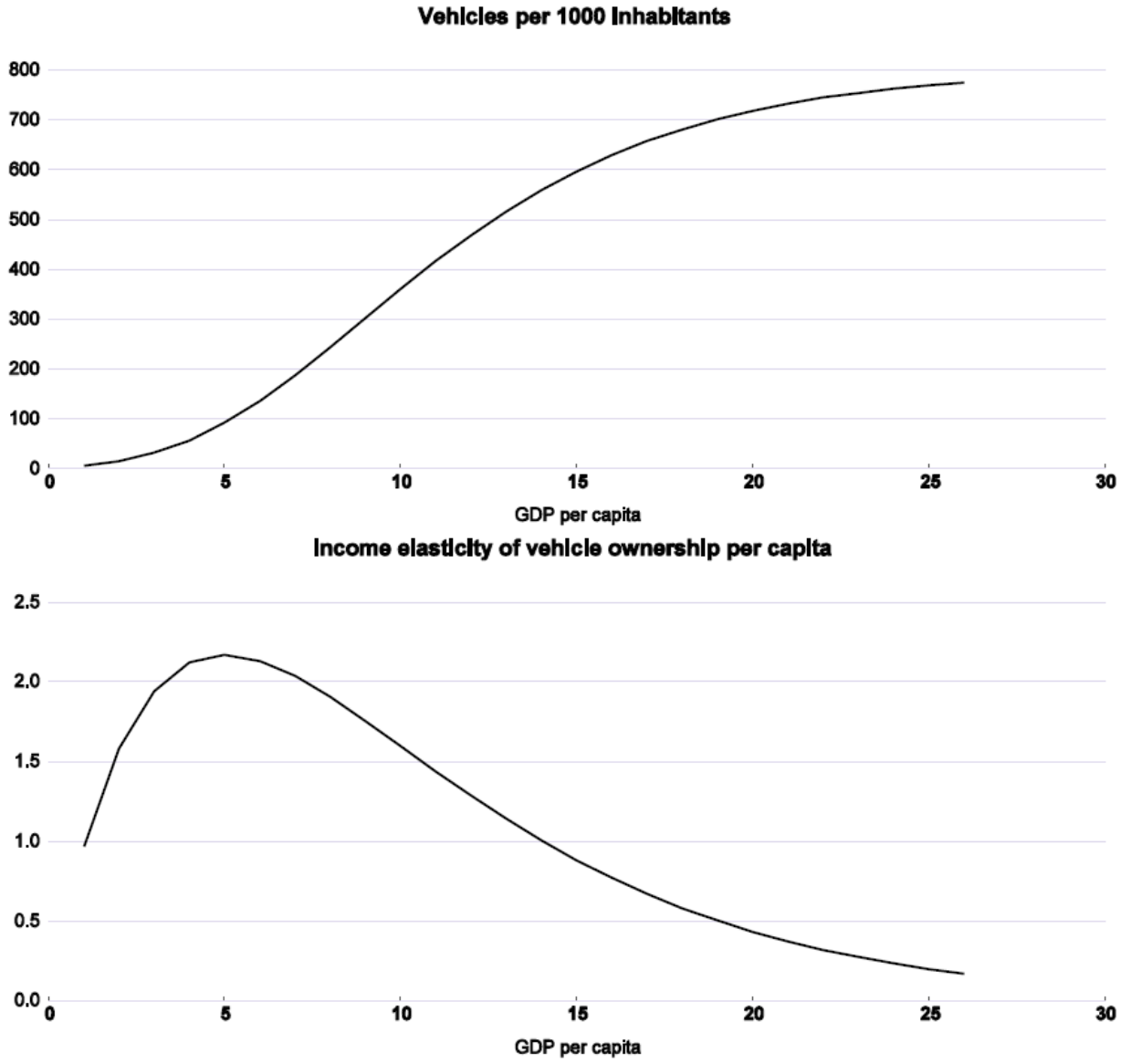
The estimated stock of cars depends on passenger cars *per capita* multiplied by the total population:

$$stock_{it} = pc_{it} * pop_{it}$$

To obtain pc_{it}, first the long-run equilibrium stock of vehicles *per capita* (per 1 000 inhabitants) is obtained:

$vlr_{it} = \gamma_i e^{\alpha e^{\beta_i GDP_t}}$ where vlr_{it} a non-linear function of the level of per capita income (Dargay *et al.*, 2007). In particular, γ_i is the saturation level of vehicles per capita, α and β_i define the shape of the function, and *GDP* is real GDP *per capita* measured at purchasing power parity (Figure 11). Dargay *et al.* (2007) econometrically estimate these parameters using annual data over the period 1960-2002. Their estimates for γ_i and α are used in this simulation exercise.

Figure 11. Vehicles ownership and income per capita



Source: OECD calculations.
Note: GDP per capita, is expressed in 1995 $ (thousands), PPPs.

Short-term trend vehicle ownership *per capita* is then assumed to gradually adjust towards this long-term equilibrium level (which itself is evolving) over time:

$v_{it} = v_{it-1} + \theta(vlr_{it} - v_{it-1})$ where θ is the speed of adjustment and $0 < \theta < 1$. For sake of simplicity, the same parameter was assumed for all the countries. Robustness tests subsequently assess the sensitivity of the results to this assumption (see below).

Estimates for β_i from Dargay et al. (2007) are used as starting points and then these parameters are calibrated so that the sum of trend sales between 1996 and 2007 is within +/- 2.5% of the sum of actual sales over this period. The implicit assumption is that over a longer period of time, the trend should capture actual sales.

Vehicles are composed of both cars and other vehicles. Passenger cars *per capita* are therefore generally obtained by: $pc_{it} = pcr_i * v_{it}$ where *pcr* is the historical average of the passenger car to total vehicle ratio. In almost all higher-income OECD countries, this proportion is highly stable, varying by less than 1% from year to year. In developing countries, the ratio of cars to total vehicles tends to rise over time. In these cases, the historical rate of increase is used until a threshold of 85% is reached which is the average for higher-income OECD countries.

The analysis is conducted for the period 1995 to 2020 with projections for GDP growth and population based on OECD and United Nations projections, respectively. Actual sales for 2009 are projected by assuming monthly sales will continue for the rest of the year at the average rate observed for the first six to nine (depending on data availability) months of the year.

Short-term prospects

Future trends in car sales are likely to vary considerably across the G7 countries, other advanced countries, China, India and Mexico (Figure 12). In high-income countries, car ownership per capita is likely to be relatively close to saturation and therefore future developments are likely to be driven by a slow increase in vehicles *per capita*. In Japan, trend car sales may stagnate as a slight increase in car ownership *per capita* is more than offset by a declining population. In Germany and Italy, as well, trend car sales are expected to be broadly flat. In France, the United Kingdom and the United States, trend sales are expected to continue to increase due to population increases as well as some increase in car ownership *per capita*, though the latter effect is less important in the United States, where the density is already high.

In contrast with the G7 countries, car ownership levels in China are very low and incomes have now risen to a level where the income elasticity of vehicle ownership *per capita* is typically high (around 2 compared with around 0.4 in Japan and Western Europe). The combination of low car ownership *per capita*, a high income elasticity, and rapidly rising income levels means that trend car sales in China are increasing extremely rapidly and are likely to do so for the foreseeable future. Trend sales increased from around 4 million *per annum* in 2005 to around 9 million in 2009. Actual sales are also rising rapidly in line with the trend, increasing from approximately 4 million in 2005 to around 7 million in 2008. China will likely overtake the United States in the coming years to become the largest car market in the world. Starting from a lower level than in China, trend sales are also increasing at a fast rate in India.

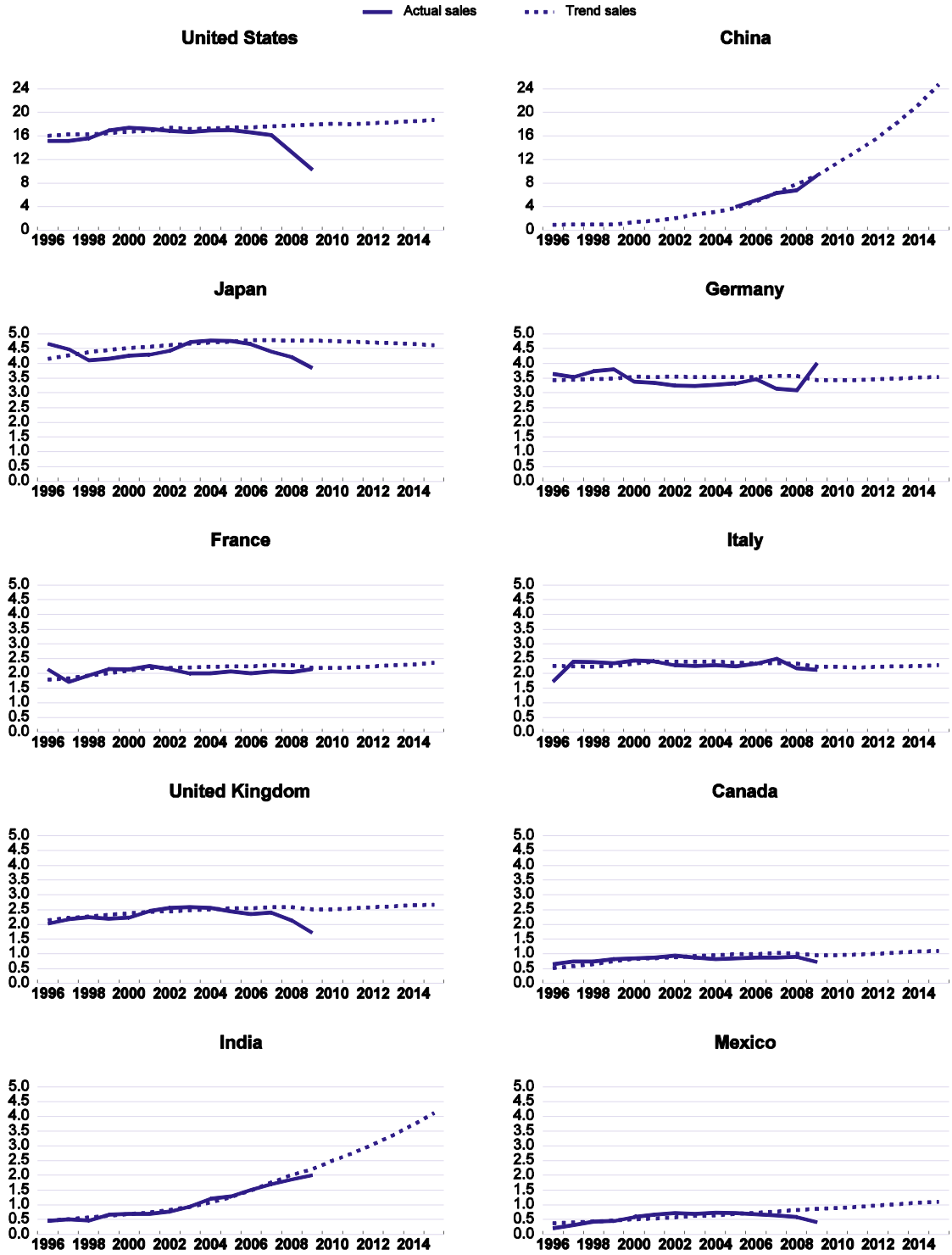
Comparing recent car sales with trend sales may provide an indication of car sales developments over the near term beyond the next few months. In Germany, the car scrapping scheme appears to have pushed car sales far above their long-term trend, suggesting that near-term car sale prospects are likely to be particularly weak. In Australia, France, Italy and Korea sales appear to be close to their trend level. In contrast, in Canada, Japan, Mexico, Spain, the United Kingdom and the United States, car sales have

clearly fallen below their trend level, suggesting some scope for a cyclical rebound. This is particularly the case in the United States where actual car sales in 2009 are set to be around 60% of trend levels.

As a cross-check on these calculations, equations for car sales in G7 countries described in section 4 have been used to make short-term projections on a mechanical basis. More specifically, these projections are based on economic activity developments and assumptions concerning financial conditions consistent with those of the Economic Outlook 86. The results suggest that higher activity and improved financial conditions could boost car sales by 1.9 million units in the United States, around 0.3 to 0.4 million in Japan and the United Kingdom, and 0.2 million in the three largest euro area countries from mid-2009 to 2011 (Figure 13). Estimates using alternative specifications using credit constraints rather than the aggregate financial condition index would not modify these patterns. The main difference would be for the United States where car sales would increase much more markedly, by 3.4 million units from mid 2009 to 2011. This gives some insights on the uncertainties surrounding these calculations. One notable caveat is nonetheless that the calculations do not incorporate the likely payback effect from car scrapping schemes.

Figure 12. Actual and trend car sales 1995 - 2015

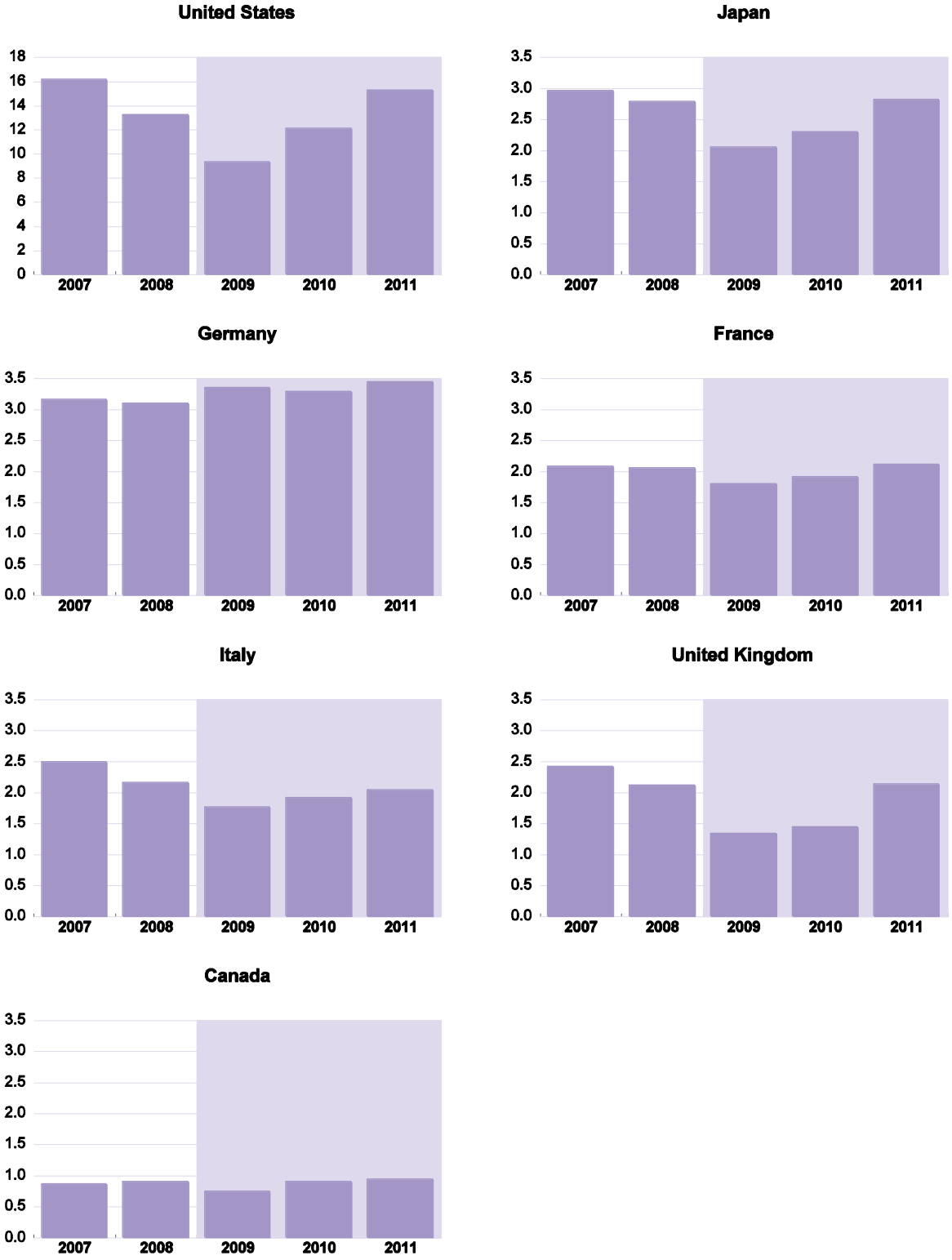
Number of cars, Millions



Source: OECD calculations; Datastream; China Association of Automobile Manufacturers.

Figure 13. Effect of a rebound in activity and financial conditions on car sales prospects for 2010 and 2011

Number of cars, Millions



Source: Datastream; OECD Economic Outlook 86 database.

Medium-term prospects

In the medium term, car manufacturers will face different demand conditions around the world. Comparing trend sales with capacity[8] provides some perspective on the forces producers in various countries may be facing. Nonetheless, whether manufacturers have excess capacity in a given country or area depends critically on their ability to compete for market share in their home market and in export markets (Table 2.4).

Table 4: Capacity and sales in the automobile industry

Thousands

	Production capacity[1]		Trend market sales[2]		Capacity as a % Trend Sales Level	
	2009	2015	2009	2015	2009	2015
Korea[3]	4 100	4 135	1 147	1 333	357	310
Japan	10 521	10 399	4 770	4 616	221	225
Germany	6 295	6 682	3 436	3 533	183	189
Mexico	1 363	1 838	855	1 111	159	165
Spain	2 435	2 419	1 501	1 543	162	157
Canada	1 297	1 284	956	1 102	136	117
France	2 922	2 859	2 190	2 354	133	121
Belgium	777	687	500	518	155	132
Turkey	825	887	702	1 446	118	61
Sweden	247	323	339	398	73	81
Austria	257	167	424	449	61	37
Australia	339	366	923	974	37	38
United Kingdom	1 445	1 698	2 519	2 675	57	63
Italy	1 021	907	2 223	2 277	46	40
China	11 507	13 755	9 329	24 673	123	56
India	2 938	4 492	2 207	4 116	133	109
United States[4]	9 696	10 875	17 875	18 697	54	58
W Europe Big 5[5]	14 119	14 566	11 868	12 382	119	118
NAFTA[6]	12 356	13 996	19 686	20 910	63	67
Total of above countries	57 986	63 773	51 895	71 816	112	89

Note: Data refer to the sales and production of cars unless otherwise noted.

1. Capacity of domestically based producers (both nationally and foreign-owned).
   To ensure consistency between car sales and capacity data, an estimate of commercial vehicle production capacity has been removed from PWC data when necessary.
2. All sales in that country's market including those produced domestically (by nationally and foreign-owned firms) and imports.
3. Excludes sales of imports.
4. Light vehicles (both sales and capacity) as it includes vehicles such as SUVs (4x4s) defined as cars elsewhere.
5. Germany, France, Italy, Spain and United Kingdom.
6. Canada, Mexico and the United States.

Source : Datastream, OECD, Price Waterhouse Coopers Automotive Institute (PWC).

8. The capacity data are sourced from the Price Waterhouse Coopers (PWC) Automotive Institute. These data measure light vehicle production capacity. For countries where they include light commercial vehicle production, they have been adjusted downwards in order to derive capacity data which are as comparable as possible with the car sales data for each country. The adjustment is based on the assumption that the ratio of commercial vehicles to car production capacity is in line with the actual production ratio. In the projection period, if sales follow the trends presented here, capacity developments may turn out to be different. In particular, for China if the actual sales increase in line with the trend presented in this chapter, it is likely that the increase in production capacity would be larger than the adjusted PWC data suggest.

Industry analysts have argued that also beyond the effects of the crisis, excess capacity exists in various countries particularly in North America and Western Europe. At a global level[9], trend sales are set to increase markedly, driven particularly by China. Whether individual manufacturers will face over-capacity in the future depends on their ability to compete for a share of this growing global market. Taking the five largest Western European countries as a whole, capacity currently exceeds trend sales by around 20% and this situation may endure over the medium term.[10] Even if manufacturers in this region were able to obtain 100% domestic market share (which is unlikely due to imports), this would imply that they would have at a minimum spare capacity of around 10% that would need to be exported outside the area in order to maintain capacity utilisation at around 90%. In other words, these countries as a whole must obtain market share outside their home markets to avoid an excess capacity situation (utilisation below 90%).[11]

By contrast, in North America (Canada, Mexico and the United States), capacity is around 65% of trend sales so manufacturers in the NAFTA area need to maintain a 60% domestic market share or to export more in order to avoid excess capacity in the medium term. In the United States, NAFTA manufacturers' market share, albeit on a declining trend, are currently at around 70% suggesting that full capacity utilisation is achievable provided that sales return close to trend and current market share trends are arrested. In Japan and Korea, maintaining their high capacity utilisation rates (around 90% and 85%, respectively, in 2008) will require maintaining their strong export performance as exports accounted for 60% and 70% of total production, respectively, in 2008.

Robustness tests

The above results give an indication of how sales may develop over the medium term using equation parameters calibrated largely on the basis of historical experience. It is possible that policy, technological or other events may change future consumer behaviour, implying a different set of parameters. To give an idea of how outcomes may change under different assumptions, an analysis of the sensitivity of trend sales in 2015 to different parameters is carried out for the two largest markets, China and the United States (Table 5).

For China (and other emerging markets), trend sales are relatively sensitive to the parameters that affect the equilibrium level of vehicle ownership, including the elasticity of vehicle ownership per capita to GDP per capita because GDP per capita is low but growing fast and the economy is far from vehicle saturation. The scrapping rate is relatively less important because the car stock is still small. In the case of the United States (and other developed countries), the scrapping rate is more important because the stock of cars is already large and the elasticity of vehicle ownership to further increases in GDP per capita is low.

For the United States, where vehicle ownership is close to the assumed saturation level and therefore a more binding constraint, the saturation level itself is also a relatively important determinant of sales. This exercise shows that if parameters turn out to be different from those underlying the main results above, it will have some effect on future trend sales, with the greatest uncertainty around emerging market trends. However, the principal initial findings still hold. In particular, there is likely to be a gradual increase in US trend sales and a far more dramatic climb in Chinese sales over the medium term.

9. The analysis considers 17 countries.

10. Germany, France, Italy, Spain and the United Kingdom.

11. Assuming that at 90% capacity utilisation there is no further spare capacity because it is not physically feasible to run manufacturing plants continuously at above this level.

Table 5: Sensitivity of Trend Sales in 2015

	Parameters			Trend Sales (Millions)					
				United States			China		
	baseline value	change from baseline	comments	low	baseline	high	low	baseline	high
α	-5.9	-/+ 10%	Common elasticity parameter across all countries	18.7	18.7	18.7	23.6	24.7	25.8
β	USA, -0.19, China, -0.21	+/- 0.2	Country specific elasticity parameter. G7 average is -0.15, range is -0.1 to -0.19	18.7	18.7	18.7	21.2	24.7	28.1
γ	USA, 852, China, 807	-/+20	Vehicle saturation level per 1000 inhabitants. G7 average is 783, range is 707 to 852	18.4	18.7	20.1	24.2	24.7	25.1
θ	0.1	-/+10%	Common speed of adjustment parameter	18.7	18.7	18.7	23.4	24.7	25.8
scrapping rate	USA 6.1%, China 6%	-/+0.07%	G7 average is 5.9%, range is 3.6% to 6.9%	16.8	18.7	20.5	24.0	24.7	25.6

Source: OECD Calculations

7. Challenges looking forward

Looking ahead, and beyond issues of straightforward capacity, car manufacturers face a number of challenges that will likely require significant restructuring to realign production capacity with changing patterns of demand, including coping with:

- Higher prices of automotive fuels driven by increasing demand for oil and policy interventions to reduce CO_2 emissions. This will likely accelerate the trend towards smaller more fuel-efficient cars which command lower profit margins. Furthermore, the bulk of demand in the rapidly growing Chinese market is for smaller cars.

- A changing geographical pattern of demand. Most trend sales growth will be in the BRIC countries and other emerging markets while mature OECD markets will remain relatively stagnant.

- Ongoing globalisation, which will likely influence minimum efficient scale economies and the configuration of companies worldwide.

BIBLIOGRAPHY

Abrams, B. and G. Parsons (2009), "Is CARS a Clunkers?", *The Economist's voice*, August.

Council of Economic Advisers (2009), "Economic Analysis of the Car Allowance rebate System ("Cash for Clunkers")", September.

Dargay, J., D. Gately and M. Sommer (2007), "Vehicle Ownership and Income Growth, Worldwide: 1960-2030", *Energy Journal*, Vol. 28, No. 4.

ECB (European Central Bank) (2009), *Monthly Bulletin*, October.

European Commission (2009), *Economic Report*, March.

Guichard, S., D. Haugh and D. Turner (2009), "Quantifying the Effects of Financial Conditions in the Euro Area, Japan, the United Kingdom and the United States," *OECD Economics Department Working Papers*, No. 677.

Knittel, C. (2009), "The Implied Cost of Carbon Dioxide under the Cash for Clunkers Program", mimeo.

Miravete, E. and M. Moral (2009), "Qualitative effects of Cash-for-Clunkers Programs", mimeo.

OECD (2009), "Responding to the economic crisis: Fostering Industrial Restructuring and renewal", July.

Ramey, V. and D. Vine (2005), "Tracking the source of the decline in GDP volatility: An analysis of the Automobile Industry", *Finance and Economics discussion Series*, No. 2005-14, Federal Reserve Board, Washington.

Sturgeon, T. and J. van Biesebroeck (2009), "Crisis protection in the Automotive Industry: a Global Value Chain Perspective", *World Bank policy research Working Paper*, No. 5060, September.

ANNEX 1: DATA SOURCES

This annex presents in more detail the data used in this paper which focuses specifically on passenger cars, as opposed to commercial vehicles.

The International Organization of Motor Vehicle Manufacturers (OICA) defines "passenger cars" as "motor vehicles with at least four wheels, used for the transport of passengers, and comprising no more than eight seats in addition to the driver's seat." The types of vehicles that are used for this type of transport vary significantly across the OECD due to inter alia the historic habits of consumers and the type of environment the vehicles are used in and countries classify vehicles in different ways. For instance, in the United States, light vans and SUVs (4x4s) are frequently used as "passenger cars", which is in stark contrast to Japan, where small and mini cars are common. An attempt was made to use data series for sales and production that would capture all vehicles with four wheels or more used as "passenger cars" in each of the countries.

Passenger car sales

New passenger car registration data that were used to analyse passenger car sales for OECD countries with the exception of Australia and Canada where sales of new motor vehicles, and the total of passenger car sales, were used respectively. For Korea and Mexico passengers car sales or total car sales (including imports) was not available therefore domestic car sales was used. For the United States sales of light vehicles were used as this includes sales of SUVs and light vans defined as cars elsewhere and used in both the United States and elsewhere as "passenger cars" and for Japan, it includes all standard, small and mini car sales.

All monthly data for OECD countries was sourced from Datastream except for Japan (issued by the Japan Automobile Manufacturers Association, JAMA), and Korea (obtained from the Korea Automobile Manufacturers Association, KAMA).

Chinese passenger car sales were sourced from the China Association of Automobile Manufacturers. For India, total car sales sourced from the Society of Indian Automobile Manufacturers were used.

Passenger car production

The availability of monthly car production data is relatively limited. Data was obtained for the G7 countries and Korea only.

Canadian and Japanese data was taken from OECD Main economic indicator database. Data for France and Italy was sourced from the national statistics offices, INSEE and ISTAT respectively. Production series for United Kingdom and Korea are provided by the Society of Motor Manufacturers and Traders (SMMT) and the Korea Automobile Manufacturers Association (KAMA).

Car production is defined as the industrial production of passenger cars, except for the United States and Germany. For the United States industrial production of automobile and light duty motor vehicles from the Federal Reserve was used. For Germany, the output of the manufacture of motor vehicles, trailers and semi-trailers from the Bundesbank was used as a proxy for passenger car production.

Sectoral data

Sectoral data on production, value-added, employment and exports and comes from the STAN database. Aggregate goods and services exports were taken from the Economic Outlook database.

ANNEX 2: SUPPORT TO THE CAR INDUSTRY

	Scrapping scheme				Other measures
	Duration	Incentives	Total amount	Effects	
Australia					Direct schemes of industry assistance of AUD 6.2 billion to make the automotive industry more economically and environmentally sustainable by 2020. Business tax deduction on new capital investment, including vehicles: for SMEs; deduction of 50% of the cost of assets ordered between 13 December 2008 and 31 December 2009. For other businesses in 2009: deduction of 30% of assets acquired before 30 June 2009 and 10% between 1July and 31December 2009.
Austria	April 2009 to December 2009 (or sooner if funds have been used).	€1500			
Belgium					Tax reduction to purchase new cars equivalent to 3% (< 115 CO2) or 15% (< 105 CO2) depending on emissions (started in 2007). In addition, the automobile sector will benefit from a number of horizontal measures, in particular changes in the system for economic temporary unemployment for blue-collar workers and its provisional extension to white-collar workers. Measures at the regional level: the Flemish goverment support to the car industry amounted to €10.5 million in 2009. The Walloon Government has developed a specific fiscal green measure to promote buying of less polluting cars (CO2 emissions), in the form of an "eco-bonus/malus".
Canada	Until 31March 2011 (for the federal programme).	Varies by manufacturer. "Retire your ride programme": CAD 300. Provincial scrap-it programme (British Columbia).			
Czech Republic	Under abeyance.	CZK 30 000.			Tax measures: increase rates for old cars, lower rates for some types of vehicles (hybrid etc.).
Denmark	Since 1July 2000 but changes in the incentives in 2002.	Premium of DKK 1750 (approximately €235) for cars retired after 30 June 2002.	DKK 150 million allocated in 2009. In the budget proposal for 2010, DKK 153.2 million are allocated	Premiums were paid for approximately 95 000 cars in 2008.	
Finland					In the 2009 budget car taxation based on CO2 emissions, heavier lorries, vans and coaches will get a reduction based on the total weight.
France	Until end 2010.	€1000 in 2009 then € 700 in January 2010 and €500 in July 2010.	€380 million in 2009 and €240 million in 2010.	About 20% of all the cars sold in January benefited from this scrapping incentive.	State guarantee for loans for the purchase of cars (€6.5 million). An additional tax of €4 on every registration certificate (in force from 15 April 2009). New measure to favour model shift and encourage eco-maintenance of vehicles (reduced VAT).

Source : OECD compilation; European Commission (2009); OECD (2009); and Council of Economic Advisers (2009).

	Scrapping scheme				Other measures
	Duration	Incentives	Total amount	Effects	
Germany	Until December 2009 but funds used by September 2009.	€2 500.	€5 billion.	New car registration increased by 30% in February.	Adjustment of the annual circulation tax for passenger cars on the basis of CO2 emissions.
Greece	30 September - 2 November.	€500 to 2 200 depending on the type of vehicle.			A 50% cut in the registration tax on new cars applicable between April and August 2009.
Italy	Until end 2009.	€800 to 1500.			
Japan	10 April 2009 to 31 March 2010.	Subsidy of ¥125 000 to 250 000 for the purchase of high-energy efficiency car, if scrapping a car 13 years old or more. Subsidy of ¥ 50000 to 100000 for purchasing a high-energy efficiency car if scrapping a car of less than 13 years old.	¥370 billion (€2.78 billion).	As of 28 September 2009, about 730 000 requests were received while 18 600 cases were already subsidised. A total of ¥19.9 billion has been spent.	Green tax schemes for automobiles were upgraded in April 2009. The motor vehicle tonnage tax (April 2009 to April 2012) and the automobile acquisition tax (April 2009 to March 2012) were reduced or exempted for environmentally-friendly automobiles.
Korea	May 2009 to December 2009.	Tax incentives for consumer trading in older vehicles: 70% tax reduction on individual consumption tax (national tax, 5 to 10%) and 70% tax reduction on registration tax (local tax, 5%) and acquisition tax (local tax, 2%).			
Luxembourg	January 2009 to December 2009.	€1500 to 1750.			The scrapping scheme complements a pre-existing measure which provides €750 for purchase of energy-efficient cars.
Netherlands	1August 2009 to 1January 2011	€750 to 1750.	€85 million.		Reduction in the registration tax compensated by an increase in the annual circulation tax for all vehicules. Discount in annual circulation tax for fuel-efficient cars. Lower excise duties for Liquified Natural Gaz to the amount applied to petrol cars. Reintroduction of a fiscal scheme for passenger cars with low-emission diesel engines.
Norway	Permanent scheme.	NOK 5 000.			
Poland					Increase in excise tax.
Portugal	Since 2000, renewed annually. Scheme made more generous from August to December 2009.	€1250 to 1500 from August to December 2009 (€1 000 to 1250 before).	€34 million (estimate for 2009 before August change).		The car industry is currently an important beneficiary of a short-time working scheme.

Source : OECD compilation; European Commission (2009); OECD (2009); and Council of Economic Advisers (2009).

	Scrapping scheme				Other measures
	Duration	**Incentives**	**Total amount**	**Effects**	
Slovak Republic	Until end 2009.	9 March to 25 March: €1500; 6 April to 14 April: €100.	€55.3 million.	In these two periods 44 200 cars with average age of 21 years were scrapped. The owners of scrapped cars can use the subsidy by the end of 2009. Up to 30 May 2009, 31589 cars with subsidy from this scheme were sold or ordered.	
Spain	Plan Vive: 1December 2008 to 31July 2010; and Plan 2000E: 22 May 2009 to 18 May 2010.	Plan Vive: interest free loan up to €10 000 for a period of five years provided the new car has a value up to €30 000. Also applicable for the purchase of old car if the scrapped car is at least 15-years old. Plan 2000E: direct support from the government: €500 per car, conditional on the manufacturers adding another €1000 per car. Some Autonomous Communities could provide an additional support of €500 per car if the scrapped car is at least ten years old or at least 12 years old when people purchase second-hand cars.	Plan Vive: €1.2 billion. Plan 2000E: €100 million and 200 000 cars, at maximum, to be financed. It is likely to be widened to €140 million euros and 280 000 cars, at maximum, to be financed.	Plan Vive: from December 2008 to February 2009, the credit was granted for 9 000 vehicles. Plan 2000E: at the end of October 2009, more than 190 000 cars were scrapped.	Support of €800 million for the sector in forms of soft loans for investment in production facilities and support for investment in RD and training. Promotional measures to support export. Pilot programme for electric cars. Financing facilities for small and medium-size companies in the automobile sector.
Sweden	Until July 2009.	Tax premium of SEK 10 000 for private persons purchasing a new eco car.			A number of tax exemptions for eco cars were abolished.
Turkey					Special consumption taxes (SCT) on motor vehicles were reduced in varying proportions according to vehicle types and periods of 2009.
United Kingdom	May 2009 to March 2010 (or sooner if funds have been used).	£ 1000 (conditional on the manufacturers adding another £ 1000).	£ 300 million.	Accounted for about 10% of car sales in June 2009.	
United States	24 July to 24 August 2009.	$3 500 to 4 500 bonuses.	$3 billion.	Between 0.2 to 0.6 million vehicles (Council of Economic Advisers, 2009).	Tariff on Chinese tyres.

Source : OECD compilation; European Commission (2009); OECD (2009); and Council of Economic Advisers (2009).

	Scrapping scheme				Other measures
	Duration	Incentives	Total amount	Effects	
Brazil					Reduction of federal VAT on purchases of small cars and trucks, and other federal taxes on the production and financing of motorbikes. Value: About $3.3 billion for 2009.
China	From 1June 2009 to 31May 2010.	CNY 3 000 to 6 000 (only large cars can be scrapped).	CNY 4 billion.		Cars to the countryside programme (CNY 5 billion).
India					A reduction in the excise duty on cars and utility vehicles with an engine capacity of 2 000 cc and above. A reduction in excise duty for small cars from 16 to 12% and for hybrid cars from 24 to 14% in the 2008 budget.

Source : OECD compilation; European Commission (2009); OECD (2009); and Council of Economic Advisers (2009).

WORKING PAPERS

The full series of Economics Department Working Papers can be consulted at www.oecd.org/eco/working_papers/

744. Towards a flexible exchange rate policy in Russia
(December 2009) by Roland Beck and Geoff Barnard

743. *Fiscal federalism in Belgium: Challenges and possible improvements*
(December 2009) by Willi Leibfritz

742. *Product Market Regulation in Russia*
(December 2009) by Paul Conway, Tatiana Lysenko and Geoff Barnard

741. *How to reform the Belgian tax system to enhance economic growth*
(December 2009) by Jens Høj

740. *Improving the policy framework in Japan to address climate change*
(December 2009) by Randall S. Jones and Byungseo Yoo

739. *Health-care reform in Japan: controlling costs, improving quality and ensuring equity*
(December 2009) by Randall S. Jones

738. *Financial stability: overcoming the crisis and improving the efficiency of the banking sector in Japan*
(December 2009) by Randall S. Jones and Masahiko Tsutsumi

737. *Recent Oil Price Movements– Forces and Policy Issues*
(December 2009) by Eckhard Wurzel, Luke Willard and Patrice Ollivaud

736. *Promoting competition to strengthen economic growth in Belgium*
(December 2009) by Tomasz Koźluk

735. *Prudential Regulation And Competition In Financial Markets*
(November 2009) by Rüdiger Ahrend, Jens Arnold and Fabrice Murtin

734. *Keeping slovénian public finances on a sustainable path*
(October 2009) Pierre Beynet and Willi Leibfritz

733. *Pedal to the metal: Structural reforms to boost long-term growth in Mexico and spur recovery from the crisis*
(October 2009) David Haugh and Agustin Redonda

732. *Achieving higher performance: Enhancing spending efficiency in health and education in Mexico*
(October 2009) Cyrille Schwellnus

731. *Russia's long and winding road to a more efficient and resilient banking sector*
(October 2009) Geoff Barnard

730. *How do institutions affect structural unemployment in times of crises?*
(October 2009) Davide Furceri and Annabelle Mourougane

729. *Understanding the world trade collapse*
(October 2009) Calista Cheung and Stéphanie Guichard

728. *Estonia and euro adoption: Small country challenges of joining EMU*
(October 2009) Zuzana Brixiova, Margaret H. Morgan and Andreas Wörgötter

727 *Towards better schools and more equal opportunities for learning in Italy*
(June 2009) Romina Boarini

726. *Iceland: Challenging Times for Monetary and Fiscal Policies*
(August 2009) Andrea De Michelis

725. *Iceland: The Financial and Economic Crisis*
(August 2009) David Carey

724. *The role of transparency in the conduct of monetary policy*
(September 2009) Makoto Minegishi and Boris Cournède

723. *Raising education outcomes in Greece*
(September 2009) Vassiliki Koutsogeorgopoulou

722. *Improving the performance of the public health care system in Greece*
(September 2009) Charalampos Economou and Claude Giorno

721. *Is there a case for price-level targeting?*
(August 2009) Boris Cournède and Diego Moccero

720. *The challenge of restoring French competitiveness*
(August 2009) Rafal Kierzenkowski

719. *Improving the functioning of the Slovenian labour market*
(August 2009) Isabell Koske

718. *What drives sovereign risk premiums? An analysis of recent evidence from the Euro Area*
(July 2009) David Haugh, Patrice Ollivaud, and David Turner

717. *The English National Health Service: an economic health check*
(July 2009) Peter Smith and Maria Goddard

716. *Financial stability in the United Kingdom: Banking on prudence*
(July 2009) Philip Davis

715. *Economic growth and the role of taxation- disaggregate data*
(July 2009) Gareth D. Myles