The Rationale Behind Car Choice in Europe

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Abstract

Since the 1973 oil crisis, scientists, economists and politicians are conscious of the role of oil supply in the economy. However, in the field of automobile transportation there are only a few signs of change: cars still use gasoline and car usage is increasing all over the world. A greater degree of individual consciousness regarding car usage and choice could make a difference regarding international policy, but this type of consciousness is unlikely to emerge.

Almost totally dependant on oil imports, the European economy was severely damaged in 1973 after the first oil crisis occurred. The years following the oil shock, the consciousness of oil dependence has increased in Europe. We have chosen to base our study on Euro-Barometer 26, a study conducted in 1986 about energy problems in Europe. We have studied the relationship between the size of the car of the respondent and his/her concerns about oil prices and energy supply. Other socio-economic factors have also been added to the model to test whether or not car choice is based on rational needs.

Our analysis has been conducted between October and December 2005 when the average public price of oil rose about 40% in the U.S. While there was a real concern in the media and the public opinion about the rising cost of gas, a few commentators noted that most American cars were still far from Japanese or European gas efficiency standards. Since the oil shocks, European (as well as Japanese) car industry has designed smaller and more efficient cars.

In Europe where the public price of oil can be 200% higher than in the U.S due to heavy taxes, the average size of the car is smaller and the average size of the engine is also less important. This study tries to identify whether or not there is a rationale behind car choices in Europe. Is the average price of gasoline responsible for the smaller car size in Europe? Variables like the perception of oil price as well as socio-economic context (number of members in the family, income…) have also been studied in relationship with the average size of the car engine.

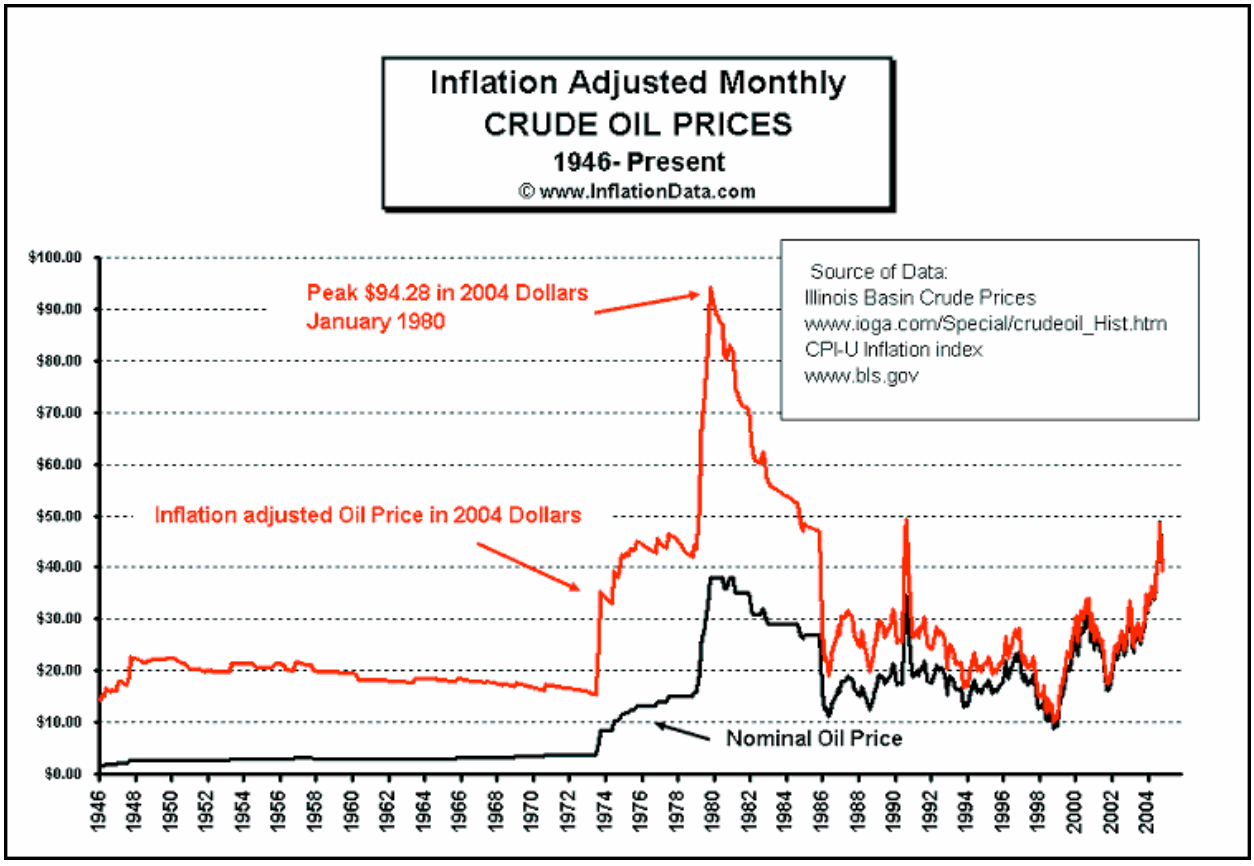
If it is possible to prove that the average price of gas in Europe has had a strong influence on car size in 1986, then a similar move toward smaller and more efficient cars might also be part of the future in the U.S, if the gas price continues to increase. Regarding the current political situation in Middle East, and also the economic situation of the American automobile industry, this question and its consequences on America can be substantial.

A similar approach is often the basis of market research conducted by the U.S car industry. We think an independent approach based on a non-specialized set of data is appropriate to see at what level the public concern about energy impacts car choice.

Price of oil since 1946.

Oil is equally important for the industry of developed economies and the agriculture of rural economies. From a historical point of view, the 19th century was the coal era, but the 20th century was the era of the black gold, the nickname of crude oil.

The “good old times” era when European colonialist regimes were able to get their oil at a cheap price while supporting totalitarian regimes (ex. Iran) was to end in the 1970s. The political situation of the Middle East is evolving. This region of the globe carries almost 75% of the whole oil natural reserve and many countries as well as many corporations compete to be allowed to exploit these phenomenal resources.

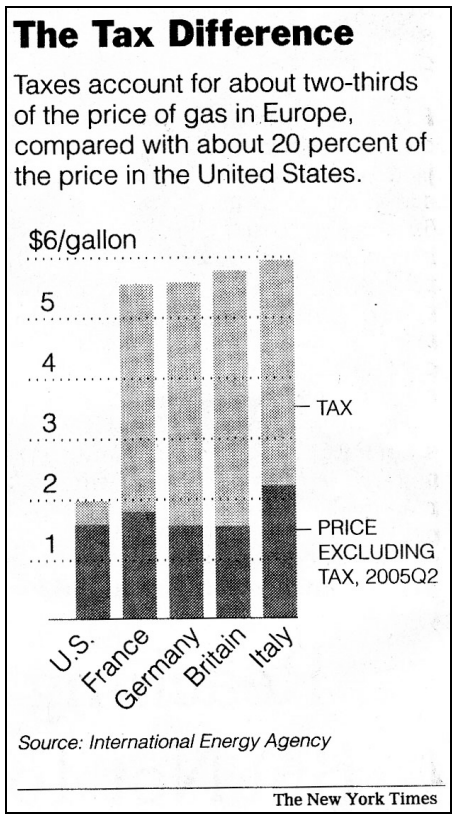


graph 1

Our modern world survived three past crisis, but with damage. However, each crisis (1973, 1979 and 1990) could be seen as alarms (see graph 1). The recent peak is an additional reminder that a shortage of oil is possible, due to political tension or natural disaster.

Public price difference between Europe and U.S

Mark Landler and Carter Dougherty from The New York Times highlighted how tax pressure on gas price is different between different European countries and the U.S in a recent article ("Europe, With Other Woes, Takes Gas Prices in Stride" The New York Times, Thursday September 1 2005 C4).



Source: New York Times

The data they published during the September 2005 crisis were eloquent. The average public price per gallon in Europe was between $5 and $6 while the American public was worried about a local price at $2.

In Europe heavy tax on oil is seen as a way to finance the automobile infrastructure, but also since 1974 as an incentive to low gasoline consumption.

Progress in gas efficiency.

In this context, it is interesting to compare what progress has been made in the U.S and in Europe regarding average car gas efficiency. According to a survey conducted by the French department of energy (Ministere de l'Industrie et des Finances), the average French car efficiency improved from 8.3 L / 100 Km in 1990 (28.5 miles per gallon) to 7.5 L / 100 Km in 2001 (31.5 miles per gallon) a significant 10% gain in 11 years. In the mean time the average usage of car did not change, 12,300 km per year.

In the U.S a federal program called as the Corporate Average Fuel Economy (CAFE) was elaborated to dictate the car efficiency sold in the U.S market. According to the Energy Policy and Conservation act in 1975, the auto industry was engaged in imposing the overall efficiency to 27.5 mpg for passenger cars and 20.7 mpg for light trucks and SUV. In a 2001 publication, the national council of research comments the effect of this legislature, "The CAFE program has had some unintended consequences, the committee said. As consumers have begun buying more and more minivans, SUVs, and pickup trucks, the overall average fuel economy of new vehicles has dropped because the larger, heavier vehicles have less stringent standards to meet than

passenger cars. In 2001, sales of minivans, SUVs, and pickups are expected to exceed sales of passenger cars for the first time ever. ».

In fact, the average car consumption in the U.S is closer to 20 mpg due to the recent trend of large SUVs in the American market; while at the same time in Europe, cars efficiency exceeds 31 mpg. This data confirms a significant gap in average car efficiency between Europe and the U.S as well as a major difference in consumer price of gas. The question we analyze is related to these facts. Does the consumer price of gasoline have an influence on the way Europeans choose their car? Moreover, is there any rational behind this choice?

The survey ICPSR 8660.

We base our analysis on the survey Euro-barometer 26: Energy Problems, conducted by Jacques-Rene Rabier, Helene Riffault and Ronald Inglehart and by Faits et Opinions, Paris. ICPSR ed. Ann Arbor, MI: Inter-university in November 1986. Named ICPSR 8680, this survey focuses on many energy related subjects as well as transportation issues within the twelve countries included in the European Economic Community now E.U (France, Belgium, Netherlands, Germany, Italy, Luxembourg, Denmark, Ireland, the United Kingdom, Greece, Spain and Portugal). Although the overall trends somewhat diverged between E.U countries, we don't focus our analysis comparing different pattern in Europe. Our main focus is to get a sense of the overall culture regarding car usage in Europe, and to compare it with the situation in the U.S.

The summary attached to the ICPSR 8680 study describes the approach of the questions regarding cars and transportation as "Respondents who held a current driver's license were questioned about the size and type of vehicle driven most often,

how frequently they drove, and whether or not they used a safety belt". We relate this part of the study to other questions of the study that included a total of 233 questions. A total of 11,789 individuals are questioned, 5,307 from them are not holding a car license.

Size of car vs. other factors.

The dependant variable that is our main focus is formulated as follow: "If you drive, which of these vehicle do you drive the most often? #1: A small car (that is an engine less than 1000 cc) #2: A medium car (engine capacity of between 1000 – 2000 cc) #3: A large car (engine capacity 2000 cc or above) #4: A van or minibus #5: A lorry Truck, a bus or coach #0 DK/NA #9: Inapt., Not holding a current license." We decide to drop the respondent who chose to answer #5, #0 and #9 from the sample, as they are not related to our concerns. The respondents who chose #4 are added to category #3, a van or a minibus for domestic usage is going to be considered for our purpose as a large car. After this recoding, we obtain a final dependant variable named "type of car" including three categories, 1: small vehicle, 2: Medium vehicle, 3: Large vehicle. A total of 6,050 respondents are studied with the recoded variable (see table below).

Dependant Variable type of car		
	Frequency	Percent
1	1,445	23.88
2	3,966	65.55
3	639	10.56
Total	6,050	100.00

The main goal of our analysis is to find what factual parameter is likely to influence the car used by the respondent, focusing in particular on gas prices. As independent variable, we use the following (see appendix):

- Number of children between 8-15 years in the family
- Number of children less than 8 in the family
- Age of respondent
- Income of the family
- Age of respondent's license
- Size of locality where respondent live
- Gas price perception (this past 6 months)
- Perception of energy issue in 10 years

The original coding is always used except for the size of the locality where different scale is used for different countries.

The model.

We chose all of these variables, as they are likely to influence the size of the respondent's car if his/her choice was based on practical and factual factors. To evaluate our model we use an oprobit mathematical regression with the variable "type of car" as dependant variable and all the independent variables listed above. The results are shown on table 2 below.

```
Number of obs   =       3848
LR chi2(8)      =     157.02
Prob > chi2     =     0.0000
Pseudo R2       =     0.0242
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	Coef.	Std. Err.	Z	P>z

Number of children (8-15 years)	.0151649	.0255984	0.59	0.554
Number of children (<8 years)	-.0315031	.0270695	-1.16	0.245
Income of the family	.0496944	.0066152	7.51	0.000
Age of respondent	-.0085465	.0021016	-4.07	0.000
Age of license	.1403309	.0205057	6.84	0.000
Size of locality	-.0049626	.0140448	-0.35	0.724
Perception of oil price(6 month)	.0338552	.0155015	2.18	0.029
Energy prob. Next 10 years	.0683781	.0173340	3.94	0.000

Table 2

According to the results, the reliable information is the one related to the independent variables “Income of the family”, “Age of respondent”, “Age of license”, “Perception of oil price” and “Energy problem within the next 10 years”. These five variables have an independent effect of the size of the car in Europe. The other variables don’t show enough reliability to be study as the P>z value is too high.

The first variable that has a real effect on the size of the car is the income of the family. According to the positive coefficient, the higher the incomes are, the larger the size of the vehicle is. The second variable, age of respondent, shows a negative coefficient. One interpretation that can be done is as far as the respondent is older, he/she is likely to use a smaller car. Our sample was very diverse in age (16 to 94 years) with 50% of the sample between 16 and 40. It can be assumed that after 40 years, the probability of children living in the household decrease, as well as the average size of the car used.

Interestingly, the variable “age of license” shows a different figure. The coefficient is positive. As far as the driver is experimented, he is likely to drive a larger car. This result is not a surprise; the average owner of medium and large car in Europe is near 50, according to marketing studies made by the auto industry.

The result regarding the perception of gas price has to be analyzed rigously. The original question asked is, " From your own experience, compared with 6 months ago, how have the prices of petrol or oil products for consumers changed? #1: Gone up a lot, #2: Gone up a little, #3: stayed the same, #4: Gone down a little, #5: Gone down a lot. It appears that in 1986, date of the study, the average public price went reasonably down as the crude price went sharply down (see graph 1). 55% of the respondents have the perception that the gas price is down or flat, while there was a worldwide tendency to low the gas prices. The first conclusion related to this variable is the perception of gas price is different than the actual price. In addition, it must be noted that according to the positive coefficient, if the respondent has a perception that oil prices are down, he is likely to drive a larger car. Users of large car are certainly more likely to informed about the real price of gas. Another hypothesis might be that large car owners are satisfied with the current price of gas in 1986. In any case, there is a clear relationship in our population between the size of the car and the perception of the gas price.

The last independent variable that can be analyzed is the vision of the respondent about a potential energy crisis within the next 10 years. The coefficient in the model is positive. As far as the respondent concerns are low (Not a very serious problem or no problem) he/she is likely to drive a large car.

Our analysis shows how a sample of rational concerns is related to the size of the European car; however, the total impact of these aspects has also to be analyzed. Our model shows a Pseudo R^2 value equal to 0.0242. Among all the reasons that have an impact of the car size the respondents are driving, only 2.4 % are included of our

model. Even if some of our independent variables have a real impact, many other might have a stronger influence on our dependant variable.

Conclusion

The main goal of this study was to identify whether or not European drivers in 1986 were choosing their car with the gas price in mind. We have a clear answer from our model. The perception of the gas price as well as the possibility of a future energy crisis have a real but, in fact, limited influence. Even with a price artificially maintained at a very high level, consumer gas prices do not significantly influence Europeans drivers.

In our modern societies, cars are a very important expression of social personal identities. The rationale behind the choice of the car is not the main reasoning. Automobile is a symbolic representation of the owner's personality; as a consequence we believe that the choice of a car is mostly driven by emotional reasons.

To succeed in selling highly efficient cars, the car industry might have to follow its current strategy: make cars that appeal to one's emotion thanks to design and features. It is interesting to see that most of the gain in efficiency on the European market has been possible thanks to a move from petrol powered engine to diesel powered one. While the average size and style of the car have not changed, the technology it has inside. This experience of the European market with high gas prices might be useful for the U.S car industry. Fuel efficiency is not a sufficient feature to sell cars even when oil is at high price. To improve the efficiency of U.S cars, new technology has to be integrated in the current vehicles that appeal American customers.

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Appendix

Number of children (8-15 years)

	Freq.	Percent	Cum.
1	8,844	74.71	74.71
2	1,864	15.75	90.46
3	866	7.32	97.78
4	207	1.75	99.53
5	43	0.36	99.89
6	13	0.11	100.00
Total	11,837	100.00	

Number of children (<8 years)

	Freq.	Percent	Cum.
1	9,330	78.82	78.82
2	1,576	13.31	92.13
3	763	6.45	98.58
4	137	1.16	99.74
5	22	0.19	99.92
6	5	0.04	99.97
7	4	0.03	100.00
Total	11,837	100.00	

Age of respondent

	Freq.	Percent	Cum.
15	186	1.57	1.57
16	189	1.60	3.17
17	202	1.71	4.88
18	214	1.81	6.68
19	233	1.97	8.65
20	213	1.80	10.45
21	217	1.83	12.29
22	254	2.15	14.43
23	231	1.95	16.39
24	274	2.32	8.70
25	272	2.30	21.00
26	249	2.10	23.10
27	228	1.93	25.03
28	226	1.91	26.94
29	236	1.99	28.94
30	239	2.02	30.96
31	207	1.75	32.71
32	207	1.75	34.45
33	231	1.95	36.41
34	272	2.30	38.71
35	240	2.03	40.73
36	229	1.94	42.67

37	191	1.61	44.28
38	167	1.41	45.69
39	208	1.76	47.45
40	234	1.98	49.43
41	166	1.40	50.83
42	188	1.59	52.42
43	171	1.45	53.87
44	199	1.68	55.55
45	220	1.86	57.41
46	204	1.72	59.13
47	176	1.49	60.62
48	160	1.35	61.97
49	164	1.39	63.36
50	186	1.57	64.93
51	125	1.06	65.98
52	164	1.39	67.37
53	141	1.19	68.56
54	209	1.77	70.33
55	177	1.50	71.82
56	167	1.41	73.24
57	162	1.37	74.60
58	156	1.32	75.92
59	159	1.34	77.27
60	192	1.62	78.89
61	154	1.30	80.19
62	169	1.43	81.62
63	148	1.25	82.87
64	188	1.59	84.46
65	194	1.64	86.10
66	166	1.40	87.50
67	144	1.22	88.72
68	120	1.01	89.73
69	105	0.89	90.62
70	141	1.19	91.81
71	102	0.86	92.67
72	127	1.07	93.75
73	114	0.96	94.71
74	99	0.84	95.55
75	84	0.71	96.26
76	82	0.69	96.95
77	54	0.46	97.41
78	57	0.48	97.89
79	39	0.33	98.22
80	58	0.49	98.71
81	29	0.25	98.95
82	23	0.19	99.15
83	25	0.21	99.36

84	20	0.17	99.53
85	18	0.15	99.68
86	11	0.09	99.77
87	10	0.08	99.86
88	4	0.03	99.89
89	5	0.04	99.93
91	3	0.03	99.96
93	2	0.02	99.97
94	1	0.01	99.98
95	2	0.02	100.00
Total	11,833	100.00	

Income of the family (todate French Francs equivalent)

	Freq.	Percent	Cum.
1 <3,000	718	7.47	7.47
2 3,000-3,999	812	8.45	15.92
3 4,000-4,999	931	9.68	25.60
4 5,000-5,999	1,135	11.81	37.41
5 6,000-6,999	1,069	11.12	48.53
6 7,000-7,999	1,003	10.43	58.96
7 8,000-8,999	866	9.01	67.97
8 9,000-9,999	6.97	74.94	
9 10,000-12,499	758	6.89	82.83
10 12,500-14,499	585	6.09	88.91
11 14,500-24,499	701	7.29	96.20
12 > 25,000	365	3.80 1	00.00
Total	9,613	100.00	

Age of licence

	Freq.	Percent	Cum.
1 <1 year	215	1.82	1.82
2 1 to 2 years	372	3.16	4.98
3 3 to 5 years	663	5.62	10.60
4 5 to 10 years	1,223	10.37	20.98
5 11 to 20 years	1,998	16.95	37.93
6 21 to 30 years	1,157	9.81	47.74
7 >30 years	854	7.24	54.98
8 not holding license	5,307	45.02	100.00
Total	11,789	100.00	

Size of locality

	Freq.	Percent	Cum.
1 rural	1,320	12.92	12.92
2 <10,000	1,240	12.14	25.06
3 20,000 to 99,999	2,070	20.26	45.32
4 100,000 and +	2,103	20.58	65.90
5 Metropole (Paris…)	3,484	34.10	100.00
Total	10,217	100.00	

Perception of oil price(6 month)

	Freq.	Percent	Cum.
1 Gone up a lot	1,376	12.89	12.89
2 Gone up a little	2,338	21.90	34.79
3 Stayed the same	2,175	20.37	55.17
4 Gone down a little	3,422	32.06	87.22
5 Gone down a lot	1,364	12.78	100.00
Total	10,675	100.00	

Energy prob. Next 10 years

	Freq.	Percent	Cum.
1 very serious	2,314	23.98	23.98
2 Fairy serious	2,802	29.04	53.03
3 Not very serious	2,216	22.97	76.00
4 No problem	2,316	24.00	100.00
Total	9,648	100.00	