Determinants of Intended Expansion of Polish Small Firms*

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Abstract

This paper investigates the determinants of Polish small firm's intentions to expand production in the context of possible economic expansion on accession to the EU. Using a non-linear specification a model is developed using twenty-seven explanatory variables derived from a questionnaire given to Polish small firms in late 1999 asking about their motivations in expanding production. Seven of these variables are found to be significant, namely: the existence of export and franchising activity, a recent increase in fixed assets, the difficulty in obtaining a bank loan, the level of human capital, the technological level of the firm's products and the estimated proportionate change in income from 1997 to 1999. Significant catch-up gains exist for small but fast growing firms.

JEL classification: C22, C52, L00, P27

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Introduction

Small firms[1] have an important role in a transition economy such as Poland. Their importance as sources of employment and GDP, as well as their contribution to future growth potential, is increased by the prospect of accession to the European Union.

This paper investigates the determinants of Polish small firm's intentions to expand production in the two years following a survey conducted in late 1999 in the provinces of Gdansk and Lublin.[2] It uses original cross-section data from 162 firms from across the main NACE sectors**.** The motivation of this study is to provide an insight into the factors that influence the prospects of small firms in view of Poland's possible future entry into the EU.[3] This should provide the basis for guidance in policy orientation. Section 2 outlines the model used for the investigation. Section 3 presents the results and section 4 draws conclusions.

1. Factors Explaining Small Firm Expansion

The dependent variable that we model is denoted Y. This variable indicates the intention of an enterprise to decrease, maintain or increase production (and if so by how much) over the coming two years. The values assigned to Y correspond to a graded five possible responses[4] to the question concerning a firm's intention to expand output in the 1999-2001 period.[5] For comparative purposes we also apply the method of ordinary least

[1] Small firms are defined according to the official EU definition as employing between 10-49 workers.
[2] The reference for this survey is PHARE-ACE P97-8123-R.
[3] For a comparable study of Greek small firms EU see Voulgaris, Asteriou and Agiomirgianakis 2002.
[4] The dependent variable, Y_i, is constructed from responses to the question: "During the next 2 years the enterprise intends to: 1.Decrease the production output (turnover). 2. Maintain the production output (turnover) at the existing level. 3. Increase the production output (turnover) by 5% or less. 4. Increase the production output (turnover) by 5% – 10%. Increase the production output (turnover) by more than 10%.
The values of the dependent variable are represented by integers ranging from 1 to 5. However, the upper and lower values include unbounded data, that is, Y taking a value of 5 corresponds to a small firm's intention to increase production by *more* than 10%. Similarly, when Y is 1 this means that firms' production will decrease by some unspecified amount. We will therefore consider censored estimation, that is, we estimate the model to ensure that the values of Y predicted by the model lie between 0.51 and 5.49.
[5] Allowance of an extra 0.49 units on either side of the boundary provides a consistent range of values surrounding each integer that correspond to each response. Hence, each integer value can be identified through the process of rounding. Censoring the dependent variable to lie between 0.99 and 5.01 produced almost identical results suggesting estimation is robust to the censoring values used. Also we employ the Quadratic Hill Climbing optimisation algorithm with a normally distributed error using the EViews 3.1

squares (OLS). This method provides more information, in terms of diagnostic testing, which turns out to inform the specification of our model. In particular, it suggests the use of a non-linear functional form. We outline both the linear and non-linear forms of the model.

The general specification in which the estimated non-linear models are nested is:

$Y_i = \Sigma_i \beta_i X_i + \Sigma_i \delta_i X^2_i + u_i$ **(1)** where u_i is a stochastic error. Our non-linear model specifies squared explanatory variables – not possible for some dichotomous variables that only take either the value zero or one.[6] Variables that we considered entering as squared values are indicated in the Table 1 in the appendix. Expected signs are also indicated in Table 1. For the non-linear specifications we report the most general model and a few parsimonious models obtained through the general-to-specific method whilst bearing in mind our theoretical priors.

Our model variables were obtained from a questionnaire that had fifty-eight questions - many were broken down into sub-parts. Not all variables were suitable for measurement and inclusion in our model. Data was inherently difficult to obtain for some variables (e.g. profit figures for small firms) and proxies were indicated. Twenty-seven variables were chosen on both practical grounds and economic reasoning concerning the small firm's growth decisions. These are presented in Table 1 in the appendix. Poland experienced significant growth in the 1990s with some deceleration from 1998 onwards. From 1989-1999 GDP increased by 20% and was 50% higher than that of Russia. Unemployment fell from 16% in 1993 to 10% in 1999. New jobs were created at 1% p.a. since 1994. Poland attracted considerable foreign investment and manufacturing productivity saw positive growth. Many Polish firms are very small and will still be very local even after entry into the EU. We expect a great deal of uncertainty about the actual impact of accession to the EU. The questionnaire asked entrepreneurs for the variables most likely to influence their plans for expansion. We expected that these plans would

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software. In our estimations, reported below, the Jarque-Bera test never indicated significant departures from normality suggesting the validity of our assumption of normality

[6] We did not consider the squared value of the variable *fixed asset investment in 1999* because it is almost a dichotomous variable, which only takes the values –1, 0 and 1.

depend upon a number of variables that could be broadly divided into the following groups:

The firm's estimation of the impact of joining the EU upon its plans for expansion.

Direct influence on growth, e.g. the *level of demand and* recent increases in *turnover.*

Credit conditions. Small firms frequently complain of the difficulty of obtaining credit. We ask if bank loans are already in existence and the difficulty of obtaining such loans.

Supply side factors such as:

* *Factor productivity*. This is proxied [7] by the level and recent increase of fixed assets - one important factor in the measurement of productivity levels. We expect that those firms with higher levels of fixed assets and those with recent increases in their level would be more optimistic about expansion plans.

* *The firm's technological level and its products as well as the existence of R&D.* We expect firms at higher technological levels to be more optimistic about expansion.

* *The level of human capital is expected to influence a firm's growth prospects*. This variable is divided into four parts asking for the levels of education in the firm's workforce. The existence of the firm's policy on professional education is also asked for.

* *Recent increases in investment levels* are expected to positively influence future expansion plans. Investment is linked to innovation and productivity improvements.

* Many of the more competitive firms in the manufacturing sector of developed economies have experience in *sub-contracting arrangements*. We expect that firms already with this experience would be more optimistic about expansion benefiting from network arrangement and greater demand for their products.

* We expected that any existing *international experience of the firm* would be positively correlated with expansion plans especially in the context of EU accession. Consequently a number of questions (ownership of other foreign firms, existing franchising arrangements, knowledge of EU markets and export activity) probe for this experience.

* *Labour market restrictions* affect a firm's optimism about expansion. Consequently two of the questions reflect the existence of trade union activity (traditionally associated with restrictive practices in Poland) in the firm and the difficulties of recruitment.

[7] We had no data on sales turnover in our questionnaire and therefore lacked a denominator for the calculation of labour productivity.

* The *size of the firm* - measured by the number of employees and/or the level of assets may affect expansion plans. We would expect that the larger of the small size firms would be more likely to expand in the light of EU accession. Related to this question is whether the firm owns other national or foreign firms.

3. Results

Because censored and OLS regressions yield the same coefficient estimates and the other statistics are similar, we only report the OLS estimation results because they provide additional information in terms of misspecification tests. Table 1 in the appendix details the results. We found evidence of non-linearities in our experiments with linear models. We report the results of our non-linear models estimated by OLS. There is no evidence of misspecification, according to the reported diagnostic tests.[8] The general non-linear model**,** OLS 1, contains all the variables plus twelve squared explanatory variables. However, many variables are statistically insignificant. Following a general-to-specific search for a parsimonious specification we exclude twenty of the untransformed variables and all but one of the squared terms to give model OLS 2. An F-test cannot reject the deletion of these thirty-one variables from model OLS 1. The variables retained also include the addition of the squared value of the variable *recent increase in income*. The non-linearity of this variable is consistent with the interpretation of diminishing returns to intended expansion**.**

We found, however, a second distinct non-linear specification with superior fit reported in Table 1 as OLS 4 and Censored 4, respectively. The imposed restrictions are valid. All of the untransformed variables included in the non-linear model, OLS 2, feature in OLS 4 with the additional human capital variable.[9] All of the untransformed variables have theoretically plausible signs. The overall non-linear effect of *technology* is represented by equation **(2)**.

[8] Due to space constraints we omit OLS T statistics from Table 1 except for censored 4. - they can be viewed in Ghatak et alia 2001. The addition of the squared explanatory variables have successfully removed any evident non-linearities providing support for a non-linear functional form and suggests our inferences will be valid**.**

[9] In this case two variables, *percentage of employees with both post-secondary and higher education*, have the same coefficient given to them.

$Y_i = 0.983\ technology_i - 0.399\ technology_i^2$ **(2)**

This indicates an initially positive, then negative, relationship between Y and *technology*. This may be explained as follows. The productivity levels of Polish small firms is low by international standards. As they increase the technological level of their products in the early stages they are still not in competition with international firms and they have a large and rapid catch-up effect. They are therefore optimistic about expansion. However the few firms in the higher range of technological development, especially those in manufacture, are fearful of international competition as Poland accedes to the EU. A similar conclusion has been reached by Macejski (1996).[10] This model includes human capital and features 46% explanatory power - greater than model OLS 2.

The significant variables in our results were: an increase in *recent investment and turnover levels*, the *technological level of the products* of the enterprise, the already existing level *of international activity - exporting or franchising*, the difficulty or ease of *finding credit*, and *the importance of human capital*. All these variables had the theoretically expected signs.

Of the 27 original variables many proved insignificant. Reasons for this include the following. There are four variables included in the general variable on *human capital*. Other variables are quite close to one another - e.g. those on income changes between 1997-1999 and 1998-1999. Two variables relate directly to expectations concerning EU accession - *knowledge of EU markets* and *expectations about accession* - and therefore in the estimation of small firms probably fell outside the two year enquiry of the survey. Other variables indirectly relate to EU accession (*the existence of foreign competition*). Variables directly relating to the size of firms did not prove significant - e.g. the *level of fixed asset investment in 1999* and the *number of employees in 1999*. Other variables indicating indirectly perhaps the size of firms - *ownership of other national and foreign firms* - also proved insignificant. We indicate in the conclusion that this may point to strong catch-up possibilities for the smaller firms while the larger of the small firm

[10] Many of the smaller firms have extremely simple technology: 60% of Polish small and medium size firms (SMEs) do not use the computer and 80% do not use the internet (Dzierzanowski 2001 p16).

stratum may be encountering more European competition. *R&D* was insignificant probably because the short term horizon of the two year period enquired into. It would surely have proved significant in a longer run period. *Recruiting difficulties* and *trade union activity* did not prove significant because firms did not report any difficulty in this area. Similarly any *policy on professional* education is a rarity in small firms.

4. Conclusions

To a significant extent the results tell us what economic reasoning indicates. Optimism of small firms with respect to future expansion, as indicated by the survey, is very much related to the following factors.

Recent performance of small firms measured as an increase in recent investment and turnover levels. It is not the absolute level of turnover and investment but its recent growth that matters indicating that targeting of fast growth small firms by government should concentrate on these types of firms: small but faster growing than average.

The technological level of the products of the enterprise - a non-linear variable. There is a significant literature on the positive impact on SME's growth of increasing their technological level (Carlson 1984 and 1991) as well as improving their innovation performance (Acs and Audretsch, 1989, 1990). However, in the Polish case it is not the technological level of the firm but of its products that is influencing expansion plans. This probably means that many small manufacturing plants are assembling products rather than manufacturing them. Such business could well be expected to grow with more foreign firms and capital entering Poland and benefiting from cheaper land and labour facilities than in their country of origin.

The already existing level of international activity - exporting or franchising. Those firms that are already exporting are expected to benefit from Poland's further opening process and eventual integration into the EU. They have already surmounted the barriers to export that deter other small firms (bureaucracy, information, foreign exchange risk etc) and already have knowledge and experience in foreign and especially European markets. Franchising has been classified here as part of international activity. This is because the main sources of franchising are presumed to come from abroad and therefore those firms with franchising arrangements with foreign firms will further benefit from

further integration to the European economy – they are already operating in an international framework. However franchising is also a significant variable impacting on future expansion plans since those firms with franchising arrangements are benefiting from economies of scale (e.g. those of R&D) shared with the parent firm. Nugent's (1996) study of Korean SMEs strongly indicated that SME share in manufacturing was correlated with their participation in international activity.

Tthe difficulty or ease of finding credit. This is a ubiquitous finding. Again Nugent (1996) found that a wide range of credit conditions were positively correlated with SME share. Clearly the Polish government will need to lower the cost of small business credit if it intends to promote expansion.

The importance of human capital measured as the percentage of employees who had achieved higher/post-secondary education. This confirms the general work by Barro (1995) showing the important contribution of human capital to growth at the national level. This again points to clear policy recommendations for the government to promote the skill levels of the small business stratum.

Small firms therefore provided a positive but qualified response to the question concerning expected growth. They expect that the more efficient firms and those with proven competitive advantage would expand within the two years following the survey in 1999. These are firms that were confident they could outride the deceleration in the late part of the decade. These had already proved themselves with higher growth of turnover and investment, higher levels of technology in their products and superior levels of human capital. They are firms with proven international presence and have overcome the difficulties of high cost bank loans - probably by sourcing growth from profits. Our results indicate that it is not just the larger of the small firms that are expected to grow. In many cases variables indicating the absolute size of the firm proved insignificant while variables indicating recent growth, for example in investment and turnover, proved significant. Rather it is the faster growing of the small firms that are expected to continue to do well. The non-linearity of the variable *technological level of the firm's products* points in the same direction. By implication therefore strong catch-up gains are possible for the smaller but faster growing firms.

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Notes to Table 1

(D) indicates that the answer is dichotomous–usually answerable by yes or no. (GNR) indicates that the answer is either in the form of or can be converted into the form of a graded number response thus indicating intensity. P or N indicates the expected signs, positive or negative.. Variables in bold proved significant. All models are of the dependent variable, Y, use the same 162 cross-sectional observations and are estimated by OLS. OLS T denotes OLS t-ratios and White T White's heteroscedasticity adjusted t-ratios. AIC denotes OLS Akike's information criterion. Adj R^2 represents the adjusted coefficient of determination, s is the regression's standard error and DW is the Durbin-Watson statistic. FSC1 is a modified F-version of Breusch-Godfrey's test for first-order serial correlation, FFF1 is the F-version of Ramsey's Reset test for non-linear functional form, χ^2N2 is the Jarque-Bera test for normality and FH1 is an F-version of White's test for heteroscedasticity. The Breusch-Godfrey test is superior to the DW statistic. F(1→) is an F-test for the variables deleted from the general regression to obtain the reported equation. Figures in squared parentheses denote probability values. All estimations were carried out using Microfit 4.0. Both OLS and censored regression models are reported. See above notes for an explanation of the statistics. The F-tests,denoted F(1→), impose the same coefficient on Hum cap -1 and Hum cap-2 (Hum cap-1&2=Hum cap -1+Hum cap-2) and delete 29 variables from the model OLS 1.The distribution is F(30, 123) and the 5% critical value is approximately1.68 –this statistic is based on the distribution F(30,120).

Table 1

Model →	OLS 1	OLS2	White T	OLS3	White T	OLS4	White T	Censored 4	T ratios
	Coeft	Coeft		Coeft					
Intercept	0.050	1.650	6.583	1.669	6.965	1.849	10.473	1.849	9.766
Own National.firms (D) (P)	–0.088								
Own Foreign firms. (D) (N)	0.632								
Subcontracting (D) (P)	–0.004								
Exporting (D) (P)	0.485	0.506	2.767	0.508	2.740	0.459	2.665	1.459	2.467
Franchising (D) (P)	1.105	0.658	4.337			0.840	3.212	0.840	1.963
Demand level (GNR) (P)	–0.342								
Dom/Foreign .Comp (D) (P)	0.206								
Tech level firm (GNR) (P)	–0.426								
Tech.level product (GNR) (P)	1.359	0.521	3.920	0.514	3.086	0.983	4.190	0.983	3.906
R&D (D) (P)	–0.118								
Investment (GNR) (P)	–0.105								
Δ.Investment 98-99 (GNR) (P)	0.814	0.568	4.728	0.597	5.092	0.612	4.979	0.612	5.157
Employment level (D) (P)	0.069								
Hum cap -1 (D) (P)	0.043					0.006	1.884	0.006	1.976
Hum cap -2 (D) (P)	–0.008					0.006	1.884	0.006	1.976
Hum cap -3 (D) (P)	0.010								
Hum cap -4) (GNR) (P)	0.008								
Policy prof..Educ (D) (P)	0.348								
Recruitment diffs. (D) (N)	–0.169								
Trade Union (D) (P)	–0.194								
EUMarkt.Knowledge (GNR) (P)	–0.252								
EU Accession impact (D) (P	–0.164								
Bank loan diff. (D) (N)	–0.157	–0.342	-2.283	–0.339	-2.255	-0.308	-1.985	-0.308	-2.032
Bank loan existence (D) (P)	0.231								
ΔY 97-98 (GNR) (P)	–0.011					0.006	4.293	0.006	4.336
ΔY 97-99 (GNR) (P)	0.015	0.011		0.011	3.887				
Demand^2	–0.498								
Tech firm^2	0.252								
Tech prod^2	–0.566		3.921		-2.450	-0.399	-2.595	0.399	-2.338
Δ.Inv 98-99^2	–0.173								
Empl^2	–0.0008								
Hum cap -2^2	–0.0003								
Hum cap -2^2	0.0003								
Hum cap -3^2	–0.00002								
Hum cap -4^2	–0.00004								
EU Markt knowledge^2	–0.079								
ΔY 97-98^2	0.00003								
ΔY 97-99^2	–0.00002	–0.00001	-2.461	–0.00001					
AdjR^2	0.472	0.446		0.441		0.459		0.465	
S	0.836	0.857		0.860		0.847		0.842	
AIC	2.689	2.577		2.579		2.559		2.571	
DW	2.075	2.083		2.115		2.072			
QLB1								0.185 [0.667]	
QLB2								0.601 [0.741]	
FSC1	0.243 [0.623]	0.329 [0.567]		0.606 [0.438]		0.243 [0.623]			
FFF1	1.072 [0.303]	2.223 [0.138]		2.803 [0.096]		3.885 [0.051]			
χ^2N2	0.231 [0.891]	2.779 [0.249]		3.207 [0.201]		3.995 [0.136]		4.373 [0.112]	
FH1	0.437 [0.510]	0.299 [0.585]		0.040 [0.842]		0.066 [0.797]			
F(1→)		1.247 [0.198]		1.282 [0.169]		1.128		1.094	