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**THE ANALYSIS OF CAR SCRAPPAGE
INCENTIVE SCHEMES ACROSS COUNTRIES**

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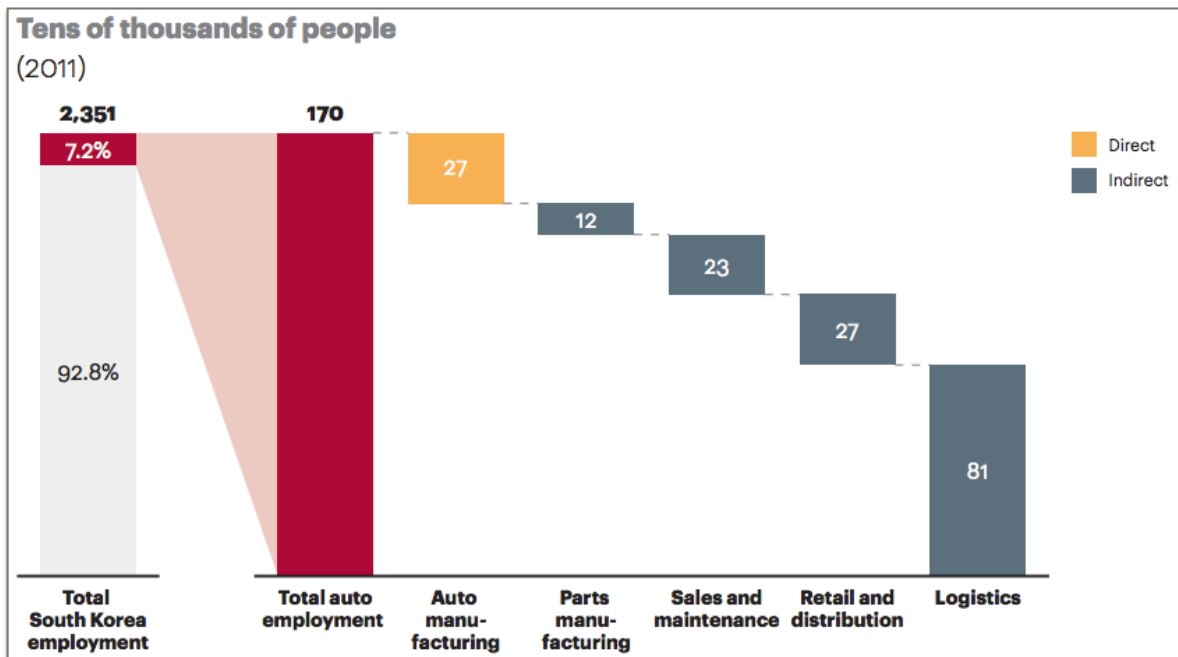
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Acronyms

CARS	Consumer assistance to Recycle and Save
CZK	Czech Republic Koruna
EU	the European Union
EUR	Eurozone currency
GDP	Gross Domestic Product
NHTSA	National Highway Traffic Safety Administration
OPEC	Organization of Petroleum Exporting Countries
SUV	Sport Utility Vehicle
UK	United Kingdom
UNFCCC	the United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
WTO	World Trade Organization

Introduction

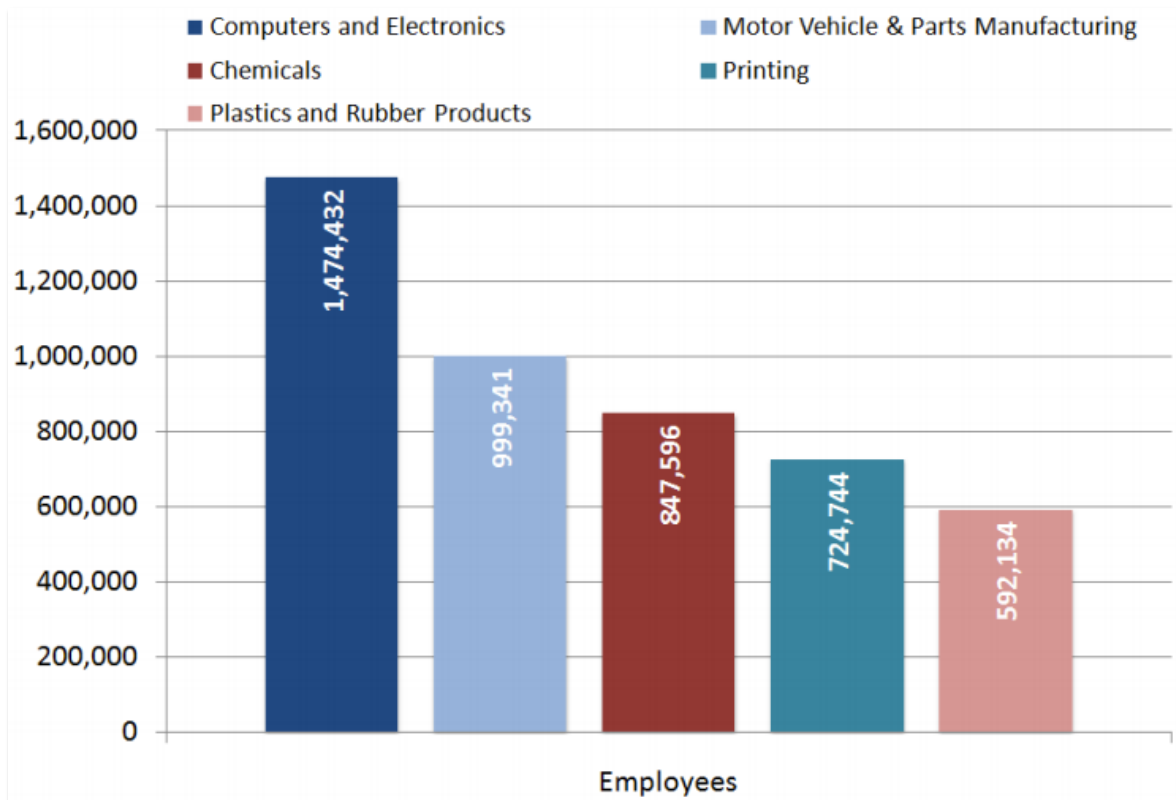
Automotive industry takes a big part in economies of many countries. Huge number of people is dependent from this industry. Number of upstream (mining, steel, fuel, electronics) and downstream (finance, insurance, after-market services, advertising) industries is influenced by fluctuations at the market. For example, we can examine the direct and indirect impact on employment in South Korea, a fast growing automobile producing country:



Source: Klink, Kidambi, Mathur & Sen, 2013

Fig. 1 Tens of Thousands of People (2011)

Another country where automotive industry plays a huge role is the USA. It is vital for a country to support industry during downturns. A chart presented below provides a comparison of number of employees by selected industry. For instance, when “General Motors and Chrysler filed for bankruptcy in 2009, the U.S. government stepped in with billions of dollars to bail out these companies. Both firms successfully bounced back – preserving a host of other downstream and upstream industries and millions of jobs” (Klink, Kidambi, Mathur & Sen, 2013).



Source: "Contribution of the," 2010

Fig. 2 Employees by Selected Industry

During recession the demand for cars also decline. To protect economy and keep people employed, to support spending government authorities implement stimulating policies. One of the most known and used policy is stimulating cars purchases. People tend to reduce expensive and not important at the moment purchases because they either do not have enough funds for it, or they are not sure in future. Customers may not know whether they would lose their jobs or not. Auto makers struggle with this problem and some of them seek to fight this tendency. During the crisis started in 2008, certain car makers attempted to support purchases of their products. Hyundai was the first company on the American market, which wanted to secure their customers with special measures.

In 2009 Hyundai Motor America introduced a scheme, according to which a person can freely buy a car and in case of losing the job, he or she can give the car back. In this situation the loan obligation would be cancelled (Valdes-Dapena, 2009). Hyundai's experience was successful and such car makers as General Motors and Ford introduced similar schemes. However, there was some

difference: “GM said it will make nine car payments of \$500 each for customers who lose jobs. Ford is offering payments of up to \$700 for 12 months” (Freeman, 2009).

However, car makers on themselves are not likely to support economy. So, a government should step in. Firstly, one of the ways to encourage people purchase new cars is to subsidize car buyers. Secondly, government can bring a scrappage scheme at work.

Russia assisted automotive industry in 2010 with a rebate program. This program was aimed to encourage Russians to buy domestically-made cars to replace old models. Sales of new cars and light vehicles rose 30 percent in 2010, 39 percent the following year and 11 percent in 2012 to 2.94 million units ("Russian gov't subsidies," 2013). After the end of that program, on July, 2013, Russian government initialized the program of subsidizing interest rates on car loans. The banks took more than 212 thousand applications for preferential car loans as of September 8th, by which it was sold 65,558 new cars from the beginning of the program ("One-third of preferential," 2013).

This thesis is focused on another way of encouraging people to buy new automobiles – a scrappage program. A scrappage program is a governmentally budgeted incentive to replace old and inefficient cars with modern and newly produced. This program not only seeks to replace old vehicles with new, but also to stimulate domestic automotive production. A lot of countries implemented such programs to stimulate economy in the individual sector during the global recession began in 2008.

1. Scrappage program and its goals

1.1. Stimulation policies and other measures to stimulate consumers

Car scrappage program has a positive influence on car purchases. However it is usually borrowed from the purchases that are to occur in the near future. The short run benefits of the program are crucial – it boosts the economy and provide people with working places. On the other hand, research conducted by Atif Mian and Amir Sufi (2010, p. 3) said that instead of participating in the program, customers would get new cars within two-three years. Overtime changing circumstances can help to predict what types of cars might be purchased in the future. Economic situation, personal preferences, and trends can influence which car will a customer purchase. The USA stands as an example of such shift in preferences: the 1970th oil crisis forced people to put aside their powerful cars and choose fuel-efficient instead.

The scrappage program is imposed only if there is a need in it. The program either boost economy and renew the fleet, or it also can shift the preferences. The program can act as a consumer' preferences polishing measure. It tends to go ahead and move technology forward, giving birth to a new trend, for example, such as fuel efficient vehicles. In case the economy starts its recession cycle, people tend to economize. The recession cannot be always global like it was in 2008, but it can be local, like it have happened in Russia in 2014. Or, another side, when citizens and governments recognize their involvement into ecological processes of our planet. Such trend is gathering its momentum in European Union and the United States.

Scrappage program's names vary from country to country. Some of the countries connected it with an environmental benefit ("Vehicle Efficiency Incentive" in Canada, "Umweltprämie" (environmental premium) in Germany, "Ökoprämie" (eco premium) in Austria), but others did not (for example, "Incentivi Alla Rottamazione" (scrappage incentives) in Italy, "Prime á la Casse" (scrappage premium) in France, and "Consumer Assistance to Recycle and Save" in the USA) (Yacobucci, Canis, p. 1).

The scrappage program accelerated renewal of vehicles, which led to the ecological and safety progress. As the EU Economic Report on Transport says in 2010, “the average number of CO₂ emissions decreased in 2009: by 4.5% in France and by 8% in Italy” (Scrappage Schemes In Europe: An Assessment). CO₂ emissions decreasing are not the only positive point. The replacement of old cars with modern allowed rapid modernization of the car fleet and reduced the average age of vehicles from 8-10 years to around 7 years in the EU in 2010.

A government is not the only institution which can implement scrappage schemes. Another party is presented by car dealers. They call it "car repurchase". The scheme works by trading an old used car for a new one. Some companies guarantee to pay to a customer the highest possible price. For example, the Czech company "Auto ESA" provides CZK 10,000 as a bonus for buying a car from them (Auto ESA).

In addition, one may be coerced to car recycling by several reasons. At first, a vehicle may be old enough to operate. Or, recycling can be a measure in case of a tough car accident, when it is impossible to repair it. Furthermore, there is another one alternative. A person may like to purchase a new vehicle. In this case scrappage process will help one to get rid of a useless clunker and not to pay taxes for it.

The last century of car manufacturing showed us the price we have to pay to use the comfort of owning a car. The first countries to understand the issue were countries with high productivity – the USA, Japan, Germany, and some other countries. With the increase in production and shortened lifetime of vehicles, it has become more visible. The situation led to higher amount of cars and, as a consequence, to a higher ecological pressure. The changing environment pushed countries and car manufactures to create tough requirements, starting from car building and ending with its recycling.

Researches show, that recycling of an average vehicle weighted 1,050 kg lets to save 3,300 kg of natural resources, to decrease the need in energy by 56,000 MJ, to reduce emission of harmful materials by 1,950 kg. The recycling costs of such car are about UDS 100 (Bobovich, 2010, p. 7).

In most countries scrappage is presented by a separate sphere. It has its own infrastructure and it is regulated by government. The scrappage sphere includes more than 1.5 million of people. The price of goods produced from recycled materials is evaluated in hundreds billion dollars.

About 95% of used vehicles are scrapped in the US and about 70% - in the EU. Profits of such enterprises in the US are more than USD 25 billion per year. The sphere includes more than 7,000 enterprises with about 46,000 employees. Such companies recycle 14-15 million of vehicles annually. Suppliers of these recycling companies are about 20,000 smaller businesses. They gather and prepare used cars for the scrappage process. At first, they understand which parts of a car can be reused or restored, and only afterwards a car proceeds to a scrappage plant. Car producers in Germany are obliged by law to receive their vehicles for scrappage. Some of those producers have their own scrappage plants. Such plants are sometimes comparable to car manufacturing plants. Gathering old cars is a duty of about 1200 companies (Bobovich, 2010, p. 10).

About 95% of used vehicles are scrapped in the US and about 70% - in the EU. Profits of such enterprises in the US

1.2. Stimulation policies and other measures to stimulate consumers

Governments consider the economy stimulating as their strategy. Furthermore, the stabilization of the economy during declining cycles and social unrest is vital. As economy stimulating measures, governments implement policies targeted to shift in the demand, supply, and at the restructuring of industries. Government aims to enforce employment, reduce cyclical fluctuations, and to keep the inflation low. A main idea of such policies is reaching high and stable GDP increase.

Economics is cyclical. These cycles are periodical, but not regular. Economists figure out four types of cycles, where the shortest type lasts 3-4 years and the longest 45-60 years. In contrast to classical economists, Keynesians support the idea, that government should undertake measures aimed to stabilize economy. The main idea of it is to reduce fluctuations in production and employment levels.

Every cycle consists of periods of expansion (growth) and contraction (recession). The recession periods are especially undesirable because during the recession the employment level may appear much lower, what will lead to the decrease in

production and increase in the amount of jobless people. So, Keynesians claim that an economical wealth will rise if government will try to diminish cyclical fluctuations (especially recession) (Abel & Bernanke, 2012, p. 529).

All requirements of the scrappage program are based on a government's goal. These goals are economy stabilization, environment improvement, and fleet renewal. All countries decide what is more important for them. The goal depends from the situation country faces. A country is free to choose one of the three main goals, however, they can combine all of them. In case of descending sales a government may either wait until a market deals with it. Or, in other case, a government implements a certain program in order to help its economy.

1.2.1. Economy stabilization

Abel and Bernanke (2012, p. 529) presents three possible scenarios a government can utilize during crisis periods:

1. No changes in the macroeconomic policy. In this case economy is supposed to be able to regulate itself. During the first scenario, the process of adjusting prices, production and employment levels are lower than in situation of their full utilization.
2. Increase in money supply.
3. Increase in government purchases.

Moreover, there are certain measures a government can use for stimulation of production potential of a country:

- Loosening of tax policy in order to increase the share of people working;
- Financial stimulus of investments into property and assets, as well as into technology and innovations;
- Providing measures for professional education for certain job places;
- Financial sector competition stimulation in order to increase the efficiency of capital;
- Privatization and reducing of government control after industries;
- Co-working with regional authorities, encouraging working force mobility;

- and deep and thorough work with labor unions to develop flexibility of labor market.

In case of crisis government may break the Laissez-faire principle, the principle of non-interference, and start playing the important role. This role means taking risks and administering economic growth by influencing fundamental researches as well as technical progress. Before taking a decision which scenario to choose, government authorities should consider all its possible outcomes.

Fiscal policy has three types of tools for influencing economy: governmental purchases, transfers, and taxation. First two tools is concerned as governmental spending, but taxation is the main source of income of budget. Governmental purchases influence only the aggregate demand, however taxation and transfers influence aggregate supply as well as aggregate demand.

This thesis is concerned on scrappage program, which is one of the fiscal policy measures. In its turn, fiscal policy is a branch of macroeconomic stabilization activity. As Abel and Bernanke claim (2012, p. 529), this policy impacts the economy by changes in taxation and spending. The primary goal of it is to achieve a high rate of economic growth. Growing economy leads to expanding of businesses and increasing of overall welfare of country and its citizens. Policy's second goal is level of employment. Government should maintain it at the high level, since those, who are unemployed, do not pay taxes and have little money to spend. Also, unemployment increases government spending for unemployment benefits. Economic stability is another goal of fiscal policy. It deals with fluctuations of economy, attempting to level it by restrictive and expansive policies.

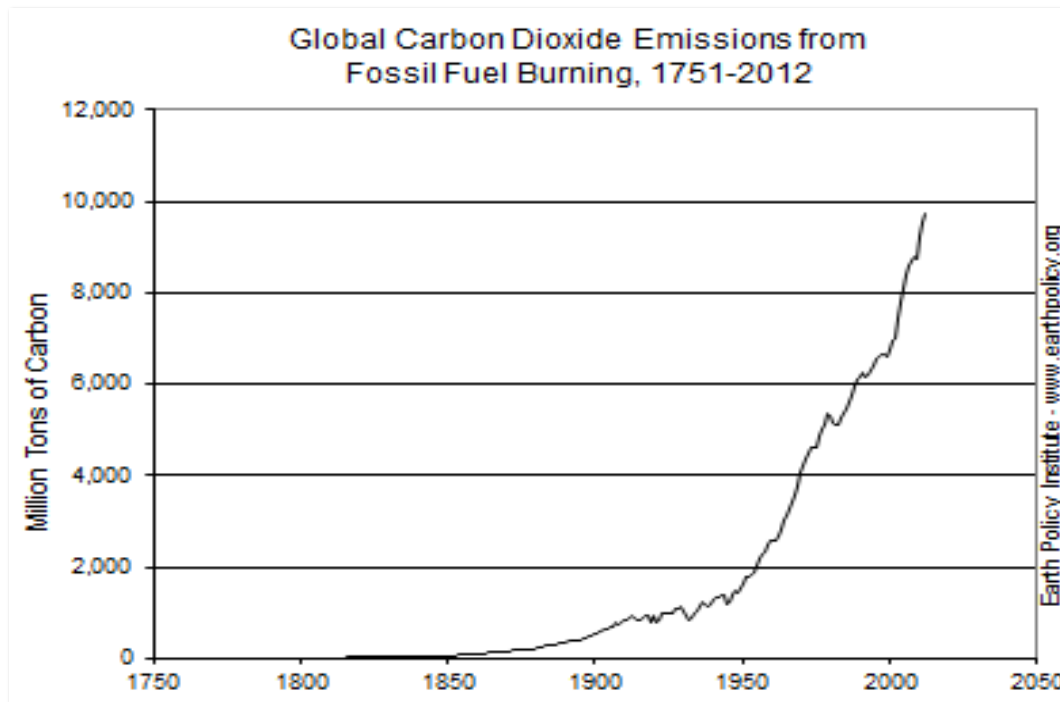
With a great amount of citizens influenced by an automotive industry (with its downstream and upstream companies), it becomes one of the most important industries for the country. Nevertheless, it is vital to understand where the new car comes from: is it produced domestically, or is it imported. Nowadays with a number of trade organizations not every country is able to give all benefits of the program to domestic producers. Since trade organizations (like WTO) control competition between countries, it flattens the outcomes of the program. Russia was the only one country during the crisis of 2008 who was able to use this restriction. Though, Russia is a member of WTO since 2012, during the crisis of

2014 it still exclude imported cars from the list. To be eligible for that program a car should be produced by a local company or produced domestically by a foreign company.

1.2.2. Environmental improvement

A government incentive may be a motivator for people to trade-in their cars and buy a more fuel-efficient one. Newer and more fuel-efficient cars with less CO₂ emission are more "friendly" for ecology. However, CO₂ is natural, since it is released from volcanic emissions, vital activity of organisms, and human activity, its share grows steadily. The impact of this growth is called the "carbon footprint". The main reason of the growth is burning of fossil fuels (such as coal, oil, and gas). Furthermore, the carbon footprint is increased by growing number of personal and public transport, cutting and burning forests, as well as industrial activity ("State of the," 2012).

Rirdan states, that during the last two centuries the amount of CO₂ in the world increased heavily, what can be seen from the graph showing global carbon dioxide emissions (Adams, 2013). As a result of such change scientists noticed the so-called "greenhouse effect." Greenhouse effect is an increase of temperature in the lower atmosphere and the surface of Earth. CO₂ and other greenhouse gases absorb infrared radiation. Any change in Earth's ability to re-radiate and to absorb the heat leads to a change in temperature of atmosphere and world ocean. This, in turn, shifts stable weather circulation. If CO₂ level would increase twice, average world temperature would also increase by 1-2 degree centigrade (Rirdan, 2012, p. 8).



Source: Adams, 2013

Fig. 3 Global Carbon Dioxide Emissions from Fossil Fuel Burning, 1751-2012

Greenhouse effect is something, what is unavoidable within current conditions. Almost two decades ago, in 1997, a Kyoto Protocol was adopted and entered into force on 16 February 2005. It was signed in Japan, in the city of Kyoto. The Kyoto Protocol extends the United Nations Framework Convention on Climate Change (UNFCCC), signed in 1982. The Kyoto protocol is one of the signs of today's economy globalization. It is the case when the regulations of economic activity become the object of intergovernmental agreements.

The Kyoto protocol assumes that a possible global catastrophe can be prevented by reducing greenhouse gas emissions in two ways. First of all, changes in the fuel mix of the world should be done. The world should shift to less "dirty" technologies. The second way is a widespread adoption of energy-saving technologies and of sewage treatment plants (United Nation Framework Convention on a Climate Change). As to an official protocol of UNFCCC (United Nations, 1998), the mechanisms are:

1. International Emissions Trading. The Kyoto Protocol allows countries to trade their spare units of emissions. These countries are free to sell such units to other countries, which are over their limits. This mechanism created a totally new

supranational market space, known as the "carbon market." So, with the Protocol, carbon became traded like any other commodity.

2. Clean Development Mechanism. It allows a country "with an emission-reduction or emission-limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries." Such project can earn certified emission reduction credits, which are saleable and each of the credits are equivalent to one tonne of CO₂. These credits can be counted towards the requirement of Kyoto protocol. As a result, the mechanism stimulates sustainable development and emission reductions, whilst giving industrialized countries certain flexibility in their emission control policy.

3. Joint implementation – it allows a country to earn emission reduction units by playing a role in another country's emission-reduction project. JI is seen as a cost-efficient and flexible mean of fulfilling a part of country's Kyoto commitments. On the other hand, the host country benefits from increased foreign investments and technology transfer.

Nowadays many world leaders like Francois Hollande, president of France, and Barack Obama, president of the USA during the UN summit on 23.9.2014, devoted an attention to a climate change ("Ban hails 'bold'," 2014). As it was mentioned there, the climate is changing faster, than world society is realizing. In order not to transfer this problem to future generations, there is a need to lower the carbon footprint. It can be done by:

1. Decreasing in consumption of hydrocarbon fuels (for example, coal and oil emit CO₂ 60% more than any other fossil fuels);
2. Increasing fuel-efficiency as well as on a private (household) level, as on industrial level;
3. Implementing more efficient heating and cooling systems in the infrastructure;
4. Spreading the usage of renewal fuels such as solar, wind, and geothermal energy;

5. Implementing measures on the governmental level to protect the cut of forests;
6. Supporting supranational agreements aimed at decreasing greenhouse gases emissions into the atmosphere (such as the mentioned above Kyoto Protocol);
7. Investing in researches and innovations for neutralizing noxious outcomes of human activity;
8. Tightening engine emission standards;
9. Governmental support of spreading of biofuel and hybrid cars.

One of the most important measure, which can help to decrease the carbon footprint is an emission standard – a certificate of compliance of a vehicle to standards, which impose limitations on the amount of pollutants from vehicles. For example, European emission standard was first imposed in 1992 (the table below) ("European engine emission standards - SMMT"). It was implemented in countries of European Union, the US, and Japan, however the standard was only for petrol engines. The standard put limits on emission of carbon monoxide, hydrocarbon, and nitrogen oxide. It was the first, but progressive step for ecology improvement. Nowadays, there is Euro 6 standard in the EU. Its analogue for the US is EPA '10 (imposed by United States Environmental Protection Agency) and Post-New Long-Term (Post NLT) regulations in Japan. The world map, telling which country uses which type of standard, is presented in the Appendix 1. To understand how the scrappage program can help to improve the ecological situation, we can take a look at Germany's incentive, implemented during the 2008 crisis.

Tab. 1 Emissions Standards

Euro standard	New type approval	All new cars registered
Euro 1	1.7.1992	31.12.1992
Euro 2	1.1.1996	1.1.1997
Euro 3	1.1.2000	1.1.2001
Euro 4	1.1.2005	1.1.2006
Euro 5	1.9.2009	1.1.2011
Euro 6	1.9.2014	1.9.2015

Source: European engine emission standards – SMMT

The main idea of any scrappage incentive in automotive industry is based on the fact, that a person changes his or her old and car for a new one. The newly produced car has to meet certain ecological requirements to be admitted to the market. These requirements are, for example, such as Euro-5. However, not all countries make its citizens buy brand new cars – in Germany, during the world crisis started in 2008, it was possible to buy a one year old car with the help of the scrappage incentive ("German car scrappage," 2009). The incentive required people to get rid of at least nine years old cars. The incentive was imposed in January 2009, what corresponds to the standard "Euro 4", as we can see from the table above. So, people should have exchanged their old cars, which met standards lower than Euro 3. On the other hand, these people became able to purchase a Euro 4 car with a discount. As a result, this measure not only provided the whole automobile industry with job (small and upper small car segments profited from the scrappage program as they made up 84% of the newly registered cars during the program), but also this measure improved the ecological situation in the country (Böckers, Heimeshoff & Müller, 2012, p. 1).

In the United States, drivers prefer larger cars, minivans and SUVs to smaller, fuel-efficient passenger cars (McConnel & Abel, 2002). However, world history gives us the example of the situation when overtime changing circumstances influence the preferences of car buyers. During 1960-1973 one of the most popular types of cars were so called "muscle cars". Originally they were small two or four doors passenger cars, but since the price for fuel was low, Ford installed a huge engine. Their Ford Mustang led to the new wave of cars – not always big, but

always with huge engines. As U.S. Department of State claims, that “during the 1973 Arab-Israeli War, Arab members of the Organization of Petroleum Exporting Countries (OPEC) imposed an embargo against the United States”. Thus, “the price of oil per barrel first doubled, then quadrupled, imposing skyrocketing costs on consumers”, they say (“Milestones: 1969–1976,” 2013). The increase of gas price is depicted on the graph “Annual Average Gasoline Prices” (see Appendix 2). Muscle cars ceased to be low cost vehicles and their era gone. Nowadays vehicles with a low fuel usage are being in trend again. US surveys show that “37 percent said their leading consideration when shopping for their next car will be fuel economy.” Quality of a car stays on a second place with 17% followed by safety (16%), value (14%), and performance (6%) (“CR survey: Americans,” 2012). More and more people seek to be less independent from gas prices. This can be achieved not only by downsizing, but also by changing the power supply system. According to the same survey, gasoline prices are number one reason for purchasing a fuel efficient car. People are more open now to “hybrids, electric cars, or models with diesel engines” (“CR survey: Americans,” 2012).

1.2.3. Fleet renewal

Many things depend on an average age of cars. However it is strongly connected with the environmental goal (since, as it was mentioned above, older cars emit more CO₂), it is not the only.

The most important is safety. The European Union has certain requirements for each new car produced and imported. As it is said on the website of European Commission (“Safety,” 2014), “all new cars sold in the EU must also be equipped with new safety features such as driver seatbelt reminders, ISOFIX child seat anchorages, tire pressure monitoring systems and other safety enhancing measures.” Safety is sometimes perceived as a national goal and forced by a government. Sweden government is a shareholder of a project running by Volvo, the project's name is “Volvo vision 2020.” The most desired outcome of the project is to lower the number of injuries and deaths (in Volvo cars in Sweden) to zero (Eugensson, 2009).

A government can subsidize purchases of cars for government officials and organizations. In case, that there are specific restrictions, this kind of purchase

provides domestic car-makers with extra job. A special attention is given to emergency vehicles.

1.3. Drawbacks of a scrappage incentive

Scrappage incentives are usually perceived positively by people and are popular among car owners. However, there are arguments against car scrappage schemes. First of all, as a measure it is temporary. Usually it lasts several months or a year (however, the program held in Romania started in 2005 and it was still in action in 2014). It aims to give economy a boost, an impulse, which will start the recovery cycle. On the other hand, it may increase car sales by bringing forward future demand. Daniel Harari states, that "when the scheme is wound up new car sales could fall, even if the economy is recovering" (2009, p. 6). He presents an illustration of a French case of the mid-1990s, when sales fell by 20% in the year the program expired. Furthermore, the decrease in new car registrations in the UK was down by about 13% on average in 2009 with further decrease of 8% in 2010.

Another problem is that money spent on the incentive may support carmakers outside the country. A country may be a member of a trade union (those like WTO), which administer the competition in the union. This situation will make a country unable to limit carmakers participating in the program. But if a country does not have such restrictions, it may support only domestic carmakers. Nevertheless, those domestic carmakers include foreign companies, which have plants inside the country. In case of Russia, during the crisis started in 2008 government supported only those who produce cars in Russia.

The last drawback of an incentive is that it acts selectively. The measure supports an automotive industry with close industries only. It does not directly supports such industries as constructing, light industry or food industry. Those industries will probably be affected, but only in a long term, when economy will start its recovery cycle.

1.4. Winners and losers of the program

As in any government incentive, there are two parties. One party wins and another loses. The same situation is with the scrappage program. When customers see the opportunity to get a new car cheaper (in some countries much cheaper, in

some – less), they definitely increase their spending and purchase new vehicles. However, second-hand car dealers are less optimistic in that situation. So, below winners and losers of the scrappage program will be analyzed.

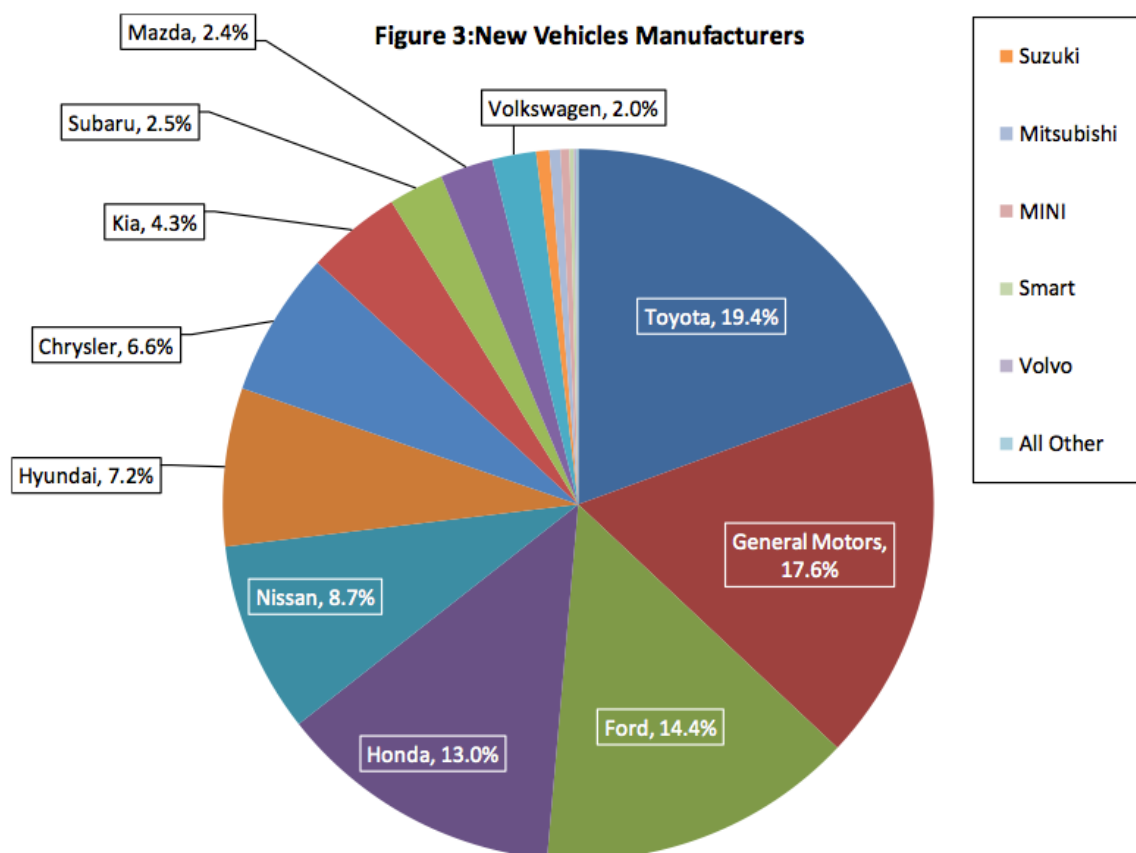
First, since the measure itself seeks to be positive, the first party is winners. This party includes several beneficiaries. One of the main is a usual customer. As it was stated above, the discount in percentage vary in different countries. Voucher in the US provided a very attractive discount of between 20% (with a reward of USD 3,500) and 26% (with a reward of USD 4,500) for the quite popular base version of Mazda 3 ("Mazda USA," 2015). Germany's incentive of EUR 2,500 for the same base car is less (only 11,9%, according to the price from official webpage of Mazda in Germany), but still attractive for any customer ("Mazda Deutschland," 2015). On the other hand, it is possible to get the same discounts from car dealers during the business downturn, or in the beginning of coming year for a car of previous year. Nevertheless, yet another discount for customers is attractive.

The next beneficiary is economy. Automotive industry is the main industry influenced during the scrappage program, but not the only. There is a huge amount of downstream and upstream manufacturing and service companies, tightly connected to the automotive industry. This fact makes the industry one of the main drivers of shifting from recession cycle to recovery cycle. The senior auto analyst at the consulting company IHS Global Insight Carlos da Silva claims, that the scrappage program in Germany and France in 2009 played in important role in the recovery process of these countries. He connects it to the fact that people there tend to save money more, comparing to countries like the US and the UK. So, the benefit of voucher for the new car purchase stimulated those people to act and to spend money they already had (Silva, 2010).

The ecology change, leaded by the scrappage incentive, sets the planet as the winner. Since the requirement of the program in every country is to renew the fleet, to get rid of old, smoking, and less fuel-efficient cars, ecology is one of the beneficiaries. Countries seek to improve the ecological situation not only by presenting and imposing new emission standards, forcing automakers to comply their new cars to these standards. They also encourage customers (private as well as public) to renew their fleet. Old cars are usually older than nine years, so the

new ones are much more fuel-efficient and environmentally friendly, since they emit much less CO₂ while driving.

The last but not the least winners are carmakers. The program in most countries supposes purchases of new cars, what brings the biggest share of profits to car manufacturers. The figure below presents 2009 situation in the US, when the manufacturers "Toyota, General Motors, Ford, Honda, Nissan, and Hyundai accounted for more than 80% of the new vehicles purchased" under the scrappage program (Gayer & Parker, 2013, p. 4).



Source: NHTSA (2009)

Source: Gayer & Parker, 2013, p. 4

Fig. 4 New Vehicles Manufacturers

To stimulate producers is, probably, the most important aim of any scrappage program, since, as it was already said, a huge number of people is influenced by producer's work and situation on the market. The more work and orders producers have, the more people are involved. One of the problems during any recession is

that companies cut the number of work places. Those retired people start saving up for their living, if they cannot get a new job. Contrary, when a government introduces a scrappage program, companies increase their sales. That brings producers to hiring new employees. Altogether, this process provides new working places, a boost to economy and, nevertheless, profits for companies.

Also, another point connected to company's profits is innovation. During the recession some companies do not only cut their expenses, but some of them are trying to invent some new product. This step is extremely risky, but it can help company to survive. Companies expect a new product to enlarge their portfolio and to attract new customers. For example, Russian biggest automotive producer "AvtoVaz" during the crisis introduced in 2014 a new model "Vesta." The start of sales in Russia are said to be in Summer 2015 ("Avtovaz: First Lada," 2014). Yet another example, but not from automotive industry, is Coca-Cola Company. During the recession of 1980's in the US they introduced "Diet Coke." As it is said in the history of the invention, they had to launch something completely new. They did, moreover, they introduced the new spin in a soft drinks market, targeted to those, who care about calories and health (Moye, 2013).

All these points stated above are important for the companies. The help they receive from the government provide new places and boost economy. However, producers and economy in general are not the only beneficiaries of the program. Others are regular customers, who receive a discount for the purchase (in some cases it is relatively high); our planet (including us, as its inhabitants), who definitely needs the change in ecology situation for healthier and sustainable future. All these groups make up the party of winners from governments' scrappage incentive, but there are losers as well. There are several groups of them, presented by luxury carmakers, second hand car dealers, second hand car owners, and (what is in some point contrary to winners party) the planet, and car manufacturers.

First of all, luxury manufacturers like BMW, Mercedes Benz, or even Bentley and Rolls Royce, are left aside of the program. Such types of brands are irrelevant to car scrappage programs. Even though the discount may be quite attractive for Mazda 3, as from the example above, it will play little role with BMW car with the price of about USD 40,000. Moreover, in some countries there was a price ceiling

for the new car. Gayer and Parker say, that in the United States "the new vehicle had to have a suggested retail price of less than USD 45,000" (2013, p. 3). As a result, luxurious brands or car models were excluded from the government incentive.

So, luxury carmakers are not the primary beneficiaries. However, they will benefit in a longer term by improving situation in economy. The primary beneficiaries are carmakers of lower and middle segments, what provide profits for these segments (excluding luxury segments) in the short term.

The planet is another loser. Even though new cars are supposed to improve the ecology situation, some people argue, that the CO₂ emitted while producing a new car takes about four to six years to dissolve. Others argue that not every scrappage program aims to improve ecology. In some countries, like Russia, there are no requirements for a new car's emission standard. That means, that during the 2010 scrappage program in Russia people could exchange their old Lada 2107 (one of the models of AvtoVaz) produced in early 1980-s, for the same Lada 2107, but newly made. The difference in CO₂ emissions of that model is almost the same within the last two decades, so the exchange of these two cars will benefit more to economy, than to ecology. Also, usually smaller and cheaper cars are not necessarily environmentally friendly than those more expensive ones.

The next two groups of losers are highly tied with the second hand car market. First, second hand car dealers mostly don't benefit from the scrappage program. The exception may be German program, which allowed one year old cars to be bought with the help of discount. But in general, why does a customer need to buy a little higher ranked car with several thousand mileage on the clock, when the he or she can get a little lower ranked car with an attractive discount?

Second hand car owners have the same problem. Their car becomes less expensive and chances to sell it for a higher price fall. The potential buyers may be rather buying a new discounted car, than an old one.

Finally, car manufacturers may enjoy an increase in sales for a short term only. Scrappage program is an artificial boost to the market. The demand for cars after the program is over may fall. Those customers, who were going to buy a new car in a year or two were stimulated to buy it now. So it is quite important to end the

program when economy has started to rise, so that the program would stimulate a long term process.

2. The analysis of scrappage incentives

2.1. Methodology

Thesis states the idea that there are three main goals for implementing a scrappage program, such as:

1. Economy stabilization;
2. Environmental improvement;
3. Fleet renewal.

When a certain country uses a scrappage program, it seeks to meet one, two, or even a combination of all these three goals. Different countries have different programs' schemes. That is why six factors, which shape every scheme, can be figured out:

1. Budget, time period;
2. Country of production of a new car;
3. Age of a car and its condition;
4. Type of the car;
5. Emissions requirements and ecology standards;
6. New purchased car segment and price.

Due to deviation in schemes of different countries, some countries stress one factor, some another. For easy comparison all main factors of the sample are presented in a consolidated table below. The table consists of selected countries, which reacted to the crisis of 2008, and factors of their scrappage policies. It also provides budget and vouchers data, which are presented in EUR for the day of program implementation.

Factors of schemes are presented with following cases of countries. Not every country from the table was analyzed, but only those, where this specific factor plays an outstanding role. Depending on the factor, the most suitable and appropriate for analysis countries are Germany, Romania, the USA, Russia. These countries have been studied by a number of researches, thus there are

more information and figures available. The information was gathered from secondary sources.

In the final part of the thesis goals and factors are summarized to understand the value of each factor and how it was implemented by specific countries. Results of analyzed countries are compared to find the best solution.

Tab. 2 Scrappage Incentive Schemes in Different Countries

Country	Budget, EUR	Main goal	Time period	Maximum incentive, EUR	Age requirement
China	N.A.	Economic stimulus	2009 – 2010	324-650	"old heavy polluting cars and trucks"
Egypt	203.5 mil	Taxi fleet renewal	4.2009–12.2015	No (loan assistance)	> 20 years old
France	611 mil	Economic stimulus, Environmental (not a priority)	12.2008–2009	1,000	> 10 years old
Germany	5 bln	Economic stimulus; Environmental (not a priority)	1.2009–9.2009	2,500	> 9 years old
Italy	1.9 bln	Economic stimulus	2009	1,500	> 10 years old
Japan	3.7 bln	Economic stimulus	2009	1,800	> 13 years old
Romania	400 mil	Fleet renovation; Economic stimulus	2005-2014	900	> 12 years old
Russia	530 mil	Economic stimulus (domestic)	3.2010–11.2012	1,200	> 10 years old
Spain	240 mil	Economic stimulus; Environmental	5.2009–7.2010	2,000	> 10 years old
United Kingdom	459.5 mil	Economic stimulus; Environmental (not a priority)	5.2009–2.2010	2,410	> 10 years old
United States	2 bln	Economic stimulus; Environmental	7.2009–8.2009	3,309	< 25 years old

Source: own research

Tab. 2 Scrappage Incentive Schemes in Different Countries – continuation

Country	Country of production	Type of the car	Emission requirements	New car price limit
China	No	Cars, minivans, small and midsize trucks	Euro-3	N.A.
Egypt	No	Taxis	No	No
France	No	Cars, LCV	< 160 g/km	N.A.
Germany	No	Small, luxury, SUV, vans	No	No
Italy	No	Cars, minivans, small and midsize trucks	< 140 g/km for petrol < 130 g/km for diesel	N.A.
Japan	No	Small, luxury, SUV	No	N.A.
Romania	No	Car, tractor, hybrid/electric car	No	N.A.
Russia	Russia	Car, light commercial vehicles, trucks, buses	Euro-3	Limited car models
Spain	No	Cars, buses (< 5 tonnes)	< 120 g/km	€30,000 (€40,000 in 2010)
United Kingdom	No	≤ 3.5 tonnes	No	N.A.
United States	No	Cars, light and large trucks, vans, SUV	consumption <10,7 l/100 km	€32,430

Source: own research

2.2. Factors influencing a program

As it was discussed in the paragraph “Main governmental goals of scrappage program,” country may pursue different goals: to stabilize the economy, to renew the fleet, or to improve the environmental situation. The way how the scrappage incentive work is nearly the same in all countries it is applied. The first thing, once the program is initiated, car dealers have to submit an application to take part in the program. Then, the scheme is easy: a customer should take his or her old car to the dealer, where he or she will get a rebate for a new car.

Each scrappage program of any country can be characterized by factors, stated in "Methodology." These factors may vary amid different countries. Some of them may stress type of the car, but others – ecology standards. The importance of factors is analyzed in following subchapters.

2.2.1. Budget and time period

Budget is the most important factor in any scheme. It does not matter if government's goal is to support economy, improve ecological environment, or to renew fleet – budget is used in all of those. First of all, scrappage program itself has a certain goal. It is not expected to work for some indefinite amount of years, but only for a certain period of time. Its operation period is limited by budget. For example, in 2009 the US called such incentive "Car Allowance Rebate System" (CARS), more commonly known as "Cash for Clunkers". It started on 1 July and ended on 24 August 2009. Within this period of time about 700,000 cars were traded in. Each customer received a voucher for either USD 3,500 or USD 4,500. The total spending for the program was USD 2.85 billion, what led to about 750,000 rebates issued (Gayer & Parker, 2013). The total spending consisted from two parts. The initial amount was USD 1 billion (only about 222,000 to 286,000 rebates were expected to be issued). However, since the program was anticipated positively, the amount was increased by additional USD 2 billion in August. If that additional money had not been approved, the CARS program would have ended.

According to the research conducted by Yacobucci and Canis (2010, p. 5), the main result of the incentive was the creation about 60,000 jobs "in auto parts, assembly, and sales, and an estimated USD 7.8 billion added to US Gross Domestic Product." Auto sales in August 2009 were 43% higher than in June 2009. Furthermore, authors add, that "the total value of all CARS transactions was USD 15.2 billion" (Yacobucci, B. D., & Canis, B., 2010, p. 5). The most important highlights are presented in the table below:

Tab. 3 CARS Program Results

Benchmark	Result
Number of motor vehicle dealers that participated	18,908
States that participated	50
Number of voucher applications submitted to NHTSA	690,114
Number of voucher applications paid	677,843
Number of voucher applications cancelled by dealers	12,272
Average voucher	4,209 \$
Total funds paid out in vouchers	\$2.85 billion
Estimated number of jobs saved or created	60,000
Percent of new vehicles manufactured domestically	49 %

Source: Yacobucci, B. D., & Canis, B., 2010, p. 5

Another example is the scrappage program in Russia, which started on 1 September 2014 and was expected to end on 31 December 2014. According to the governmental newspaper, anyone could trade his or her car in and receive RUR 50,000 (about USD 1,350 to the date of beginning of the program) for cars and RUR 350,000 (USD 9,500) for commercial trucks and buses. The goal was to sell about 170,000 vehicles during the program period. The budget of this scrappage program was RUR 10 billion (about USD 271 million) (Barshev, 2014). However, on 2.12.2014 the program was extended for 2015 with extra RUR 10 billion budgeted (Fomchenkov, 2014).

The last example is the United Kingdom. The scrappage program was initiated in May 2009 and was extended in September. The program wound up in March 2010 and its total cost was GBP 400 million (USD 600 million). Customers received GBP 2,000, which were provided by a government and car's manufacturers together. The budget was estimated to cover 400,000 of new vehicles (Harari, 2009, p. 1).

To summarize, budget and time period is the most important factor of any scheme. The amount of money allocated for the program dictate conditions for how long will the program be active, how many people and vehicles will it cover, what type of vehicles, and what bonus will participants receive. Authorities should find a balance in all these characteristics. It is extremely important to find it, because too high bonus will attract a lot of people and the budget will exhaust soon. On the

other hand, if a bonus is low, the program will hardly attract people, who will give up their car. Some countries decide to set a double deadline, defined by a final date or budget exhausting, whatever happens first. Therefore, some of them may extend the program – for instance, UK's scrappage program "was scheduled to end in October 2009 or when all the funds had been used up," however in September 2009, using additional funds, it was extended until February 2010 (Crossley, Leicester & Levell, 2010, p. 65).

2.2.2. Country of production

The second requirement is connected with the country of production. This feature is strongly connected to an economic stabilization goal. However, it is limited by possible membership of the country in such organizations like World Trade Organization (WTO). The scrappage program itself aims to boost domestic economy, so economy growth is the most expected and desired outcome. That's why economists sometimes argue, that even though there was a huge increase in car sales, the big share of benefits may be received by overseas manufactories. That is the situation happened with the US and European countries during the same 2008 crisis. Customers, in exchange for their old cars, could buy a car produced in any country. That caused a certain critique of the incentive (Cantos-Sánchez, Gutiérrez-i-Puigarnau & Mulalic, 2015). On the other hand, during that crisis Russia was the only country (among European countries, the USA, Egypt, China, and Japan) to impose a place of production requirement. Countries-members of WTO were not allowed to do it since the anti-competition law ("Car scrapping," 2011, p. 2).

For instance, with the help of the incentive, 49% of all new vehicles in the United States were produced domestically (Yacobucci, B. D., & Canis, B., 2010, p. 8). The original proposal limited rebates to vehicles manufactured in the United States or North America. However, these limitations were removed to be compliant with WTO rules. The table below, gathered from the NHTSA report to Congress on CARS program, presents numbers of new vehicles and trade-ins participating in the program. The biggest share of foreign cars was imported from Japan (Yacobucci, B. D., & Canis, B., 2010, p. 10):

Tab. 4 Country of Origin of CARS Vehicles

Country	New Vehicles	Trade-Ins
United States	329,173	499,365
Japan	115,526	54,958
Mexico	81,655	11,307
South Korea	73,119	3,738
Canada	65,177	90,420
Germany	10,056	11,199

Source: Yacobucci, B. D., & Canis, B., 2010, p. 10

Only one country from the table of factors set restriction on country of production – Russia. Since that requirement narrowed the number of cars available, it helped domestic carmakers. But still a lot of foreign vehicles of lower and middle segment were allowed to the program:

Tab. 5 Car Models (Foreign) Approved for the Program

Car Models (Foreign) Approved for the Program			
Chevrolet	Niva, Captiva, Cruze	Nissan	Teana, X-Trail
Ford	Focus, Mondeo	Toyota	Camry
Renault	Logan, Sandero	Skoda	Fabia, Octavia
Kia	Sorento, Spectra	Volkswagen	Tiguan
Fiat	Albea, Doblo; Ducato	Hyundai	Accent, Sonata, Santa Fe
SsangYoung	Actyon, Kyron, Rexton	Isuzu	NLR85
Opel	Antara, Astra		

Source: "Results of the," 2011

The first year of the program provided 468,260 of vouchers with 449,100 vehicles sold. The program appeared to be one of the main factors of economic increase. The main city of Russian car-making industry, Togliatti, called the capital of car making in Russia, played the most important role in the program. First of all, with the help of the program it has the biggest share of new car purchases. In October 2010, 14 thousands of vouchers were given in Togliatti (situated in the Western part of the country). On the other hand, Eastern part of Russia was much more

passive, than Western. People there were excluded from the program because they could not trade-in their right side wheel cars since it did not meet the requirements. High price for logistics, huge distances, and cheaper Japanese right side wheel cars played in the program its negative role.

Secondly, the biggest Russian carmaker AvtoVaz was the main beneficiary of the scrappage program. As for October 2010, AvtoVaz received 254.400 certificates. Renault takes the second place with 21.100 certificates and Skoda takes the third place with 8.500 certificates. Ford is on the fourth place with 6.900 certificates, GAZ (Russia) – 5.700, UAZ (Russia) – 4.900, and Chevrolet with 4.100 certificates ("Results of the," 2011).

To sum up, country of production restriction plays an extremely important role when a government pursues the idea of economy stabilization. If it is a current goal, this restriction plays a positive role. It supports domestic car-makers and those foreign car-makers, who produce its products within the borders. In case of the US, only 49% were produced domestically, but in case of Russia, the whole bunch of eligible cars was produced at home. Even though it narrows the capacity, it benefits country's economy. The results of achieving goals are presented in the table below.

Tab. 6 Outcomes of the Country of Production Factor

Goal	Country	Goal's achievement
Economy stabilization	USA	achieved (limited – big share of imported vehicles)
Economy stabilization	Russia	achieved

Source: own research

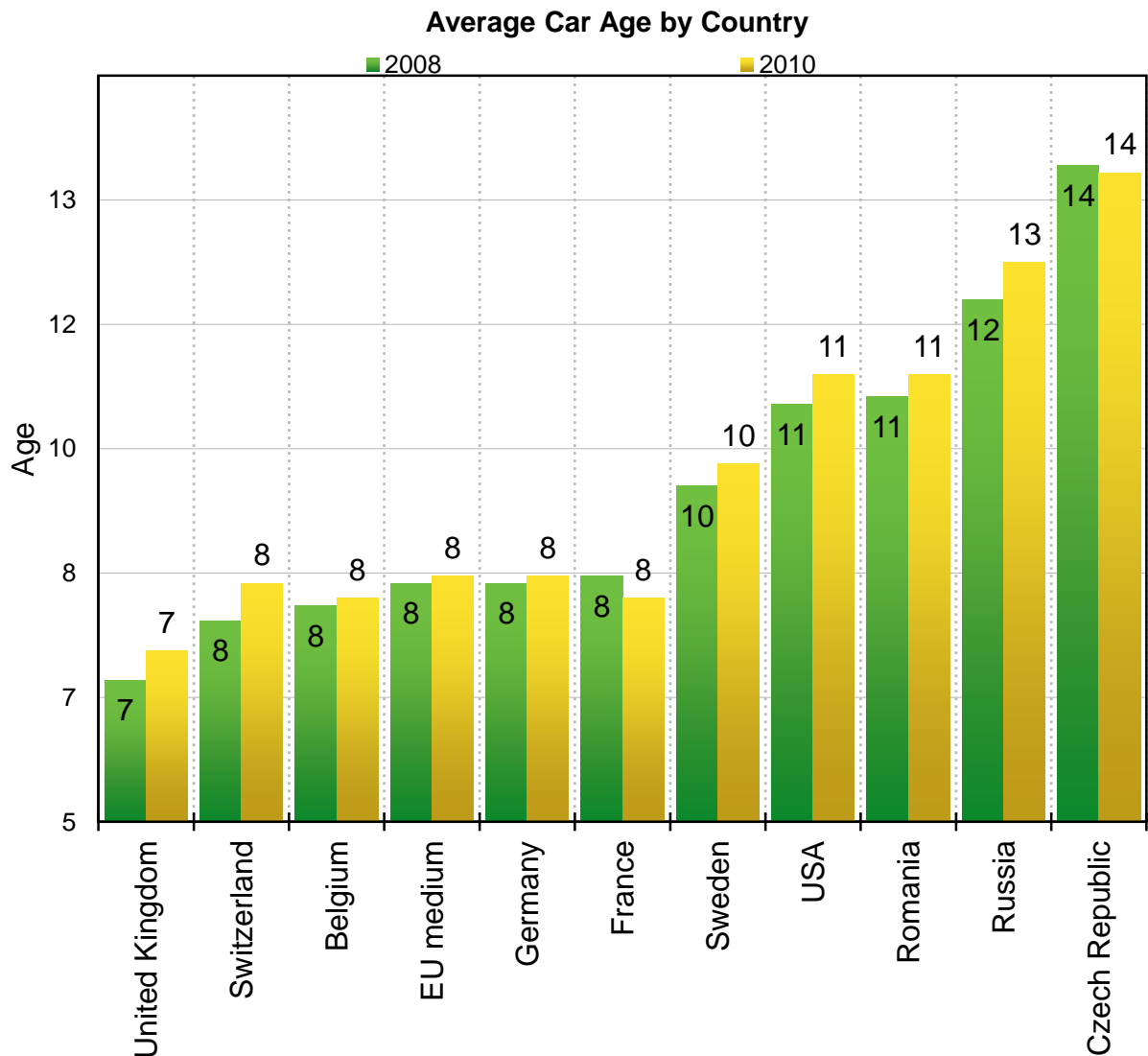
2.2.3. Age of car and its condition

The third requirement which differs among countries is car's age requirement. This factor is influenced by all three government's goals. It mostly refers to old cars eligible for a trade-in, but it also may affect the purchasing decision of customers. All scrappage programs have one common fact, that purchased car should be brand new. However, it was not the same with Germany in 2008. German authorities agreed to extend the opportunity of customers, when they allowed to

trade-in and purchase a "new car or vehicle registered with another person or company for not more than 14 months" (Böckers, Heimeshoff & Müller, 2012, p. 6). Nevertheless, the main criterion is the age of a traded-in car. For example, during the crisis of 2008 Japan imposed a scrappage incentive with the age requirement of minimum 13 years for a car; China allowed only "old heavy polluting cars and trucks" with no certain reference to the age; Spain connected the minimal age of 10 years with a run of the car set on 250,000 km; Egypt accepted only taxis older than 20 years ("Car scrapping," 2011, p. 2).

Countries introduce requirements with a link to government's main goals. The scheme applied in the US aimed to improve the ecology situation. Authorities set not the minimal age of a car, but its maximal age. The limit was 25 years, but there was no requirement for younger vehicles. However it did have a requirement about vehicle's condition. The car should have been in a drivable condition; otherwise it would have defeated the ecological purpose of the program. Since rusting and staying on blocks cars do not pollute, authorities stimulated people to trade in drivable cars. That also means that the car should be complete (with engine, gear box, transmission, wheels, battery, and seats) (Gayer & Parker, 2013, p. 3). On the other hand, Romanian problem was an older car fleet, comparing to Europe. In 2006 Romanian vehicle fleet "was in average of 13 years old, much greater than the European mean," what was realized as "an important factor in deadly car accidents" (Răceanu, 2014, p. 182).

The bar chart below presents the average age of cars to the beginning of the crisis of 2008 and at 2010. In 2010 some countries still had their scrappage program in progress, but some of the countries wrapped it up. According to it, in 2008 the lowest average age was in the United Kingdom and Switzerland, and the highest – in Russia and Czech Republic. The situation in 2010 almost did not change, however there is even a slight increase in the average age of most countries, except France and Czech Republic.

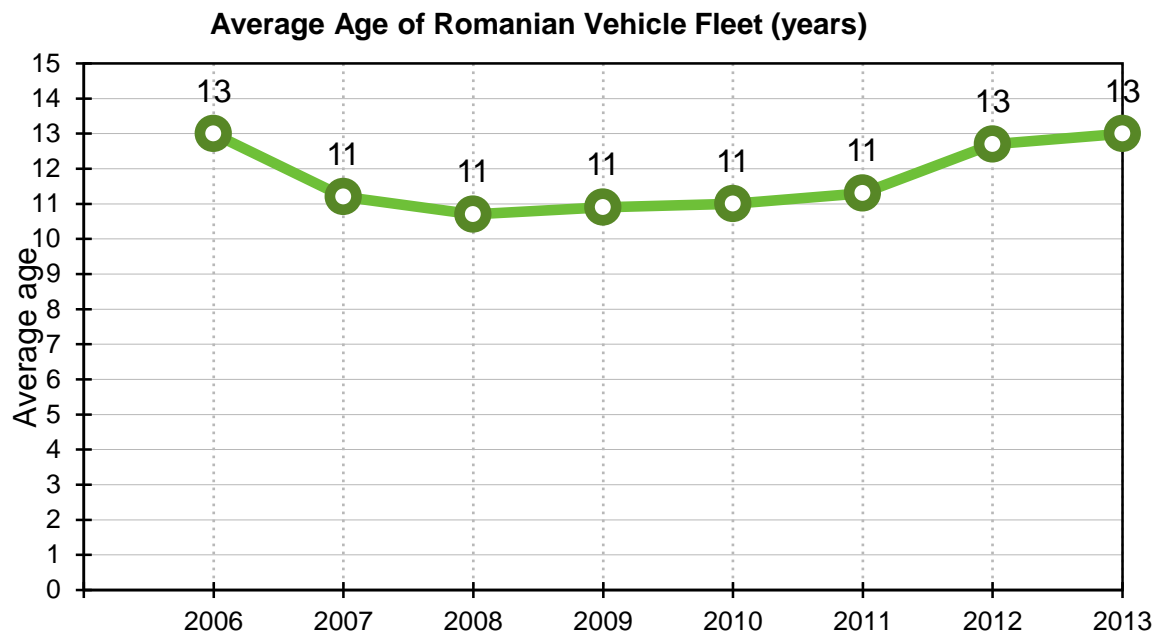


Source: "Age of car,"2015

Fig. 5 Average Car Age by Country

Romania was implementing the scrappage program for years since 2005 up to 2014. As it was mentioned above, the main goal of Romania was to renew the fleet and to decrease its average age. The case of Romania is interesting for the research, because they managed to decrease the average age from 13 years in 2006 to 10.7 in 2008. However, with the beginning of the crisis in 2008 average age started to grow. The graph "Average Age of Romanian Vehicle Fleet" depicts this situation. The program had several versions. The first version from 2005 to 2009 was eligible only for private cars and the voucher at the beginning was RON 3,000 (EUR 831), in 2009 it was increased to RON 3,800 (EUR 917). The voucher was not transmittable – the owner of an old car could use only one voucher for a new car. The mentioned above graph shows this period as the most effective in

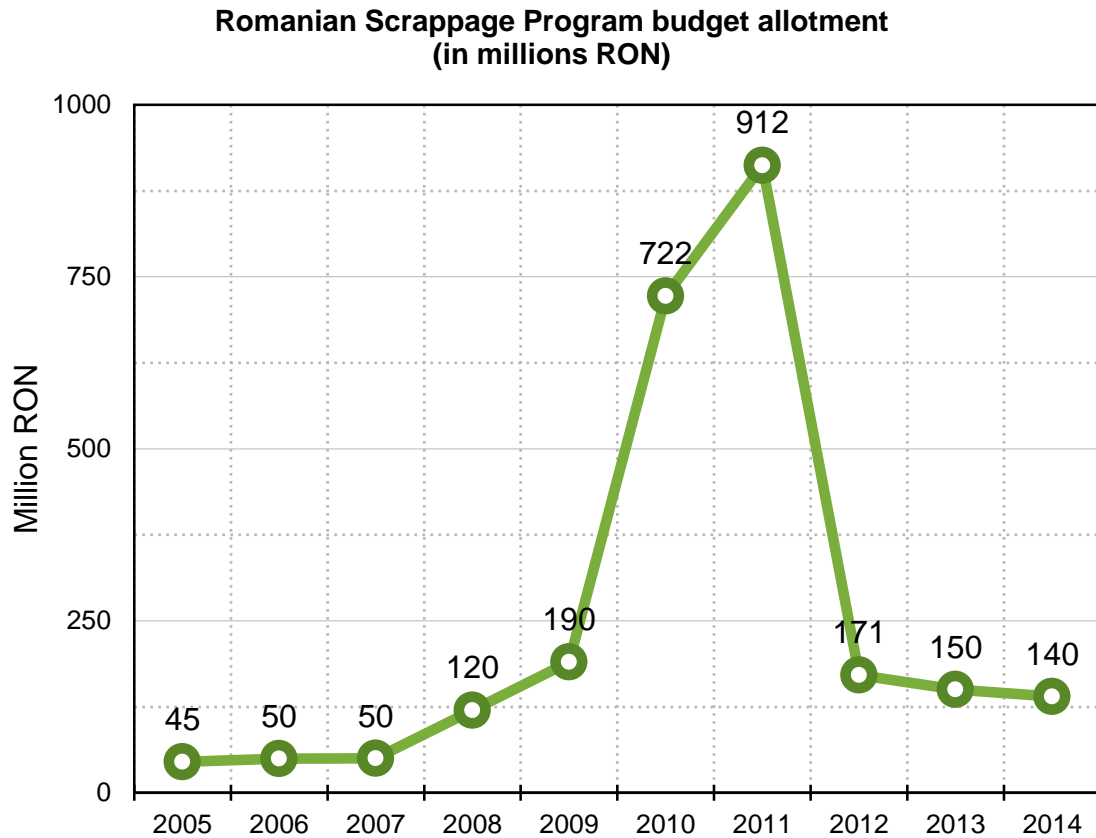
reducing average age of fleet – it decreased by more than two years (from 13 in 2006 to 10,9 in 2009).



Source: Raceanu, 2014, p. 186

Fig. 6 Average Age of Romanian Vehicle Fleet (years)

The next version was implemented in 2011 with two major changes: the voucher became transmittable, and it was possible to use three vouchers together for the new car. Also, the program was extended to include legal customers (however, vouchers were not transmittable for legal customers). To make all this possible, the government enlarged the budget by 3,8 times (from RON 190 mil (EUR 46 mil) in 2009 to RON 722 (EUR 174 mil) in 2010), what is depicted on the graph “Romanian Scrappage Program budget allotment” below. Another novelty was the inclusion of tractor and self-propelled agricultural machinery in 2010. The scrapping bonus for tractors was RON 17,000 (EUR 4,100). The sum invested in 2011 was even bigger – RON 912 mil (EUR 222 mil). Now the program sought to stimulate cars as little polluting, as possible.

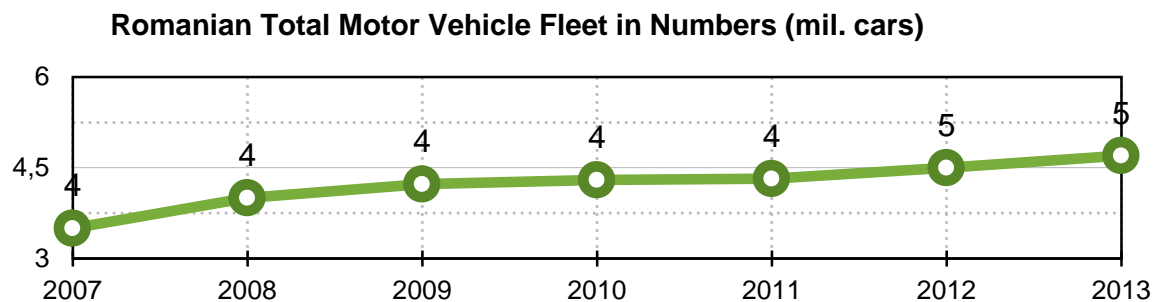


Source: Raceanu, 2014, p. 186

Fig. 7 Romanian Scrappage Program budget allotment (in millions RON)

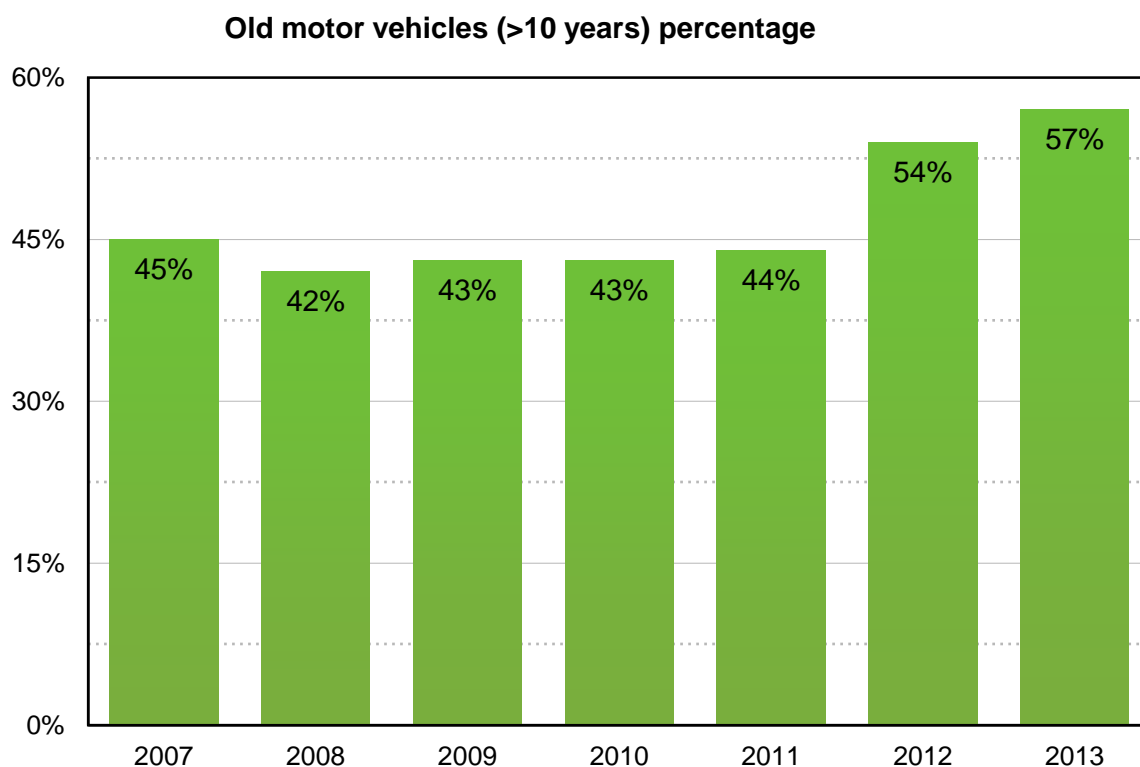
As it is seen from the graph "Romanian Total Motor Vehicle Fleet in Numbers," the number increased by more than for a million. However with the increased spending for the program, caused by enlarging the eligible cars number and extending for legal customers, vouchers became transmittable and several of them could be used for one purchase. So, Romania managed to decrease average age of its fleet until scrapping vouchers became transmittable. Even if it would stimulate the final customer to purchase a car with a discount of three vouchers, the amount of new cars would decrease. In case than if before one voucher was equal to one car, transmissibility made the equation (for certain cars) as three vouchers for one car. So, those, who gave transfer their vouchers to another person had two ways: either not to buy any car, or to buy a car, which is not covered by the scrappage program – that is an old car. As a result, the increase in number of new cars was not leading to decrease in its average age (what can be seen from the graph "Average Age of Romanian Vehicle Fleet"). Furthermore, the

number of cars older than 10 years increased by 14% in 2013 (see graph "Old Motor Vehicles Percentage").



Source: Raceanu, 2014, p. 186

Fig. 8 Romanian Total Motor Vehicle Fleet in Numbers (mil. cars)



Source: Raceanu, 2014, p. 187

Fig. 9 Old Motor Vehicles (> 10 years) percentage

The age factor is an important characteristic of any scheme, its outcomes are presented in the table below. The smaller is the age or traded-in car, the more people can take part in the program. But age of an old car is not the only criterion – age of newly bought car matters. If a government allows slightly owned cars to be bought (like it was done in Germany), it also increases target group of the

program. In addition, age of cars can be taken as a base in country's goal of fleet renewal, what was used by Romania.

Tab. 7 Outcomes of the Age of Car and Its Condition Factor

Goal	Country	Goal's achievement
Economy stabilization	Germany	achieved
Environmental improvement	USA	achieved
Fleet renewal	Romania	achieved to the beginning of 2008 crisis; was minimized in 2011 with vouchers transmission

Source: own research

2.2.4. Type of a car

The fourth requirement is the type of cars. It is used in case of any of country's goals. As Böckers, Heimeshoff, and Müller (2012, p.10) state in their analysis, only private cars were eligible for the scrappage program in Germany, since "commercial car holders did not qualify for the scrappage bounty and are excluded from total car registrations." Authors present the list of car types, which consists mostly from small and upper small cars, lower and middle luxury, vans. That put special limitations on the program's scheme, keeping commercial automotive industry away from government's benefits. UK's authorities combined cars and light commercial vehicles under weight criteria – a traded in vehicle should be lighter than 3,5 tonnes. The new car as well should weight not more than 3,5 tonnes. However, some other countries use the scrappage incentive more broadly. For example, Romania implemented the scrappage program in 2005, which lasted until 2009. The program was eligible only for privately owned cars. In 2010 the program was extended to "legal persons," including public institutions. Also in 2010 another car type was added – tractor. Then, in 2011 the program was extended again by adding separately hybrid and electric cars. According to the same analysis, conducted by Andreea Roxana Raceanu (2014, p. 188) from National University of Political Studies and Public Administration in Bucharest, the

Romanian scrappage program was still in action in 2014 with all car types mentioned above.

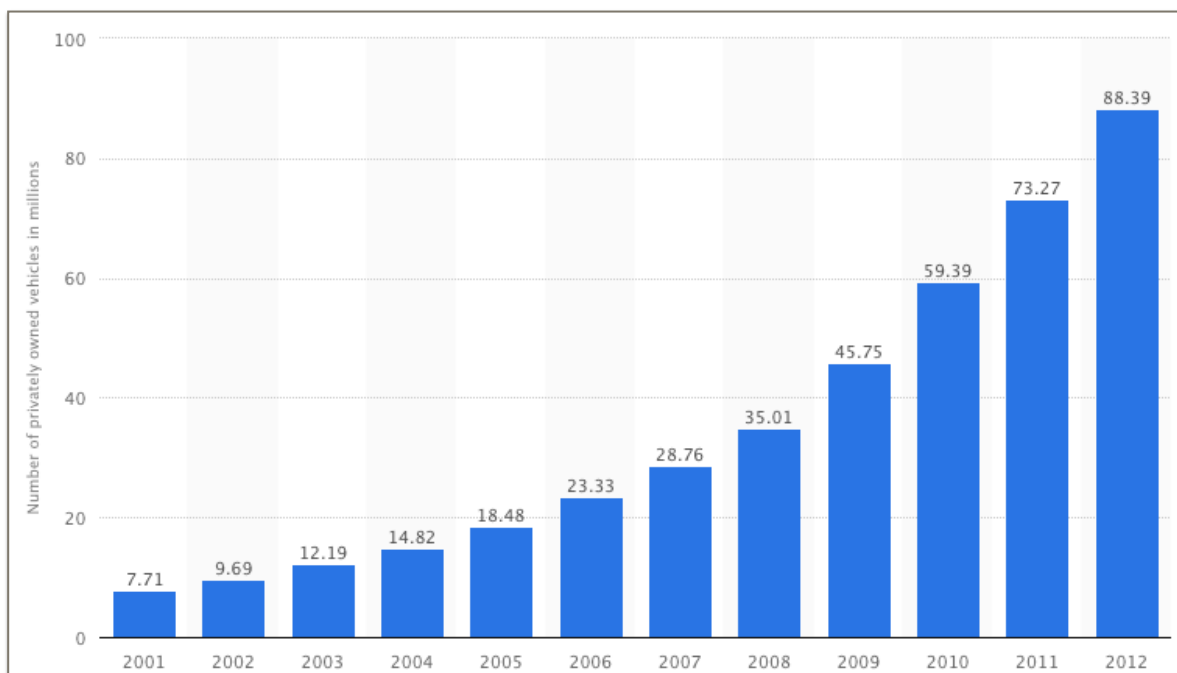
Also, mentioned above the United States of America had its scrappage program eligible for passenger cars, sport utility vehicle (SUV), small trucks, minivans, pick-up trucks and some large vans and trucks as well. However, motorcycles were excluded from the list (Gayer & Parker, 2013, p. 2). Russia's scrappage incentive went even further, since they also allowed large trucks and buses for the program (Barshev, 2014).

But one of the most interesting cases is a case of Egypt. Government of Egypt decided to cope with the global recession by stimulating a certain sphere – taxis. Vehicles over 20 years old are not allowed to operate since July 2011, what also includes taxis. So, Egyptian government started the program of renovation of its taxi fleet. The first phase of the program was in action since April 2009 until March 2010. This phase made possible to replace over 21,272 taxis. The second phase has started in March 2011 and it is in action until December 2015, and its aim is to replace 21,250 taxis.

The present phase is a part of governmental project "Long Term Development Vision 2020," which "has stated its overall goal as working towards reducing poverty and improving livelihoods for the people of Egypt" (Nzau-Muteta, 2010, p. 1). The project is designed to generate more than 11,000 new working places, including not only taxi services, but also car supplier companies and technicians in after-sales and maintenance sphere.

Old cars are usually requiring more funds to maintain their work, so the government of Egypt aims to "enhance overall incomes of taxi owners by 40% and for taxi-drivers by 100% (Nzau-Muteta, 2010, p. 1)." Taxi owners are mostly from the low-income group and they are not able to replace their old car without taking a significant risk. But reducing poverty is not the only one reason for renovation of taxi fleet. It was designed to assist small-scale taxi owners in replacing their old taxis; to improve the quality of air with a subsequent improvement in health-related sphere; to upgrade the urban transportation system, which is recognized in tight connection with economic growth (by change in commuting time), productivity, and income generated from tourism.

In their book McConnell and Abel (105) a decade ago predicted that "China is a country in which motor vehicle use will probably increase substantially over the next several decades". To prove that fact, the graph "Privately owned vehicles, in millions" depicts, that Chinese automotive market is steadily rising for last years. It increased more than 11 times since the last decade. In December 2014 China took the lead as the largest automobile market in the world with 18,368,900 cars registrations ("Largest automobile markets," 2015). In 2011 ended the small car displacement car policy. The policy was provided by Chinese government for buying a small displacement car. This measure has helped to increase overall spending power. The government introduced a new policy of redemption, giving car owners a discount to buy a new car. The new measure shifted customers' preferences from small and low-end models to more expensive and bigger cars. New car segments have gained attention in China – sport utility vehicles (SUVs) and imported cars. The behavior of Chinese customers changed from easily buying small cars to more rational buying behavior.



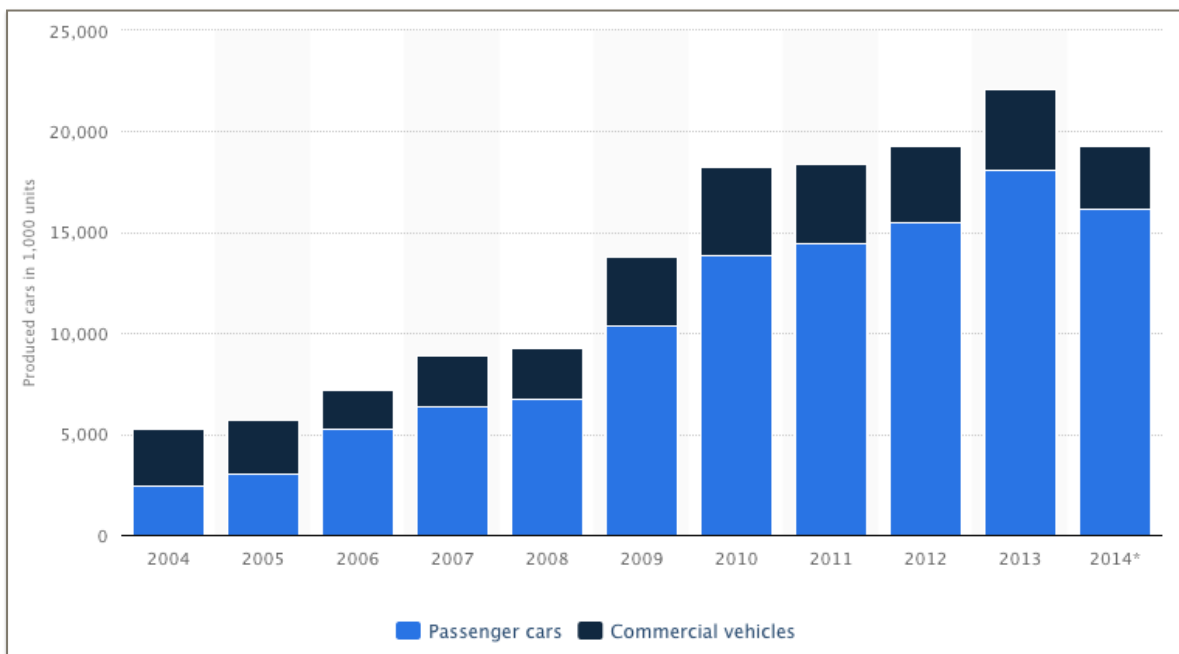
Source: "Privately owned vehicles," 2013

Fig. 10 Privately owned vehicles, in millions

The number of high-end models increases on the Chinese market. Customers prefer even bigger models, which are presented on the market. In 2000 Audi

announced a long wheelbase model A6L, which is not available anywhere. Audi was the first car maker to introduce it in a not flagship model. Later, in 2009, Audi introduced even smaller A4L, which is also a long wheelbase model for China. BMW jumped into the competition only in 2006 with its long wheelbase 5 Series. In 2010 Volvo joined this segment with S80L and Mercedes Benz with long E Class. This shows the importance of the Chinese market for such premium brands and their desire to fulfill growing needs of Chinese customers (Xiang, 2010).

The new government's aim is to strengthen the domestic automobile industry. It is possible to see the growth of cars production in China. It rises steadily, but Chinese authorities of the highest level see e-mobility as a future of Chinese automotive industry. This opinion is hardly pressed by the president and party leader Xi Jinping. Since the government do not consider Chinese automotive industry to take the leadership in vehicles with internal combustion engines, they consider to take leadership in a segment of electromobiles. Chinese government will provide subsidies for cars and spread electrical public transportation vehicles in the cities. The aim of central government is to have 500,000 electric vehicles by 2015, and 5 million vehicles by 2020. 30% of all new sold public transportation vehicles are expected to be electric by 2015 (Meissner, 2014).



Source: "Privately owned vehicles," 2013

Fig. 11 Production of cars in China from 2004 to October 2014 (in 1,000 units)

As a result, this factor provides benefits for some kinds of cars, but ignores others. It is strongly limited by budget, since the amount of cars of certain types is estimated before the implementation of the program. Its outcomes are presented in the table 9. The more types are included, the better it is for all three government's goals. Also, this factor can be used to promote new types of cars. In case of Chinese government, whose goal is to renew its fleet and move research and development of local car-makers through subsidizing electric vehicle.

Tab. 9 Outcomes of the Type of a Car Factor

Goal	Country	Goal's achievement
Economy stabilization	Germany	achieved (limited – excluded commercial vehicles)
Fleet renewal; Economy stabilization	Romania	achieved
Environmental improvement	USA	achieved
Fleet renewal; Economy stabilization	Egypt	achieved (in progress until Dec. 2015)

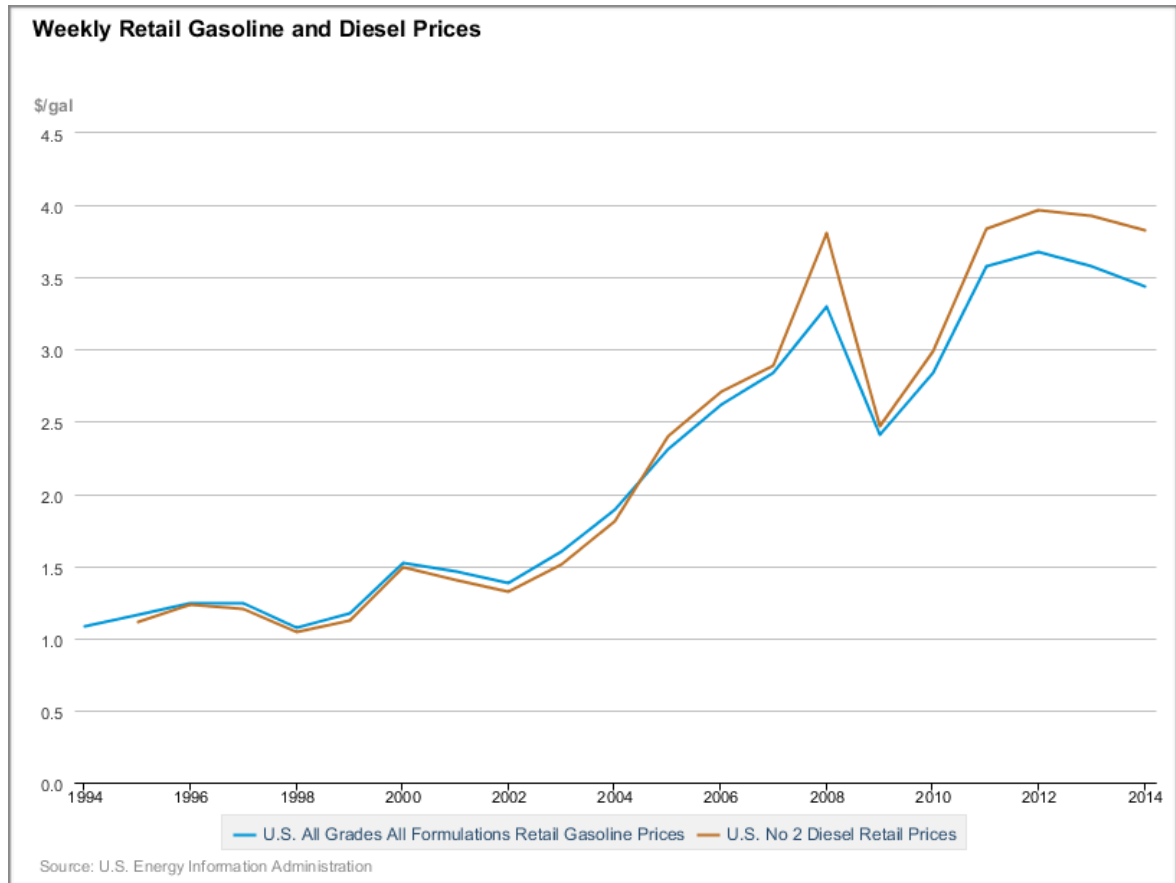
Source: own research

2.2.5. Emissions requirements and ecology standards

The fifth factor, tied to ecological issues, is highly connected to the country's goal of environmental improvement. During the 2008 crisis Germany did not impose any emission requirements, since Euro 4 was already in action since 2006 and it was impossible to buy less fuel-efficient car under the scrappage program (Böckers, Heimeshoff & Müller, 2012, p. 7). As Gayer and Parker claim (2013, p. 2), United States as well focused not on the special emission standards, but on mileage per gallon. The higher the mileage of a new was, the higher was the voucher.

The results of the crisis of 2008 were similar to those caused by the oil crisis in 1970s. In 2008 retail prices for gasoline and diesel were at its peak (what is shown at the graph "Weekly Retail Gasoline and Diesel Prices" below). Since the recession started, American government implemented a scrappage program, aimed to support customers. Outcomes of the program are presented in the table

below. According to Gayer and Parker (2013, p. 3), more powerful vehicles were traded-in, than purchased. Less fuel-efficient heavy trucks were replaced by lighter ones, and a lot of light trucks were replaced by much more fuel-efficient passenger cars. Combined with the results of previous crisis, both times there was a downshifting of power, which was caused by fuel prices.



Source: "Weekly retail gasoline," 2015

Fig. 12 Weekly Retail Gasoline and Diesel Prices

Tab. 8 Outcomes of CARS Program

Category	Vehicles Purchased	Vehicles Traded-in
Passenger Cars	404,046	109,380
Category 1 Truck	231,651	450,778
Category 2 Truck	46,836	116,909
Category 3 Truck	2,408	8,134
Total	684,941	685,201

Source: Gayer & Parker, 2013, p. 3

On the other hand, a lot of countries during that crisis focused on ecological requirements based on emissions. France, Italy and Spain restricted the purchase of new cars with CO₂ emissions higher than 120-140 g/km, depending from the country and engine of new car ("Car scrapping," 2011, p. 2).

According to a 2007 Eurobarometer survey, the majority of respondents (53%) across the EU-27 used individual motorized transport, such as cars or motorcycles, as a main mean of transportation (see Appendix 3). Europe seeks how to decrease the carbon footprint within its borders. The main pollutants are road transport, which is responsible for 70% of emissions. It is also about making cities cleaner since "urban traffic is responsible for 40% of CO₂" ("Consumers in Europe," 2009, 259). Most European countries, suffered from the 2008 crisis, in 2009 have already implemented some kind of a scrappage program. The figure below presents these countries. This problem leads not only to environmental and climate changes, but also to "higher accident levels in urban area, increased health problems (...), and negative economic losses both through bottlenecks in the logistics chain, as well as delays in getting staff to work" ("Consumers in Europe," 2009, 259). The majority of Eurobarometer respondents (80%) states, that they do not have problems with accessing local transport networks within towns. They are sure, that tax and price policy in correlation with compulsory manufacturing changes would be the best measures to encourage the use of more fuel efficient and biofuel vehicles.



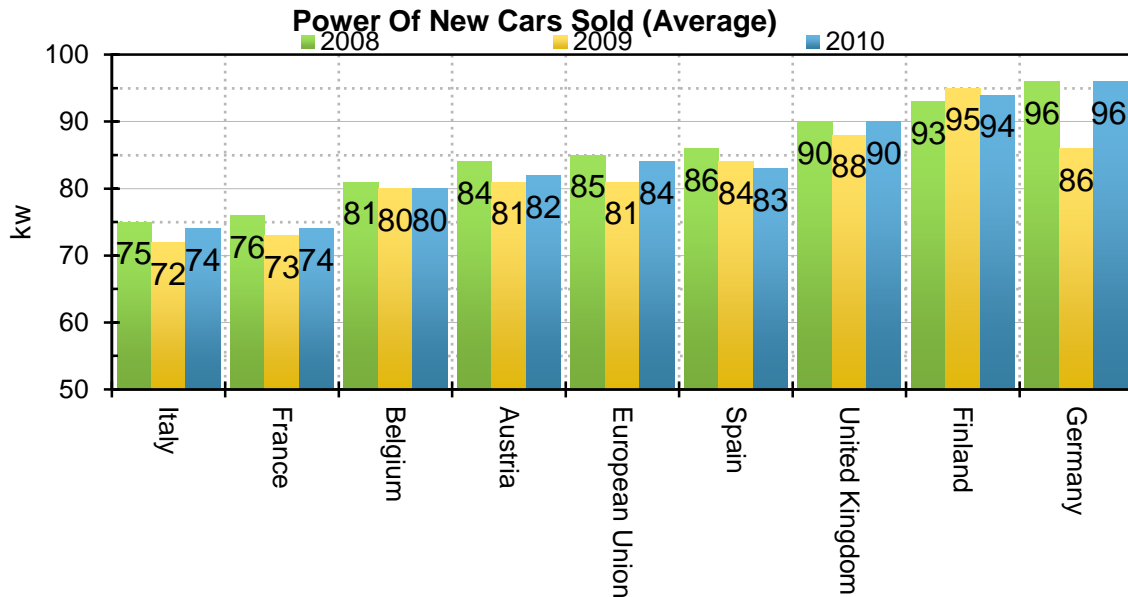
Source: Allen, 2009

Fig. 13 Countries Implemented Scrappage Program During the 2008 Crisis

The price for fossil fuels is forecasted to increase in near future (see Appendix 4). Also the highest price increase in Europe were for fuels and lubricants, and passenger transport services ("Consumers in Europe," 2009, 267). These drivers promote developing of energy efficiency and renewable fuels, so the trend for fuel efficient cars quickly gains popularity.

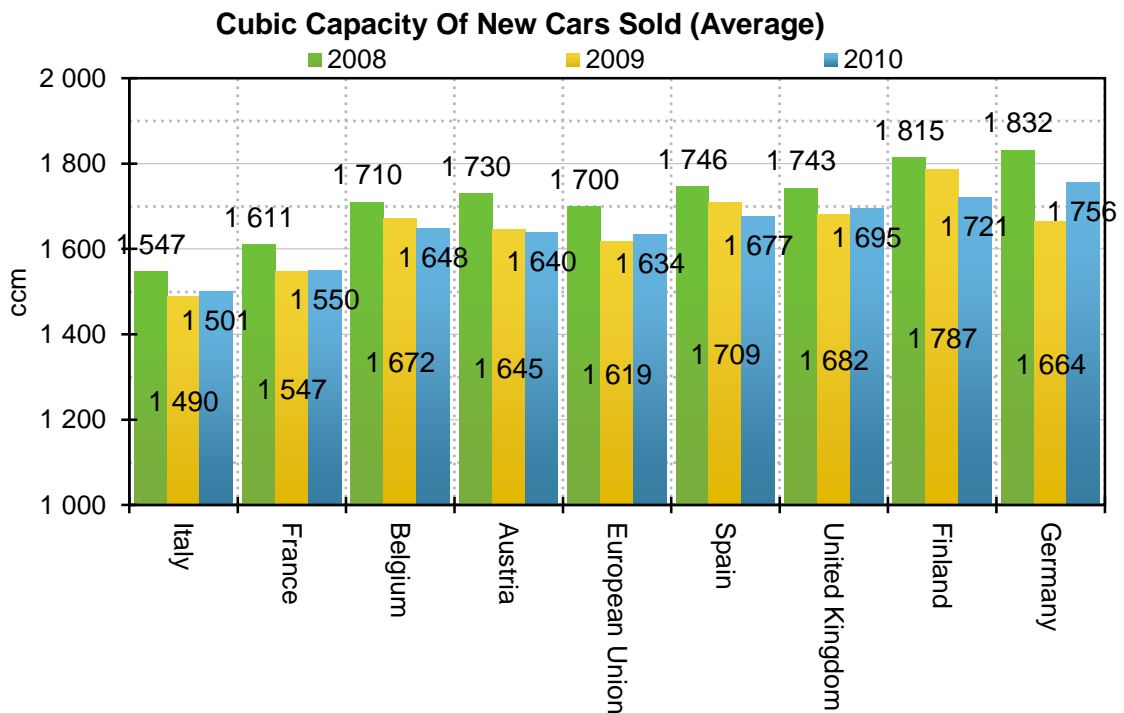
As it is depicted on the bar chart below (see "Power Of New Cars Sold"), at the beginning of the crisis of 2008, people started buying less powerful cars. Cars bought in 2009 were either with lower power (kw), and with a smaller engine capacity. However, when situation started to get better, in 2010 customers increased their need in more powerful cars (so figures in 2010 became about the same as it was in 2008). On the other point, there is a correlation between two charts "Power Of New Cars Sold" and "Cubic Capacity Of New Cars Sold." With the decrease of power in 2009, cubic capacity also falls. However, with the increase of power in 2010 in most countries, the cubic capacity in some countries falls even more. So, the correlation is reverse. Technical progress made possible to get the same power with lower engines, what was desired by many customers and car-makers. This fact led to the improved fuel efficiency and decreased fuel

costs. Tightened emissions standards force car-makers to innovate and create more fuel-efficient cars, even if engines are getting bigger. Outcomes of the factor are presented in the table 10 below.



Source: "Power of new cars", 2012

Fig. 14 Power Of New Cars Sold (Average)



Source: "Cubic capacity of new cars", 2012

Fig. 15 Cubic Capacity Of New Cars Sold (Average)

Tab. 10 Outcomes of the Emissions Requirements and Ecology Standards Factor

Goal	Country	Goal's achievement
Environmental improvement	USA	achieved (downshifting)

Source: own research

2.2.6. New purchased car segment and price

The last factor – new purchased car segment and price. When a government takes a scrappage program into action, it sets the mix of car segments allowed to be bought with a voucher. Egypt is an interesting example. The program was divided into two phases. The first phase was implemented from April 2009 to March 2010. The second phase is in action since March 2011 to December 2015. The only type of cars allowed to trade-in and to buy as a new one are taxis. Egyptian government was concerned about the fact, that a huge number of taxis over 20 years old are still operated. They do not only pollute heavily and require maintenance, but also influence tourism badly. So, Egypt is the example of program focused on a specific type of cars and their owners profession (Nzau-Muteta, 2010, p. 1).

On the other hand, government may implement the program for a bigger number of segments. "Cash for clunkers," implemented in the USA, had several groups of vehicles. Here is how Ted Gayer and Emily Parker (2013, p. 2) state these group in their evaluation of the program:

"Eligible vehicle types included automobiles (passenger cars), category 1 trucks (sports utility vehicles, small trucks, and minivans weighing less than 6,000 pounds), category 2 trucks (vans and pick-up trucks weighing between 6,001 and 10,000 pounds), and category 3 trucks (large vans and trucks weighing between 10,001 and 14,000 pounds). Motorcycles were not eligible".

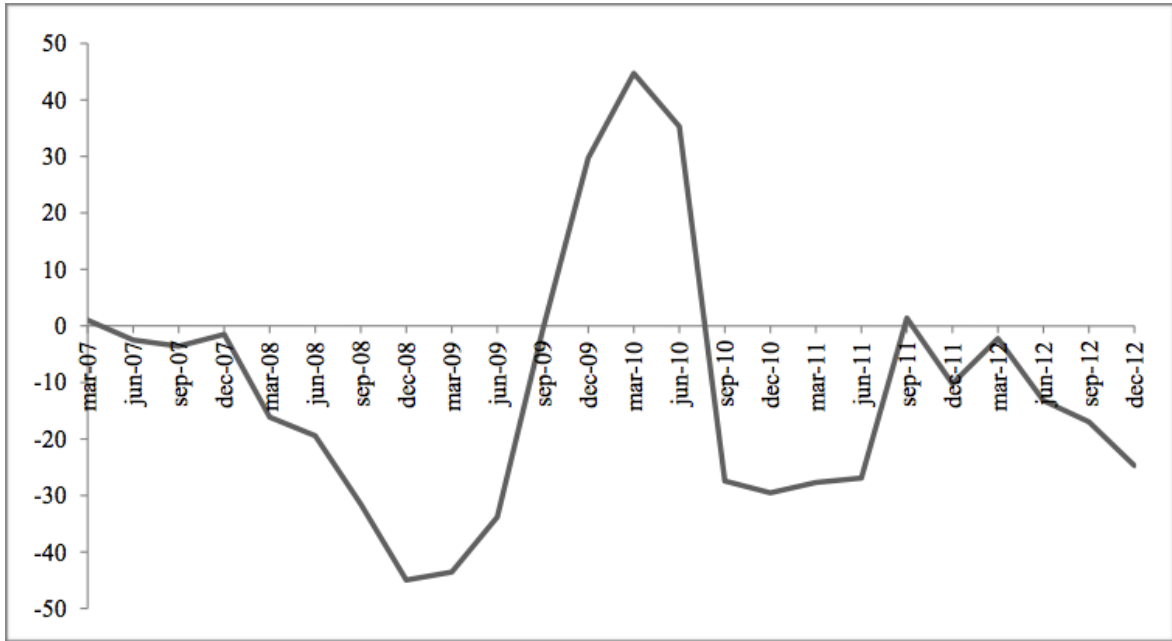
The aim of the program was to improve ecological situation, so the amount of voucher was higher if the mileage per gallon was as well higher. The table of vehicles traded-in and purchased was presented above in the fifth factor (2013, p. 16). The table shows, that customers traded-in their "large" trucks from third category and purchased smaller trucks of a second category. The same

downshifting in every category, so the most beneficial for producers appeared the category of passenger cars.

Another point is connected to the policy of the incentive. From these figures we can see, that the amount of cars traded-in and purchased differs by a small amount of 260 cars. Here comes into action one of the requirements – "the new vehicle had to have been purchased between July 1, 2009 and November 1, 2009." However, as authors of the evaluation say, the last day of purchase was later moved to 24 of August, 2009. Moreover, the maximum price for the new car was set USD 45,000 (Gayer & Parker, 2013, p. 3). These limits played its role in the fact that not all vouchers were used during the program.

However, the set of eligible car segments is subject to change over time. It was proved in Romania. The program started with passenger cars and lasted from 2005 to 2009. Afterwards in 2010 it was extended and additionally included tractors. Since 2011 up to 2014 the program was extended for plain cars, hybrids and electric cars (Raceanu, 2014, p. 188).

The price of new vehicles plays an important role in the scrappage scheme. Sometimes a government sets the price limit – like it was in the USA. Spain's program also included price restrictions. First of all, the program consisted of three stages: the first stage was held from 19th May, 2009 until September, 2009. Its allocated budget was EUR 100 mil. The second stage was held since November, 2009, until the end of 2009, and its budget was EUR 40 mil. These two stages had similar price ceiling of EUR 30,000. The third and the last stage was held from January of 2010 until June of 2010. The third's stage budget was identical to the first's stage – EUR 100 mil, however the price ceiling was raised up to EUR 40,000. Even though these stages had different price limitations, all of them had the same scrapping bonus of EUR 2,000. The graph below presents quarterly percentage change in sales of new vehicles, which shows that the subsidy was able to stop the drop in demand in 2009, but it caused only a short-term effect, since with the end of the program, sales immediately declined.



Source: Cantos-Sánchez, Gutiérrez-i-Puigarnau & Mulalic, 2015, p. 7

Fig. 16 Quaterly Percentage Change in Sales of New Vehicles

But the problem appeared with the bonus. The amount of EUR 2,000 was divided between three parties. As it is said in the report on the case of Spain, "the government aid consisted on a grant of EUR 500 per car from the State government plus another EUR 500 per car from the regional government. Furthermore, it was expected that the car industry would grant an additional subsidy of EUR 1,000 per car. The industry ended adding up to this initiative, and the total aid represented an amount of EUR 2,000 per car" (Cantos-Sánchez, Gutiérrez-i-Puigarnau & Mulalic, 2015, p. 6). Car-makers used this situation for their profit maximization during the recession time. Since customers are not always able to monitor prices and notice an increase in it, or if they cannot influence it, the price increasing plays for car-makers. The half of voucher's cost was subsidized by an automotive industry, so they just raised prices for EUR 1,000 (Cantos-Sánchez, Gutiérrez-i-Puigarnau & Mulalic, 2015, p. 3). This action let them cover their expenses for subsidizing, but some models became too expensive to be eligible for the program. As a result, customers received only EUR 1,000 benefit, what is twice less the official amount.

To sum up, all those factors shape the program. The most important thing that influences it is a program's goal – either ecological improvements, vehicle fleet renewal, or specific help, like it was done in Egypt. Some countries may restrict the possibility to buy a new car produced abroad – like it was done in Russia. In this case domestic producers will receive more benefits, what is advantageous for the country. On the other hand, countries-members of WTO cannot impose such restrictions for the place of production.

Tab. 11 Outcomes of the New Purchased Car Segment and Price Factor

Goal	Country	Goal's achievement
Economy stabilization; Fleet renewal	Egypt	achieved (in progress until Dec. 2015)
Economy stabilization; Environmental improvement	USA	achieved
Economy stabilization; Fleet renewal	Romania	achieved (electromobiles and hybrids promotion)
Economy stabilization	Spain	achieved (only short-term effect – turn back after the end of an incentive)

Source: own research

2.3. Conclusions

As it was said in the previous chapter, countries connect schemes of their scrappage programs with its final goal. They can pursue economy boost, environmental improvement, or fleet renewal. These goals are interconnected, and sometimes countries attempt to reach two of them or even all of them within one program. Thus, schemes implemented are different: for some countries it is more important the emissions requirement, for others – age of cars. According to these three main goals, the following thesis concludes which factors are more crucial and which countries adopted it most advantageously. Gathered information about factors can be briefly summarized within a table. The table presents those factors, which play most important role for these specific goals.

Tab. 12 Goals and Most Important Factors

Economy Stabilization	Fleet Renewal	Environmental Improvement
Budget, time period, and certificate amount		
Country of production		
Age of a car and its condition		
Type of a car		
		Emissions requirements
New purchased car price and segment		

Source: own research

The first goal, which is also the most common, is economic stabilization. All countries, analyzed in the previous paragraph, aimed to stabilize economy. Unlike fleet renewal and environmental improvement, this is usually a primary goal, sought by most countries. Here are several crucial factors of scheme, such as budget and time restrictions, country of production, type of cars, and restrictions on price and segment of new cars. So, out of all six factors figured out, countries, who care about economy stabilization, have stressed these three factors. Budget is in duty when it comes to the sum of benefit and time period of the scrappage program. Sales of cars boosted for 40% on an annual basis in March 2009 in Germany. "CARS" program, implemented in the US increased sales in July 2009 by 14% and in August 2009 by 28%. However, sales in the US returned to pre-program levels just the next month the program was over. Many researchers claim, that scrappage program is only a temporary measure and those, who use it, otherwise would make their purchase in a year or two. Nevertheless, the program lasted only for several months, but it was prolonged with an additional funds.

On the other hand, a government may decide to concentrate on its local economy – as it was done by Russia. Rules of some trade organizations (like WTO) prohibit setting restrictions on a country of production of new car since it breaks competitive rules. Such restriction of Russian government let local companies receive the biggest part of benefits from the program. Russia is the only country from the sample benefited from the possibility to impose the restriction during the 2008 crisis. As a result, the main beneficiary of the program appeared AvtoVaz, who received more than half of all vouchers. Though customers could buy foreign

vehicles, all of them should have been produced in Russia. That measure helped to overcome the recession and keep money "at home." The inverse situation was in the US, where GM and Ford received only 31% of all sales. The biggest part was after Japanese carmakers. This fact received a lot of critique about the scheme of the program. Since imported cars were not excluded from the program, it shortens the positive effect of the program. From this point of view, Russian scheme worked best. After the end of the program, sales fall much less, than it was in America.

Age of cars it taken into consideration in every country of the sample. It usually sets the lowest age of an eligible car, but US had it different: they set the maximum age of 25 years. So, those vehicles above 25 years, were not eligible for the program. This case is an example when two goals are mixed: economy stimulation and environmental improvement. Government authorities claimed that a car, which stays at the backyard in rust, is not polluting air, so there is no need to rebate it.

Germany had a different idea. They set the minimum age of nine years for a traded-in car. However, the newly purchased car could a brand new, as well as owned, but not more than 14 months. Inclusion of those sellers, who has a "young" car and would like to sell it, somehow level one of the losers party of the program.

The importance of what types of cars are eligible for a program is explained by a number of individuals taking part. The wider is a variety of cars to trade-in, the more people can use it. Romanian long lasting program started in 2005 with only passenger cars, but in 2010 it was expanded for agricultural vehicles like tractors. It appeared like a new market for the program. Lately the list of eligible cars was widened even more, attracting electric cars and hybrids. All these changes require money, so government should have been increased the budget allocated.

In contrast to Romania, who enlarged the list during the program was in action, the United States of America had its list quite wide from the very beginning. Romania had nothing to do with trucks, when the US had three groups of vehicles, according to its weight and purpose. Russian list was wider for one position. It also

included buses. Thus, the largest number of groups of customers could benefit from the program.

The price of new cars and its segment plays its role during crises. Countries like Spain and the United States imposed the price limit for new cars. It restricted consumers from buying luxurious cars. This point has two sides: on the one hand, the percentage share of voucher is bigger, if a car is cheaper. Thus people can buy a desired car more easily. But some of them also can buy a more expensive car – the difference is covered by voucher. On the other hand, vehicles above this price are excluded from the program, what narrows the possible model line.

Another point is that a traded-in car can cost more, than a voucher provides. Such people would not participate in the program. If a voucher would be greater, that would attract owners of more expensive old cars. So, the price limit could be also risen. But here appears two problems: owners of cheap cars will receive a huge benefit, what will contrast with owners of expensive cars. Yet another problem is budget restriction. The bigger the voucher is, the higher are expenses of the state (or, otherwise, less vouchers can be given, what does not go in hand with economy stabilization). The possible decision may be a binding of a sum of voucher to the price (or segment) of owned car. This will help to include expensive cars, thus more people will participate in the scrappage program.

Fleet renewal is another goal for governments. The original will can be to decrease the average age of cars. This paper analyzed a Romanian case. As it was stated in the first chapter, high average age of cars leads to many problems, including road safety, health situation, and high expenses for keeping an old car in an operating state. Romania managed to decrease the average age of its car fleet for first two years of program implementation (from 2006 to 2008). The following years the average age started to rise. Since a government changed the scheme of the program, this problem appeared. When a government allowed transmission of vouchers from owner to a potential customer; moreover, when a government allowed potential customers to collect three vouchers for a purchase of one car; in cooperation with the crisis of 2008, the trend was turned in opposite direction.

The possible solution would be not to implement transmission of vouchers. This will reduce bonus per one purchased car, but involve more people, therefore more

new cars bought. However, in situation of crisis of 2008 it could not help to keep the same age (10.7 years in 2008), but it could help to prevent an increase in it.

Type of cars can play a vital role in some schemes. Scrappage program of Egypt was implemented for specific and only type of cars – taxis. The program was aimed to help taxi owners and taxi drivers, whose cars are more than 20 years old. Though, the scheme in Egypt was different not only because of a certain type of car, but also because there were no vouchers. The restriction for new cars was implemented in Egypt, since taxi drivers could purchase only taxis. The program was funded by government in association with banks, which provided cheaper loans. As a part of National Development Plan, made up by Egyptian government, more than 21,000 people benefited from its first stage, and more than 21,000 people will benefit from it until December 2015.

The last goal countries can pursue is to improve ecological situation. Not every country has implemented the newest emissions standard, so not all of them concentrate on emissions reduction factor. Germany allowed scrappage program's members to purchase cars, which were owned for not more than 14 months – even such cars suited the requirement of modern standards. An outstanding approach was in America, where a sum of a voucher depended on fuel efficiency. The more fuel efficient the new car is (than the traded-in), the bigger is the voucher. This method stimulated people not just to buy a new car, but also care about its efficiency. Environmental care was leading in creating this scheme, when a government did not allow to trade-in not-operating cars and cars older than 25 years old. As a result of the program, people preferred to get higher bonus, what led to the tendency of downshifting. People traded-in large and powerful trucks and bought smaller, but more fuel-efficient trucks. Or, as it is shown in the table, many of them preferred passenger cars to trucks. This measure appeared to be efficient in case a government pursue the goal of environmental improvement.

To conclude, countries may vary or mix their goals. Economy stabilization is a goal, which will be perceived even if a government renews the fleet or wish to improve the environmental situation. Economy stabilization or boost always goes hand in hand with scrappage programs. The specifics of a scheme defines secondary goal.

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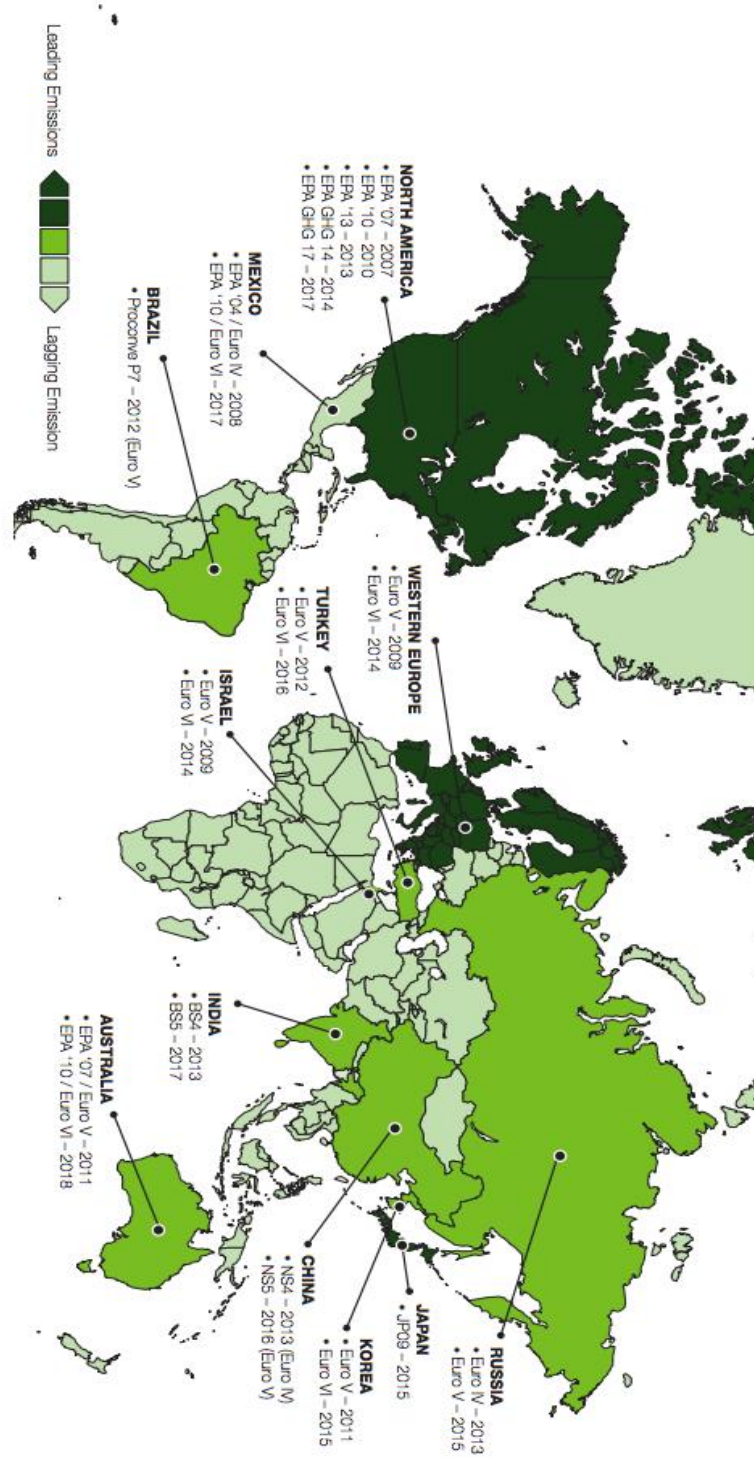
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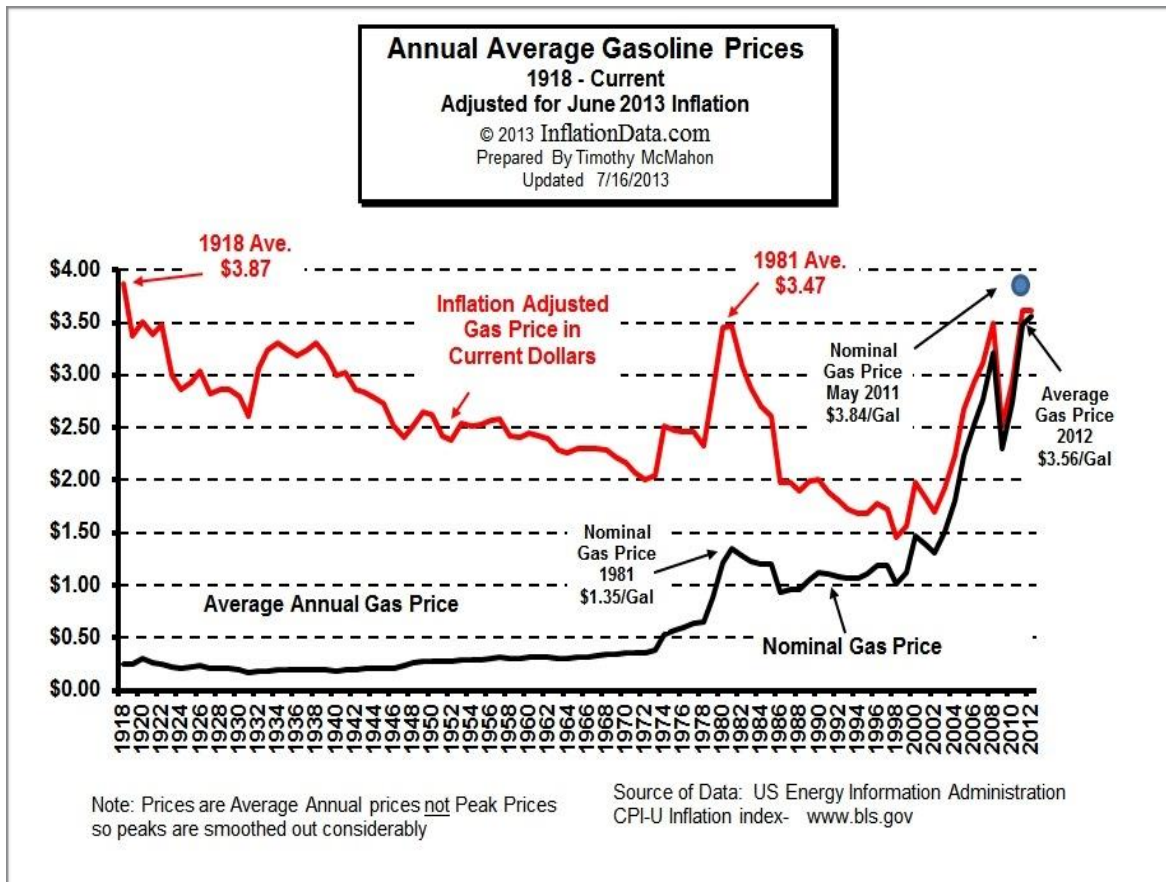
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Appendix No. 1 – Emissions Standards Across Countries



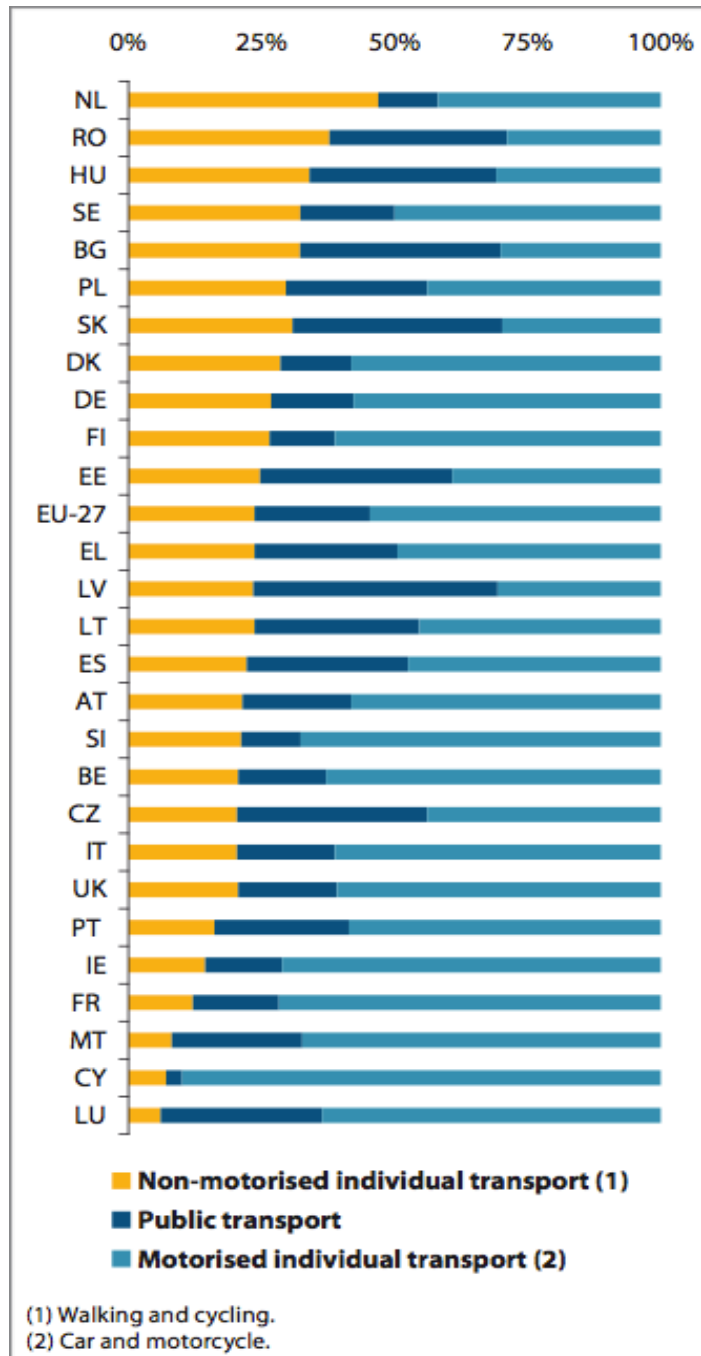
Source: "Global Emissions Regulations," 2014

Appendix No. 2 – Annual Average Gasoline Prices



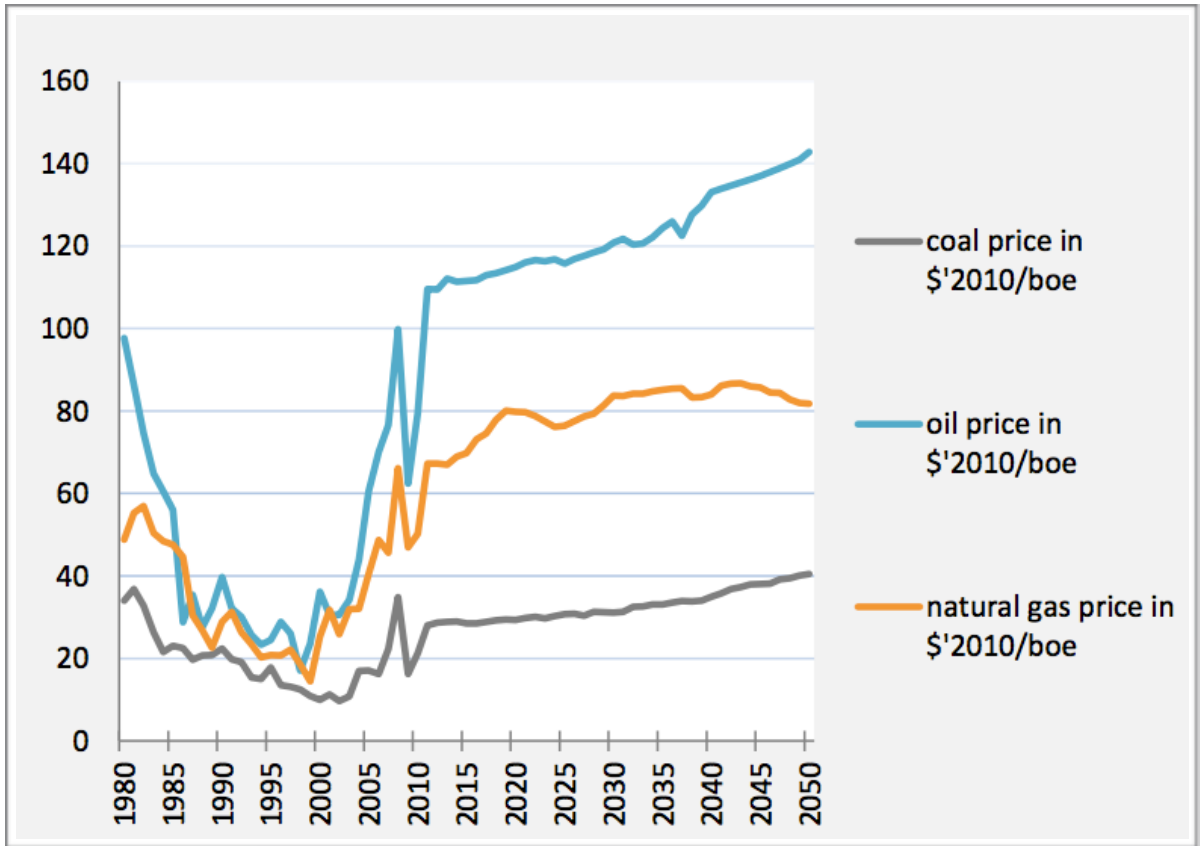
Source: McMahon, 2013

Appendix No. 3 – Main Mode of Mobility, May 2007 (percentage of respondents)



Source: "Consumers in Europe," 2009, p. 259

Appendix No. 4 - Fossil Fuel Import Prices



Source: "EU energy, transport," 2013

ANOTAČNÍ ZÁZNAM

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STRUČNÝ POPIS	<p>Diplomová práce klade za cíl analyzovat různé typy konceptů šrotovného a porovnává je. Programy šrotovného zavádí vlády, stávají se součástí fiskální politiky státu. Práce poukazuje na 3 základní cíle zavádění šrotovného. Zpracování je zaměřeno na jeden, dva nebo dokonce na kombinaci všech tří cílů. Prvním cílem je stabilizace ekonomiky, druhý zdůrazňuje obnovení vozového parku a třetí se týká zlepšení životního prostředí. Tyto cíle se liší podle přístupu k nim, a proto jsou rozdílná i jejich schémata. Schémata jsou popsána podle využitých charakteristik, jako jsou rozpočet a časové období, stáří aut a jejich stav, země výroby, ekologické požadavky, typy aut, povolených v konceptu šrotovného, a také cena a typ nových aut. Tyto charakteristiky utváří koncept šrotovného v souladu v cíli. Ve výsledku byla provedena analýza vybraných zemí s určitými odlišnými charakteristikami a uvedeno nejefektivnější uplatnění šrotovného.</p>		
KLÍČOVÁ SLOVA	Šrotovného, recyklace, vládní pobídky, USA, Rusko, Německo, Rumunsko		
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ANNOTATION

AUTHOR	Anton Snytserev		
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SUMMARY	<p>The thesis aims to analyze different kinds of scrappage schemes and to compare them. Scrappage programs are implemented by governments' authorities and they are a part of Fiscal Policy of states. An author figures out three goals of all scrappage programs. The program may pursue one, two, or even a mix of three goals within one program. The first is to stabilize economy, the second is to renew the fleet, and the last one is to improve environmental conditions. Thesis, that these goals differ by its approach, thus schemes are also different. Schemes are different through the utilizing such characteristics of programs, as budget and time period, age of cars and its condition, country of production, emissions requirements, types of cars eligible for the program, and new cars price and segment. These factors shape the program according to the goal. To show outcomes of it, a sample of countries with certain outstanding factors was explored to find best solutions.</p>		
KEY WORDS	Scrappage program, recycling, government incentives, USA, Russia, Germany, Romania		
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