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INTERNATIONALISATION MODES AND DETERMINANTS.

THE CASE OF ITALIAN AUTOMOTIVE FIRMS

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INTERNATIONALISATION MODES AND DETERMINANTS. THE CASE OF ITALIAN AUTOMOTIVE FIRMS

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Abstract

This aim of this paper is to study the characteristics of the internationalisation process and to identify its determinants in a representative sample of firms in the Italian automotive chain. The main findings of an econometric analysis based on micro-evidence are that: a) the firms engage in complex modes of internationalisation; b) the individual firm's characteristics play a significant role; c) the firms located in the province of Turin have a clear localisation advantage, a sort of an"industrial district" effect.

Key words: Internationalisation, Firm Behaviour, Auto Industry, Qualitative Choice Models

JEL codes: D21, L62, F23, C25

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1. Introduction and background literature

In the past fifteen years internationalisation processes have become central to the firms' strategies and have taken on many and complex forms. In fact, the current capacity of a firm to penetrate the international market is the outcome of a strong commitment that is reflected in investments in commercial penetration, technical agreements and foreign direct investments. These operations, in some cases, are of a complementary rather than substitutable nature (Basile et al., 2003). Furthermore, exposure to foreign markets has been accelerated by the international fragmentation of production, i.e. by the externalisation of sizeable segments of the production process to other firms operating beyond the national borders. This process affects all industries, from textiles to aerospace (Feenstra, 1998; Feenstra and Hanson, 2001; Hummels *et al*., 2001; while Antras 2003 ; Antras and Helpman 2004 explore the implications of firms' heterogeneity on strategies of insourcing and outsourcing). The extension of the supply network to an international scale has been facilitated by the diffusion of information and communication technologies; however an important role was also played by the direct investments of multinational firms that have, to an increasing extent, fragmented production across different productive sites over the past fifteen years.

Italian firms are also subject to great exposure to foreign markets: while exporting goods from plants located in Italy is still the most common activity, the past ten years have witnessed more frequent use of more complex forms of internationalisation. This is true also of the involvement of Italian firms in the process of fragmentation of production on an international scale, which took place starting in the second half of the 90's as a reactive strategy to the structural change in the global competitive context in which they operated.

The broad and complex participation of the firms on foreign markets was accompanied by an increasing interest from theoretical and empirical literature that threw new light on the nature and determinants of the internationalisation process. As it has been widely recognised, in the second half of the 90's there was a significant break with the accepted interpretation according to which the explanatory variables of the presence of the firms on international markets were mainly attributable to comparative advantages, the characteristics of the different industries, commercial barriers and transport costs. The contribution from Bernard and Jensen in 1995 (and subsequently 1999 and 2004a) emphasizes, for the first time, the heterogeneity of the firms, underlining that, even within the same industry, exporting and non-exporting firms are distinguished by several firm-specific characteristics. Initially adopted only for exports, a new perspective, , according to which there is a systematic relationship between firms' characteristics and their participation in trade and international investments has gained momentum:

"Exporting firms are not a random sample of the population of firms in an industry, and neither are firms engaged in FDI. Only a small fraction of firms export, they are larger and more productive than firms that serve only the domestic market, and more firms export to larger markets. A small fraction of firms engage in FDI, and these firms are larger and more productive than exporting firms. A lot of within-industry heterogeneity exists, and the distribution of firms by size or productivity varies substantially across industries" (Helpman, 2006: 590).

The availability of micro panel data enabled researchers to carry out econometric analyses that confirm, for different countries and different types of industry, the theoretical predictions according to which a set of firms' characteristics constitute the main explicative variables of the different internationalisation modes of the firms. These results are similarly confirmed for Italy in Basile et al, 2003; Baldwin et al., 2007; Bugamelli et al., 2000; Castellani e Zanfei, 2007; Sterlacchini 2002.

1.1 The internationalisation of the firms in the automotive chain: objectives of the research

Our empirical analysis falls within the above mentioned framework and focuses on the automotive firms. This industry constitutes a privileged point of analysis: it felt the full force of the process of globalisation of the market for intermediate and finished goods, a

process that was effectively stigmatised by the expression "the world that changed the machine" (Boyer and Freyssenet, 2001)[1]. In the space of ten years, in fact, there was an acceleration in the transformation of the entire geographical area of reference, the relative weight of outlet markets shifted and with this the importance of the single areas of production, as well. The expansion of new markets brings with it the establishment and consolidation of new areas of production and new destinations for foreign direct investments, and thus Western Europe and North America lose weight in favour of Asia and China, *in primis*, which became the third largest producer of motor vehicles in 2006, overtaking Germany (OICA, 2007), Western Europe and South America. According to the World Trade Organization: "In the production of an "American" car 30% of the car's value originates in Korea, 17.5% in Japan, 7.5% in Germany, 4% in Taiwan and Singapore, 2.5% in the U.K., and 1.5% in Ireland and Barbados. Only 37% of the production value is generated in the United States" (Antras and Helpman, 2004) The growth of vertical international specialisation has given rise to a thorough spatial reorganisation among the large auto assemblers and their suppliers, which goes beyond national boundaries to create transcontinental supply networks with the result that "local, national and regional value chains in the automotive industry are 'nested' within the global organizational structures and business relationships of the largest firms" (Sturgeon, 2008).

In Italy the expansion on foreign markets of the firms operating in the auto chain witnessed an acceleration at the end of the 90's. The phenomenon is the fruit of two effects. On the one hand, it emerges as a reaction to the decreasing weight of the Italian supplier firms in the strategies of Fiat Auto, the key player in Italy. In the 90's, in fact, Fiat Auto created a regional industrial pole in Poland and extended its presence in Argentina and Brazil. The expansion on foreign markets accompanied the process of moving production to South Italy, a process that culminated in 1993 with the building of a factory in Melfi. The Turin pole shrank even further after the turn of the Century, following the acceleration of the Fiat crisis and the loss of market shares on the domestic and international markets.

On the other hand, we also find the co-location effect: for a selected group of firms in the Italian auto chain the internationalisation process is rather the fruit of a "privileged" relationship with Fiat Auto that encouraged some suppliers to relocate near to their foreign factories, so that Fiat was sure to maintain the desired qualitative standards.

Our empirical study of the determinants on internalisation uses as a data set the information gathered by the Turin Chamber of Commerce, Industry, Agriculture and Handicrafts (CCIAAT, 2006) on a representative sample of 786 firms operating in the auto chain. The variables refer to 2005, which saw the end to the worst crisis ever for Fiat Auto in over a hundred years of activity, which the company seemed to overcome only in March 2005.

Our research has a dual objective: firstly to test, using econometric models, the nature of the internationalisation process, that is to verify whether the firms in the auto chain tend to carry out different modes of internationalisation at the same time, such as exports, commercial agreements, technical collaboration, and foreign direct investments. This implies, as a number of authors have stressed, that the process of internationalisation is not sequential, from exporting to FDIs, since it is cumulative: a number of modes of foreign expansion are put into place to support competitiveness on foreign markets. (Helpman, Melitz and Yeaple, 2004; Greenaway and Kneller, 2007). Few studies have been carried out in this respect for the automobile sector in other countries. For the Italian automobile firms, the qualitative evidence in Castelli et al. (2008) seems to provide empirical support for this approach.

Secondly, our aim is to investigate which are the characteristics of the firm that affect internationalisation processes. In accordance with the theoretical predictions and the above mentioned empirical findings, one would expect the company size to play a determining, but not exclusive, role. Other important characteristics are growth, innovation, the diversification of customer portfolio, and belonging to a group. Moreover, the data at our disposal enable us to examine, albeit via a crude proxy, the impact of localisation in the province of Turin on the internationalisation of the firms. Our main findings based on the available micro-evidence are that: a) the firms engage in complex modes of internationalisation; b) the individual firm's characteristics play a significant role; c) the firms located in the province of Turin have a clear localisation advantage: the industrial district effect**.**

This work contributes to the literature on internationalisation modes and the analysis of its determinants, since it proposes an inferential analysis of a representative sample of firms of the Italian auto chain, whereas these aspects have, thus far, been investigated exclusively by means of descriptive analyses of representative samples or through case-studies (we pursue the latter approach in a companion paper, Castelli et al., 2008). The article is organised as follows: section 2 provides information on the variables used; sections 3 and 3.1 discuss the results; and section 4 gives the conclusions.

[1] The expression *"The world that changed the machine"* overturns the interpretation of the beginning of the 90's: *"The machine that changed the world" (*Womack et al., 1991) an important text, resulting from a study in the International Motor Vehicle Program of MIT, which showed the "superiority" of the Japanese model of auto production and relationships with the supplier firms compared to the prevalent organisation of the larger North American firms.

2. The questionnaire, the characteristics of the firms and the variables of interest

This part of the paper will briefly offer a description of the questionnaire and of the data that have been used in the empirical analysis. The data set used come from the survey of the Turin Chamber of Commerce, Industry, Agriculture and Handicrafts (CCIAAT), which collects information, by means of direct surveys of a representative sample of 786 firms of the automotive chain, out of a universe of 3,854 firms.

Indicators of internationalisation

From the data provided in the questionnaires it is possible to construct a set of indicators related to the internationalisation modes of the firms. In particular, the questions about the presence of factories abroad (D13), the turnover generated by foreign sales (D15) and the main forms of commercial presence abroad (D15c) allow us to construct three indicators related respectively to exports, commercial penetration and foreign direct investments[2].

Table 1: Some descriptive statistics

aggregate regions	absolute frequency										
	total freq.	sales coming from the auto market (level)			sales related to the Fiat Group (level)			firms with factories abroad	exporting firms	firms with commercial penetration abroad	firms that import
		low	medium	high	low	medium	high				
Central Italy	81	3	7	71	63	7	11	3	33	12	48
Emilia-Romagna	79	3	6	70	73	6	0	6	47	17	43
Islands	14	2	1	11	12	1	1	0	3	0	6
North-East	76	7	5	64	69	2	3	6	48	20	49
North-West	495	43	89	363	347	70	76	40	341	100	310
South	41	2	4	35	25	5	10	1	16	5	20
Total	786	60	112	614	589	91	101	56	488	154	476

Turnover growth with respect to 2004	freq.	number of workers	freq.	workers working abroad (%)	freq.	turnover in 2005 (million of euro)	freq.
greater than 15%	121	from 1 to 9	177	Zero%	742	less than 1	135
greater than 5%	247	from 10 to 50	383	less than 10%	12	from 1 to 2	139
between 0 and 4%	217	From 51 to 250	147	from 11% to 25%	10	from 2 to 10	255
between 0 and -4%	112	more than 250	75	from 26% to 50%	11	from 10 to 50	145
less than -5%	44			from 51 to 75%	4	more than 50	73
less than -15%	38			more than 75%	4		
total	779		782		783		747

Table 1 describes all the possible combinations of these three indicators, with the relative absolute frequency calculated on the results of the questionnaire. The ISI indicator (Index of Strategies of Internationalisation) summarises the different combinations of internationalisation strategies.

[2] Basile et al. (2003) build similar internationalisation indicators.

Table 2: Internationalisation strategies and absolute frequency of the different forms

Internationalisation Strategies	ISI	Exports	Commercial Penetration	Foreign Direct Investments	Absolute Frequency
No Internationalisation	0				291
Exports	1	*			309
Exports and commercial penetration	2	*	*		130
Exports, commercial penetration and foreign direct investments	3	*	*	*	24
Exports and foreign direct investments	4	*		*	25
Commercial penetration	5		*		0
Foreign direct investments	6			*	7
Commercial penetration and foreign direct investments	7		*	*	0
Total					786

Based on these characteristics, it is possible to construct a cumulated index of internationalisation (shown by the FEI, Foreign Expansion Index) which will assume that FEI=0 in cases where internationalisation is absent, FEI=1 if the firm only exports, FEI=2 if the firm exports and has a commercial network abroad and, finally, FEI=3 if it exports, has a foreign commercial network and invests directly abroad. The internationalisation process is thus seen as a cumulative process. The following table gives the values and relative frequency of the FEI.

Table 3: FEI indicator and absolute frequency of the different forms

FEI	Absolute frequency
0	291
1	309
2	130
3	24
Total	754

Some characteristics of the firms: Size, Belonging to a group, Growth, Investment in R&D

From the data supplied in the questionnaire we can obtain two indicators related to the size of the firms. The first refers to the number of workers, while the second shows the turnover for the year 2005. However, there are no precise values for either, instead there are ranges of values. The strategy adopted in the construction of the two size indicators is to take the central values of the specific categories. Since we do not know the distribution within each category, this measure could be biased. Nevertheless, since the information gained from the questionnaire is for the most part qualitative, we chose to adopt this strategy rather than to create a dummy variable for each type of size variable.

Another characteristic related to the firm is whether or not it belongs to a group. We created three dummy variables that specify the position of the firm within the group: *parent company*, *subsidiary* of another Italian or foreign firm, or *independent* i.e. not belonging to any group (see Question 18).

On the other hand, we have information about the performance of the firm compared to the previous year (Question 17). Also in this case one has to deal with ranges of values, and for the reason above explained we preferred to create a variable (*growth*) using the central values of the specific categories.

Another characteristic is the amount of turnover invested in R&D (measured by the variable *research*, obtained again by using the central values of the category), and the research structures flanking the firm. In this case we created dummy variables to indicate whether this was a university (Italian or foreign), public research institute (Italian or foreign), private research institute (Italian or foreign), or the acquisition of patents (Italian or foreign). The last form, in any case, recorded a zero frequency.

Production and product characteristics

A first piece of interesting information on output is the share of turnover generated by the auto market and by the commercial vehicles markets. In order to analyse this characteristic, we created three dummy variables to indicate a low, medium or high level of sales on the auto market.

For the production chain another three dummy variables were created with the aim of showing whether the firms were specialists and subcontractors, module and systems makers, or engineering and design firms.

The questionnaire provided important information about the firms' imports. It is possible to create a number of dummy variables that identify the characteristics of the goods imported. However, since there are no additional information on the type of imports for some of these dummy variables, we decided to create just one with a unit value if the firm imported supplies and a nil value if it did not, regardless of the type of goods imported.

Relationships with Fiat Auto

The relationship between the firms and Fiat Auto was the subject of one of the questions on the questionnaire, and firms were asked the percentage of sales related to the Fiat or to suppliers of the Fiat Group. As before, in this case, too, we decided to construct a quantitative variable using the central values of the categories indicated in the questionnaire.

3. Empirical analyses

The first part of the empirical analysis takes into consideration all the possible internationalisation strategies. The reference variable is the ISI indicator with the aim to evaluate the main determinants of internationalisation choices. This first empirical analysis was carried out by estimating a multinomial logit model, in which the control variables were those previously described[4]. The results are shown in Table 4[5]. The indicator ISI=0 (no internationalisation) is used as a reference value, thus the coefficients should be interpreted as the probability of a certain mode of internationalisation compared to the probability of no internationalisation at all. In any case, internationalisation choices 5, 6 and 7 were excluded from the empirical analysis because not represented in the sample. In Table 1 we can see that for ISI=5 and ISI=7 the frequency is nil and there are only seven cases with internationalisation choice ISI=6.

The results show that the location of the firm in the province of Turin had a clear and statistically significant positive impact on the probability of internationalisation, especially for those firms using modes 1 (exports) and 2 (exports and commercial penetration), for which the coefficients are highly significant.

One interesting result is the link between the firm and Fiat as a customer. The coefficients of the 'sales to Fiat' variable are all *negative* and are statistically significant for modes 1, 2 and 3. Having strong ties to the Fiat Auto reduces the probability of choosing internationalisation compared to the choice not to internationalise.

Furthermore, the decision to undertake any form of internationalisation seems to depend also on the choice of whether or not to import. Company size, measured by the level of turnover and the number of workers, seems to increase the propensity to internationalise. The parameter linked to the number of workers is significant for choice 1, while the parameter linked to turnover is significant for choices 3 and 4. As expected, all these coefficients were positive.

Another interesting point is the relationship between the internationalisation choices and the growth variable. The coefficients associated with this variable are positive and are significant for ISI=1 and ISI=2. However, we must take into consideration the fact that there is a possible problem of inverse causality. This problem is difficult to solve because the available data do not allow us to use methods of estimation based on the principle of instrumental variables. With all due precaution, these results lead us to suppose that growth in turnover drives firms to undertake internationalisation choices.

The test statistic for equalling zero for all the coefficients is 162.87, with a *p-value*=0.000.

[4] For a detailed presentation on this type of model and on the ordered probit models introduced later on, see for example Greene (2008).

[5] In the paper we only provide the results of what in our opinion can be considered to be the best specification. However the results are extremely robust compared to other specifications. The full results of the appraisal are available on request.

Table 4: Estimates and p-value of the multinomial logit model P(ISI=j), j=1,2,3,4

ISI	1		2		3		4	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Turin province	0.913***	0.000	0.673**	0.012	0.471	0.358	0.465	0.382
Innovative products	-0.235	0.477	-0.821*	0.052	-1.545*	0.096	-0.914	0.357
Mature products	-0.245	0.399	-0.426	0.223	-0.108	0.912	-0.881	0.375
Middle auto market	0.523	0.204	0.044	0.938	-1.056	0.439	18.909***	0.000
Top auto market	0.595*	0.085	0.691	0.134	0.170	0.890	19.135***	0.000
Specialists	0.542*	0.070	1.005***	0.005	-0.101	0.924	1.161	0.176
Modules-systems	0.714	0.331	1.131	0.223	1.252	0.309	0.916	0.407
Engineering-design	-0.003	0.993	-0.237	0.602	0.974	0.318	0.454	0.635
R&D	0.062	0.490	0.153	0.148	0.279	0.309	0.532**	0.034
University Research Centres	-0.232	0.723	0.129	0.861	1.208	0.331	-0.403	0.725
Public Research Centres	1.590	0.158	2.109*	0.066	2.983*	0.066	0.612	0.681
Private Research Centres	-0.096	0.867	0.350	0.598	-0.341	0.760	0.688	0.465
Turnover from Fiat Auto	-0.022*	0.080	-0.049***	0.004	-0.086**	0.033	-0.024	0.479
Imports	0.804***	0.000	0.982***	0.000	-1.110	0.173	0.569	0.418
Subsidiary	-0.672	0.197	-0.115	0.868	-1.230	0.169	-0.700	0.488
Independent	-0.140	0.777	0.136	0.841	-3.738***	0.001	-0.831	0.453
Employment	0.011**	0.038	0.007	0.300	-0.019	0.403	0.000	0.991
Turnover	0.024	0.255	0.039	0.140	0.180***	0.009	0.131***	0.005
Turnover Growth	0.016**	0.033	0.023**	0.027	0.036	0.112	0.013	0.482
R&D^2	0.004	0.547	-0.002	0.848	-0.012	0.492	-0.016	0.300
Turnover from Fiat Auto ^2	0.000	0.723	0.000	0.261	0.001	0.191	0.000	0.726
Employment ^2	0.000	0.124	0.000	0.719	0.000	0.232	0.000	0.639
Turnover ^2	0.000	0.390	-0.001	0.128	-0.002**	0.015	-0.001**	0.018
Constant	-1.661***	0.008	-2.889***	0.000	-1.880	0.154	-24.589	.

* significant at 10%, ** significant at 5%, *** significant at 1%.

The second part of the empirical analysis assumes a cumulative structure in the internationalisation choices. In addition to motivations of an economic nature, the decision to carry out this further analysis was suggested by the data obtained from the questionnaire. Tables 1 and 2 show that internationalisation choices 0, 1, 2 and 3, seen as cumulated internationalisation choices, accounted for 96% of the choices made by the firms.

The indicator that summarizes this behaviour is the Foreign Expansion Index (FEI), described in the previous paragraphs and summarized in Table 1. Thus, in this case, the possible choices are intrinsically of an ordinal nature, which goes from the choice not to internationalise, to the other extreme of exporting, signing commercial agreements and investing directly abroad. The most appropriate econometric methodology for this type of data is the ordered probit model.

The results of the estimation model are summarised in table 5 which, in addition to the coefficients, provides the standard errors (heteroskedasticity-robust) and the relative *p-values* in order to evaluate their significance. The last three rows of the table show the three μ_j thresholds with the relative standard errors. The test statistic for equalling zero for all the coefficients is 135.00, with a *p-value*=0.000.

Table 5: Estimates and p-values of the ordered probit model P(FEI=j), j=0,1,2,3

FEI	Coeff.	Std. Err.	p-value
Turin province	0.299***	0.090	0.001
Innovative products	-0.339**	0.150	0.024
Mature products	-0.153	0.134	0.254
Middle auto market	0.004	0.193	0.983
Top auto market	0.224	0.172	0.192
Specialists	0.330**	0.131	0.012
Modules-systems	0.463	0.358	0.196
Engineering-design	0.111	0.154	0.470
R&D	0.069*	0.038	0.069
University Research Centres	0.321	0.250	0.200
Public Research Centres	0.549***	0.204	0.007
Private Research Centres	0.019	0.230	0.932
Turnover from Fiat Auto	-0.020***	0.006	0.001
Imports	0.336***	0.099	0.001
Subsidiary	-0.297	0.251	0.237
Independent	-0.297	0.234	0.204
Employment	0.001	0.002	0.538
Turnover	0.019**	0.009	0.038
Turnover Growth	0.010***	0.003	0.004
R&D^2	-0.002	0.002	0.464
Turnover from Fiat Auto ^2	0.001	0.000	0.168
Employment ^2	0.001	0.000	0.667
Turnover ^2	0.001*	0.000	0.060
μ_1	0.146	0.299	
μ_2	1.470	0.305	
μ_3	2.664	0.327	

* significant at 10%, ** significant at 5%, *** significant at 1%.

As we can see from the table, some variables appear to be extremely important in determining the firms' internationalisation choices. One of these variables is the size, in terms of both turnover and employment. When analysed separately, both variables are positive and highly significant, but when entered together, only the *employment* variable appears to be significant, although the *turnover* variable continues to offer a partial explanation for the choices made by the firms.

Another extremely important element is the *growth* variable, which is positive and with a highly significant coefficient.

Looking at their relationships with the Fiat Auto, we can see that this has a great influence over the internationalisation choices of the firms; this variable is again significant and negative in regression.

While belonging to a specific segment of the automotive value chain doesn't appear here to play a particularly important role, there seems to be a positive correlation between committing a share of turnover to research and a greater propensity for a cumulated internationalisation process. Furthermore, of the research structures that the firms tend to rely on, public research centres and universities (Italian and foreign, for both) appear to be the ones that show a greater drive towards internationalisation.

It is also interesting to appraise the marginal effects of the single variables. The estimated marginal effects for each of the possible FEI values are shown in the table below (table 6). However, one must be very cautious when interpreting the coefficients since they

cannot be seen as elasticities when the variables in question are dummies or discrete variables obtained as average values of classes of phenomena that are in any case continuous.

Table 6: Marginal effects and p-values of the ordered probit model P(FEI=j), j=0,1,2,3

	FEI=0		FEI=1		FEI=2		FEI=3	
	coeff	p-value	coeff	p-value	Coeff	p-value	coeff	p-value
Turin province	-0.110***	0.001	0.033***	0.002	0.065***	0.001	0.013***	0.007
Innovative products	0.127**	0.024	-0.042**	0.032	-0.072**	0.027	-0.013**	0.035
Mature products	0.057	0.254	-0.019	0.261	-0.032	0.257	-0.006	0.258
Middle auto market	-0.002	0.983	0.001	0.983	0.001	0.983	0.000	0.983
Top auto market	-0.085	0.198	0.033	0.259	0.045	0.169	0.008	0.148
Specialists	-0.120**	0.010	0.033***	0.006	0.072**	0.016	0.015**	0.034
Modules-systems	-0.156	0.135	0.017	0.440	0.110	0.229	0.029	0.380
Engineering-design	-0.041	0.462	0.012	0.393	0.024	0.483	0.005	0.517
R&D	-0.026*	0.068	0.009*	0.077	0.015**	0.071	0.003*	0.086
University Research Centres	-0.112	0.162	0.021***	0.001	0.074	0.234	0.017	0.335
Public Research Centres	-0.180***	0.001	0.010	0.598	0.132**	0.013	0.037*	0.078
Private Research Centres	-0.007	0.932	0.002	0.930	0.004	0.933	0.001	0.934
Turnover from Fiat Auto	-0.007***	0.001	-0.002***	0.002	-0.004***	0.001	-0.001***	0.005
Imports	-0.127***	0.001	0.045***	0.005	0.069***	0.001	0.012***	0.002
Subsidiary	0.114	0.244	-0.046	0.317	-0.058	0.200	-0.010	0.181
Independent	0.108	0.186	-0.028*	0.070	-0.066	0.221	-0.014	0.309
Employment	-0.001	0.538	0.000	0.543	0.000	0.538	0.000	0.536
Turnover	-0.007**	0.038	0.002**	0.044	0.004**	0.040	0.001*	0.063
Turnover Growth	-0.004***	0.004	0.001**	0.010	0.002***	0.004	0.001***	0.009
R&D^2	0.001	0.463	0.000	0.465	0.000	0.465	0.000	0.468
Turnover from Fiat Auto	0.000	0.167	0.000	0.168	0.000	0.172	0.000	0.189
Employment ^2	0.000	0.666	0.000	0.665	0.000	0.667	0.000	0.669
Turnover ^2	0.001*	0.059	0.001*	0.065	0.001*	0.063	0.001*	0.085

* significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Marginal effects and p-value of the multinomial logit model P(ISI=j), j=0,1,2,3,4

	ISI=0		ISI=1		ISI=2		ISI=3		ISI=4	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Turin province	-0.183***	0.000	0.167***	0.000	0.017	0.592	0.000	0.827	0.000	0.833
Innovative products	0.090	0.197	0.012	0.866	-0.096*	0.076	-0.005	0.168	-0.002	0.454
Mature products	0.067	0.271	-0.025	0.701	-0.040	0.370	0.000	0.930	-0.002	0.462
Middle auto market	-0.359***	0.000	-0.459***	0.000	-0.177***	0.000	-0.004	0.121	1.000***	0.000
Top auto market	-0.195**	0.012	0.020	0.810	0.021	0.688	-0.001	0.787	0.155	0.031
Specialists	-0.145**	0.011	0.041	0.527	0.103**	0.045	-0.002	0.598	0.002	0.435
Modules-systems	-0.163**	0.149	0.047	0.749	0.112	0.442	0.003	0.641	0.001	0.774
Engineering-design	0.011**	0.871	0.014	0.838	-0.032	0.518	0.005	0.423	0.002	0.660
R&D	-0.020***	0.293	0.002	0.931	0.016	0.191	0.001	0.469	0.001**	0.022
R&D	0.025*	0.860	-0.071	0.570	0.038	0.687	0.009	0.537	-0.001	0.704
University Research Centres	-0.271*	0.003	0.092	0.509	0.168	0.191	0.013	0.447	-0.002	0.231
Public Research Centres	-0.010	0.938	-0.056	0.605	0.064	0.480	-0.001	0.682	0.003	0.519
Private Research Centres	0.007**	0.012	-0.001	0.672	-0.005**	0.018	0.000	0.118	0.000	0.879
Turnover from Fiat Auto	-0.191***	0.000	0.126***	0.006	0.073**	0.022	-0.008	0.186	0.000	0.951
Subsidiary	0.119	0.329	-0.152	0.140	0.036	0.692	-0.003	0.242	-0.001	0.637
Independent	0.033	0.749	-0.019	0.853	0.038	0.606	-0.050	0.120	-0.003	0.546
Employment	-0.002*	0.056	0.002**	0.045	0.000	0.934	0.000	0.288	0.000	0.676
Turnover	-0.007	0.151	0.002	0.581	0.003	0.268	0.001	0.138	0.001**	0.024
Turnover Growth	-0.004**	0.014	0.002	0.207	0.002	0.144	0.000	0.338	0.000	0.968
Research ^2	-0.001	0.711	0.001	0.379	-0.001	0.544	0.000	0.475	0.000	0.145
Turnover from Fiat Auto ^2	0.000	0.434	0.000	0.777	0.000	0.298	0.000	0.243	0.000	0.858
Employment ^2	0.000	0.211	0.000*	0.081	0.000	0.661	0.000	0.209	0.000	0.411
Turnover ^2	0.000	0.229	0.000	0.803	0.000	0.170	0.000	0.151	0.001*	0.048

* significant at 10%, ** significant at 5%, *** significant at 1%.

As regards company size, measured in term of turnover, it is interesting to note that the marginal effect is negative for non-internationalisation, but it is positive for all the other FEI values.

The features are also similar for all the other variables that significantly describe the behaviour of the firms in the choice of type of internationalisation. The *growth* variable, for example, has a negative marginal effect in cases where internationalisation is absent, but it has positive marginal effects for all the other forms of the FEI variable.

A closer relationship with the Fiat Auto, on the other hand, had a positive effect on the choice *not* to internationalise, but it had negative effects on each of the different types of internationalisation.

As in the previous case, we also calculated the marginal effects for the multinomial logit model. Some of the results of the ordered probit model can also be given in this case. The characteristics of firm size and growth have a negative impact on the choice not to internationalise, while the coefficients are positive for all the internationalisation choices.

In contrast, however, but still coherently with the previous model, having a strong relationship with the Fiat Auto seems to lead firms to the choice of non-internationalisation. The coefficient for ISI=0 is positive and highly significant. Of all the other internationalisation choices, only for ISI=2 was the value negative and significantly different from zero.

4. Conclusions

Our research question was the identification of determinants of internalisation modes of firms in the Italian automotive supply chain. The econometric analysis confirmed some of the earlier literature predictions about the nature of the internationalisation process. We have identified a small set of variables that explain the different modes adopted by the firms in the Italian automotive chain in order to be present on foreign markets. In this concluding section we discuss the most interesting results.

Firstly, our empirical findings confirm that the internationalisation process is of a cumulative nature for a considerable sub-group of firms. This means that, to be present on foreign markets, the firm must support its exports with activities of commercial penetration, both through its own sales networks and thanks to distribution agreements with foreign firms. Moreover for 10% of firms (out of the total that were active on foreign markets) exports and foreign direct investments would appear to be complementary rather substitute activities.

Second, with both the estimated models, company size is a highly significant explanatory variable. This is particularly true when exports are not the only activity on foreign markets and more complex modes of internationalisation are adopted. This correlation can be explained by the fact that these activities are subject to scale and scope economies and have higher levels of sunk and fixed costs.

A third interesting result is the correlation between growth in turnover and internationalisation. Long debated in literature, the question is whether it is the more efficient firms that internationalise or whether internationalisation causes firms to become more efficient. The most frequent result in the applied analyses (so much so that it is considered a stylised fact, see Greenaway and Kneller, 2007) is that it is ex-ante productivity that determines a complex form of internationalisation. Even showing the due caution required by problems of endogeneity in the estimates, our results are in broad agreement with this interpretation. However, Castelli et al. (2008), on the basis of their interviews with Turin firms operating in the auto chain, appear to support a reverse direction of causality, that is, that internationalisation was the driver of growth in turnover. In this case, the explanation could be based on the "learning by internationalization" accomplished by firms through participation in the international supply chain and on the exposure to best practices adopted by other firms. Thus we cannot reject the view that causality works in both directions.

Fourth, we have found evidence that research is carried out within the firm and in cooperation with universities and other public centres has a significant and positive impact on the forms of internationalisation. Under this view, the location in Turin of an important public University for engineering and technology (the Politecnico) and of several research centres is an advantage for other firms'. In other words, there may be a positive externality of Fiat in the Turin area. The externality is indirectly transmitted to the FIAT suppliers through a critical mass of research funds and skills available in the area, beyond direct market relations. The positive correlation between innovation and exports shows that the more innovative firms in the auto industry have incentives to expand on foreign markets to guarantee a higher return on the investments carried out in research and development. Our result would also suggest that innovative activities play a significant role also for other forms of internationalisation such as commercial agreements and foreign direct investments. As already mentioned in Basile et al., 2003, imperfections and informative asymmetries could induce the firms of the auto chain to "protect" their investments in research and development by entrusting them to agreements of various types or internalising them through foreign direct investments.

Fifth: The search of a customer other than Fiat Auto has a positive and highly significant impact on the suppliers' activities on foreign markets; this is a result that confirms what has been documented by other qualitative and univariate analyses (Castelli et al., 2008; CCIAAT, 2006). This is an important result for the Italian chain that has, for the most part, shown itself capable of emancipation from the monopsonistic dependence on Fiat.

Sixth: as far as imports are concerned, the variable coefficient is significant and positive. It is clear that through this channel it is possible to reduce internal costs, of both production and coordination. In order to better describe this specific result of the estimate, it is useful to compare it with the data from the CCIAAT (2006) and from the case study in Castelli et al. (2008). According to the CCIAAT (2006), the volume of imports of the firms in the chain is very limited: roughly half the firms do not purchase anything on foreign markets, while the rest purchase only raw materials and semi-finished goods; in the same way, Castelli et al. (2008) find that, although the degree of vertical integration of the firms is low, the quota of purchases from abroad is also low, less than 25% of the total. On the whole it would appear that these are standard supplies, with low levels of investment and, for this reason in a transnational perspective, assigned to arm's length contracts. This implies, on the other hand, that trade is "strongly localised" since the Italian subcontractors are still the privileged procurement channel thanks to the qualitative levels reached by these firms. The fact is hardly surprising: as pointed out in the thread dealing with global value chain analysis, "capabilities are bundled within firms, as well as localities, and that local and distant linkages are not mutually exclusive, but part of a nested and increasingly integrated spatial economy that involves cohesion at all spatial scales, local, national, continental and global" (Sturgeon *et al*., 2008).

In this light, we conclude by stressing one result: the role played by belonging to the Turin industrial district in promoting the processes of firms' expansion on foreign markets. As we have seen, in the multinomial logit model, being located in the province of Turin has a significant and positive impact on the internationalisation of the firm. While the variable used is only a very rough proxy, it shows that there is a sort of "district effect" which, by means of Marshall type externalities, benefits the firms in their operations on foreign markets. The external economies take the form of a local supply of top level subcontracting firms; of research links that the firms have forged with universities and, lastly, of the support from local institutions. This confirms by a wider evidence, the results of other, more qualitative studies (Enrietti and Withford, 2006).

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