European Enlargement and Expansion of Polish SMEs*

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Abstract

This paper investigates the determinants of Polish SME's intentions to expand production in the context of possible economic expansion on accession to the EU. A model is developed using twenty-six explanatory variables derived from a questionnaire given to Polish SMEs in late 1999. Seven of these are found to be significant, namely: export activity, franchising activity, the technological level of an SME's products, a recent increase in fixed assets, the difficulty in obtaining a bank loan, the level of human capital and the estimated proportionate change in income from 1997 to 1999. The latter is found to have a non-linear effect consistent with the interpretation of diminishing returns to intended expansion. Non-linearity also applied to the technological level of the firm's products. This indicates that the optimism of an SME to future expansion is related to recent increase in turnover and investment, the size of the enterprise, the technological level of its products, the availability of credit**,** the extent to which it engages in international activity and the educational level of its workforce.

JEL classification: C22, C52, L00, P27
Keywords: Polish SMEs**,** Censored regression, Non-linearities,

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1. Introduction

Small and medium size enterprises[1] (SMEs) 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 (EU).

This paper investigates the determinants of Polish SME's intentions to expand production (over the two years following the survey, which was conducted in late 1999 in the provinces of Gdansk and Lublin [2]) using original cross-section data from 162 firms. The motivation of this study is to provide an insight into the factors that influence the prospects of SMEs in view of Poland's possible future entry in to the EU.

Section 2 outlines the model, section 3 presents the results and section 4 draws conclusions.

2. Modelling SMEs' Intentions to Expand

The variable that we model is denoted Y. This variables indicates the intention of an enterprise to decrease, maintain or increase (and if so by how much) production over the coming two years. The values assigned to Y correspond to each of the five possible responses to the question of a firm's intention to expand output. In respective order these values are, 1 (decrease production), 2 (maintain production), 3 (increase production by less than 5%), 4 (increase production by 5% to 10%) and 5 (increase production by more than 10%).[3]

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 SMEs' 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 methods – see, for example, Greene (2000) Ch 20.[4] 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]

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[1] SMEs are defined in this study as enterprises employing between 10-49 workers.

[2] The reference for this survey is PHARE-ACE P97-8123-R

[3] 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%
5) Increase the production output (turnover) by more than 10%"

[4] We employ the Quadratic Hill Climbing optimisation algorithm with a normally distributed error using the EViews 3.1 software. In our estimations, reported below, the Jarque-Bera test never indicated significant departures from normality suggesting the validity of our assumption of normality.

[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.

For comparative purposes we also apply the method of ordinary least 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 estimated linear models are nested is:

$$Y_i = \Sigma_i \beta_i X_i + u_i \quad \textbf{(1)}$$

where u_i is a stochastic error.

Table 1: Potential Explanatory Variables

Legend	Description	
V09P2	ownership of other national firms	(D)
V10 P2	ownership of other foreign firms	(D)
V11P3	subcontracting activity	(D)
V16P4	export activity	(D)
V17P3	franchising activity	(D)
V19P4	level of demand	(GNR)
V20N4	either domestic or foreign firms as the major competitors	
V22P6	technological level of firm	(GNR)
V23P6	technological level of products	(GNR)
V28P4	R&D by firm	(D)
V31P5	fixed asset investment in 1999	(GNR)
V33P5	increase in fixed assets in 1998-99	(GNR)
V39C1P3	number of employees in 1999	(GNR)
V40	human capital in the firm – where	(GNR)
RV40AP6 -	percentage of employees with higher education	
RV40BP6 -	the percentage of employees with post-secondary education	
RV40CP6 -	percentage of employees with secondary (general or technical) education.	
RV40DP6 –	percentage of employees with primary education	
V43P4	policy on professional education	(D)
V44N4	recruitment difficulties	(D)
V47N4	existence of trade unions in the firm	(D)
V48P4	knowledge of EU markets	(GNR)
V49P6B	estimation of EU accession upon the firm	(D)
V53N5	difficulty of obtaining a bank loan	(D)
V54N4	existence of a bank loan in 1988-99	(D)
V56AP4	proportionate change in income from 1997 to 1998	(GNR)
V56BP4	estimated proportionate change in income from 1997 to 1999	(GNR)

(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.

The potential explanatory variables (X_is), with a brief description, are listed in Table 1 above. The theoretically expected sign of each variable's coefficient is indicated in the variable name (legend) in Tale 1. A "P" in the name indicates an expected positive sign, an "N" is indicative of a negative expected sign while "PN" means that either a positive or a negative sign is theoretically sensible. The potential explanatory variables are taken from the surveyed questionnaire.

The twenty six variables that were chosen for testing reflected a variety of explanatory hypotheses with respect to Polish SMEs as well as being based on generalised economic reasoning. A number of variables reflected, for example, the already existing extent of international activity (V10P2, V16P4, V17P3, V48P4, V49P6B) which can be correlated with SME expansion. This is especially the case since the context for the questionnaire was the possible accession of Poland to the EU and therefore the increased likelihood of international activity in the manufacturing sector. Four variables within V40 as well as V43P4 reflected the importance of human capital since this would play a crucial role in the comparative productivity of these firms and would impact on their competitive advantage. Other variables reflecting productivity and innovation concerns included the technological variables V22P6 and V23P6 and those concerning the level and expansion of fixed assets, V31P5 and V33P5. An increasing literature has indicated that SMEs increase their share within the manufacturing sector if they can compensate for structural forces of the market (e.g. growing economies of scale which will normally operate to decrease SME share) with relative efficiency and innovation improvements (Acs and Audretsch 1989[6]). Other variables reflected the recent expansion of a firm and we expected this to be correlated with optimistic expectations with regard to future expansion.

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

$$Y_i = \Sigma_i\beta_i X_i + \Sigma_i\delta_i X_i^2 + u_i \qquad \textbf{(2)}$$

We were not able to use squared values of all of the explanatory variables because, for example, variables that only take either the value zero or one are the same when squared as they are when they are not squared. Thus, we do not consider the squared values of dichotomous variables.[7] The variables that we consider entering as squared values are: V19P4, V22P6, V23P6, V33P5, V39C1P3, RV40AP6, RV40BP6, RV40CP6, RV40DP6, V48P4, V56AP4 and V56BP4.

For both linear and non-linear specifications we report the most general model and then one or two parsimonious models obtained through the general-to-specific method whilst bearing in mind our theoretical priors.

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[6] Acs and Audretsch showed that small firm share in the U.S. "is negatively related to the existence of structural barriers, positively related to the extent to which small firms rely on a strategy of innovation, and negatively related to the efficiency differential between small and large enterprises." (p.399). This model has been verified by other authors, for example Mulhern and Stewart (1999).

[7] We did not consider the squared value of V31P5 because it is almost a dichotomous variable, which only takes the values –1, 0 and 1.

3. Results

Because censored and OLS regressions yield the same coefficient estimates and the other statistics are similar, we first discuss the OLS estimation results because they provide additional information in terms of misspecification tests. Table 2 reports three models, estimated by OLS, nested within equation **(1)**. All the models are free from evident misspecification at the 5% level except for some evidence of non-linear functional form for the parsimonious models, OLS 2 and OLS 3. Inference is, therefore, presented as valid, with the caveat that there may be some unaccounted for non-linearities.

The first model, denoted OLS 1, includes all the variables specified in equation **(1)**. Only five of the twenty-six explanatory variables are statistically significant according to t-tests (with both normal and White's heteroscedasticity consistent standard errors).[8] We therefore sequentially remove statistically insignificant variables to secure more parsimonious models.

The first reported parsimonious model is denoted OLS 2. The F-test for the deletion of twenty variables cannot be rejected at the 5% level of significance confirming the validity of the model reduction. Five (six using White's heteroscedasticity consistent standard errors) of the six retained variables' coefficients (excluding the intercept) are statistically significant at the 5% level. We delete the variable, V17P3, because its statistical significance is questionable and obtain the second parsimonious model, denoted by OLS 3. The F-test for the deletion of the twenty-one variables, relative to the general model OLS 1, cannot be rejected at the 5% level. All variables are significant at the 5% level using standard and White's heteroscedasticity consistent standard errors. This model's fit slightly deteriorates relative to OLS 2. We do not, therefore, have a clear preference of the specification OLS 3 over OLS 2 and so use the latter for inference.

From model OLS 2 we find the following variables to determine SME's intentions to expand production. Export activity (V16P4), franchising activity (V17P3), the technological level of its products (V23P6), recent increase in fixed assets (V33P5), **the difficulty of obtaining a bank loan (V53N5)** and the estimated proportionate change in income from 1997 to 1999 (V56BP4). The model has 44% explanatory power according to the adjusted coefficient of determination and the approximate average error (standard error) is 0.86 units. This latter figure is greater than 0.49 units – the value of 0.49 would ensure that, when rounded, the model would always achieve the correct integer value for the dependent variable. Nevertheless, this error is less than one which means that there will be fitted values that, when rounded, equal the actual integer value of the dependent variable.

The censored regression results, reported in Table 3, give qualitatively the same results as the OLS regressions reported in Table 2. Indeed, the coefficient estimates are the same, only the standard errors and fit are slightly different – overall the censored models fit the data slightly better. This suggests that, in this case, the OLS

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[8] Whilst there is no evidence of heteroscedasticity according to the reported misspecification test we also provide t-ratios using White's heteroscedasticity consistent standard errors to ensure the robustness of our results because cross-section data often suffers from this form of misspecification.

estimates are robust to censoring. Therefore, the inferences presented for model OLS 2 provide the basis for the findings of the linear models reported in this paper.

Given the evidence of non-linearities in our favoured linear model, OLS 2, we added squared values of several explanatory variables. Table 4 reports the results of our non-linear models estimated by OLS. As before, very similar results were obtained using censored regression methods, see Table 5, so we focus our attention on the OLS estimates. There is no evidence of misspecification, according to the reported diagnostic tests, at the 5% level for any of the reported specifications. Thus, 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.

The general non-linear model, OLS 4, contains all the variables included in model OLS 1, 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 5. An F-test cannot reject the deletion of these thirty-one variables from model OLS 4. The variables retained in model 5 are the same as those in model OLS 2 with the addition of the squared value of V56BP4. All variables are significant at the 5% level using White's heteroscedasticity consistent standard errors and all but V17P3 using standard t-ratios. Whilst the further exclusion of V17P3 cannot be rejected according to t and F-tests the fit of this model, reported as OLS 6, deteriorates relative to model OLS 5. Thus, the latter specification is our favoured non-linear model from which we draw our inferences.

This model has 45% explanatory power according to the adjusted coefficient of determination and the approximate average error (standard error) is 0.86 units, which is an improvement compared to our favoured linear model, OLS 2. As for model OLS 2 we find the following untransformed variables to determine SME's intentions to expand production. Export activity (V16P4), franchising activity (V17P3), the technological level of its products (V23P6), recent increase in fixed assets (V33P5), **the difficulty of obtaining a bank loan (V53N5)** and the estimated proportionate change in income from 1997 to 1999 (V56BP4). In addition, we also find the squared value of the estimated proportionate change in income from 1997 to 1999 (V56BP4) to be significant. All the untransformed variables feature the theoretically expected sign while the squared variable features, at first sight, an unexpected negative sign. However, to investigate the overall effect of V56BP4 we must look at the impact of the whole polynomial in this variable, which is represented by equation **(3)**.

$$Y_i = 0.011\ V56BP4_i - 0.00001\ V56BP4_i^2 \qquad \textbf{(3)}$$

Figure 1 plots the relationship given by equation **(3)** and indicates a clear positive relationship, with damped trend, between Y and V56BP4.[9] That Y increases at a decreasing rate as V56BP4 increases suggests a declining marginal impact of the V56BP4 on Y. This is illustrated in figure 2, which plots the first derivative of Y against V56BP4. This suggests a diminishing return to Y from V56BP4: successive increases in the estimated proportionate change in income have decreasing positive

[9] All figures are plotted over the range of values that the explanatory variables actually take on.

impacts on SMEs intentions to expand. This seems very plausible. OLS 5 in comparison to OLS 2 has theoretical plausibility, increased fit and absence of evident misspecification.

However we also note that another non-linear specification with superior fit was discovered and this becomes now our favoured model especially because of the inclusion of human capital as a significant variable. The OLS and censored regression estimates are reported in Table 6 as OLS 7 and Censored 7, respectively. Once again we discuss the OLS results because they are qualitatively similar to the censored regression results. There is no evidence of misspecification according to the reported diagnostic tests indicating that legitimate inference can be drawn. The F-test cannot reject the elimination of twenty-nine variables relative to general non-linear specification, OLS 4, and the imposition of the same coefficient on the RV40AP6 and RV40BP6 (where RV40ABP6=RV40AP6+RV40P6). This suggests that the imposed restrictions are valid. All of the untransformed variables included in the non-linear model, OLS 5, feature in OLS 7 with the additional human capital variable RV40ABP6.[10] All of the untransformed variables have theoretically plausible signs. The single non-linear variable included in this model is the squared value of V23P6 – the technological level of products. Although the negative coefficient on this variable is unexpected we consider the overall effect of the polynomial in V23P6 to assess the theoretical plausibility of this variable. The overall effect of V23P6 is represented by equation **(4)**.

$$Y_i = 0.983\ V23P6_i - 0.399\ V23P6_i^2 \qquad \textbf{(4)}$$

Figure 3 plots the relationship given by equation **(4)**. This indicates an initially positive, then negative, relationship between Y and V23P6. That the intended expansion of SMEs (Y) will eventually decrease as the technological level of a firm's products increase (V23P6), for the range of values that V23P6 take on can be explained as follows. The productivity levels of the Polish SMEs 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. They are therefore optimistic about expansion. However for the few firms in the higher range of technological development they are fearful of international competition as Poland accedes into the EU. A similar conclusion has been reached by Macejski (1996). This model includes human capital and features 46% explanatory power - greater than our favoured model OLS 5

4. Conclusions

Our results suggest the following determinants of Polish SMEs' intentions to expand production: export activity, franchising activity, the extent of recent increase in fixed assets, the difficulty in obtaining a bank loan, the level of human capital, the technological level of an SME's products, and the estimated proportionate change in income from 1997 to 1999. The latter two variables have a non-linear effect. Such factors would, therefore, likely influence the expected future prospects of SMEs. All variables have the theoretically expected sign.

[10] RV40ABP6 is the percentage of employees with both post-secondary and higher education.

To a great extent the results tell us what economic reasoning would indicate. Optimism of SMEs with respect to future expansion, as indicated by the survey, is very much related to the following factors: firstly the recent performance of SMEs as measured as an increase in their investment levels (V33P5) and turnover (V56BP4); secondly the technological level of the products of the enterprise (V23P6); thirdly the already existing level of international activity (V16P4 and V17P3) - exporting or franchising; fo**urthly the availability of credit (V53N5)** and fifthly the importance of human capital measured as the percentage of employees in higher education. Economic reasoning suggests that expansion plans are related to recent turnover and profits. We have no reliable measure of Polish SMEs profit rates but V33P5 and V56BP4 are sound proxies. Research also suggests that SME activity is related to export efforts (Nugent 1996 and Mata 1993) and technological effort (Acs and Audretsch 1990, and Carlsson 1984) while the larger size of SMEs will help them overcome the structural barriers (e.g. economies of scale) of the market. Franchising may also be viewed as a way a small enterprise can overcome such barriers to entry by participating in the economies of scale of the larger firm. Finally the importance of human capital is stressed as one of the significant variables correlated with intention of Polish SMEs to expand.

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Table 2: OLS Linear Regression Estimates

Model →	OLS 1			OLS 2			OLS 3		
	Coeft	OLS T	White T	Coeft	OLS T	White T	Coeft	OLS T	White T
Intercept	0.854	0.433	0.779	1.978	10.518	11.305	1.996	10.592	11.486
V09P2	–0.463	–1.288	–1.532						
V10P2	1.234	1.149	1.991						
V11P3	–0.003	–1.059	–1.151						
V16P4	0.441	2.062	2.355	0.509	2.627	2.809	0.511	2.627	2.776
V17P3	0.867	1.641	2.917	0.655	1.479	3.998			
V19P4	–0.243	–1.251	–1.284						
V20N4	0.016	0.055	0.050						
V22P6	0.069	0.336	0.315						
V23P6	0.483	2.244	1.999	0.512	3.878	3.821	0.505	3.810	3.712
V28P4	–0.070	–0.548	–0.607						
V31P5	0.033	0.185	0.181						
V33P5	0.494	3.311	3.367	0.601	4.950	5.038	0.630	5.239	5.417
V39C1P3	0.018	2.157	1.853						
RV40AP6	0.013	0.654	1.165						
RV40BP6	0.010	0.496	0.847						
RV40CP6	0.007	0.367	0.651						
RV40DP6	0.005	0.225	0.379						
V43P4	0.161	0.516	0.412						
V44N4	0.077	0.259	0.268						
V47AN4	–0.460	–1.102	–0.758						
V48P4	–0.183	–1.287	–1.128						
V49P6	–0.140	–0.865	–0.842						
V53N5	–0.244	–1.403	–1.433	–0.348	–2.214	–2.334	–0.345	–2.185	–2.303
V54PN4	0.194	1.171	1.100						
V56AP4	–0.0002	–0.070	–0.086						
V56BP4	0.007	3.899	4.206	0.006	4.538	4.511	0.006	4.432	4.474
$AdjR^2$	0.427			0.438			0.434		
s	0.871			0.862			0.866		
DW	1.984			2.086			2.118		
FSC1	0.002 [0.962]			0.347 [0.557]			0.627 [0.430]		
FFF1	3.428 [0.066]			7.115 [0.008]			7.801 [0.006]		
χ^2N2	2.260 [0.323]			3.548 [0.170]			3.894 [0.143]		
FH1	0.985 [0.322]			0.039 [0.844]			0.013 [0.910]		
F(1→)				0.840 [0.661]			0.902 [0.588]		

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. 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. F(1→) is an F-test for the variables deleted from the general regression (OLS 1) to obtain the reported equation. Figures in squared parentheses denote probability values. All estimations were carried out using Microfit 4.0.

Table 3: Censored Linear Regression Estimates

Model →	Censored 1		Censored 2		Censored 3	
	Coeft	T-ratio	Coeft	T-ratio	Coeft	T-ratio
Intercept	0.854	0.474	1.978	10.752	1.996	10.794
V09P2	–0.463	–1.411				
V10P2	1.234	1.258				
V11P3	–0.003	–1.160				
V16P4	0.441	2.259	0.509	2.686	0.511	2.677
V17P3	0.867	1.798	0.655	1.512		
V19P4	–0.243	–1.370				
V20N4	0.016	0.060				
V22P6	0.069	0.368				
V23P6	0.483	2.458	0.512	3.965	0.505	3.882
V28P4	–0.070	–0.600				
V31P5	0.033	0.203				
V33P5	0.494	3.627	0.601	5.061	0.630	5.339
V39C1P3	0.018	2.363				
RV40AP6	0.013	0.716				
RV40BP6	0.010	0.543				
RV40CP6	0.007	0.402				
RV40DP6	0.005	0.246				
V43P4	0.161	0.565				
V44N4	0.077	0.284				
V47AN4	–0.460	–1.207				
V48P4	–0.183	–1.410				
V49P6	–0.140	–0.947				
V53N5	–0.244	–1.536	–0.348	–2.263	–0.345	–2.227
V54PN4	0.194	1.283				
V56AP4	–0.0002	–0.077				
V56BP4	0.007	4.271	0.006	4.640	0.006	4.517
AdjR^2	0.435		0.446		0.442	
s	0.865		0.857		0.859	
QLB1	0.005 [0.945]		0.294 [0.588]		0.562 [0.453]	
QLB2	0.021 [0.990]		0.304 [0.859]		0.587 [0.746]	
χ^2N2	2.411 [0.299]		3.826 [0.148]		4.198 [0.123]	
F(1→)			0.846 [0.654]		0.899 [0.593]	

All models are of the dependent variable, Y, use the same 162 cross-sectional observations and are estimated using the Quadratic Hill Climbing optimisation algorithm for a censored regression. Y is censored to lie between 0.51 and 5.49, with a normally distributed error. Almost identical results were obtained when Y was censored to lie between 0.99 and 5.01. Adj R^2 represents the adjusted coefficient of determination and s is the regression's standard error. QLB1 and QLB2 denote the Ljung-Box Q-statistic for first and second-order serial correlation, respectively. χ^2N2 represents the Jarque-Bera test for normality and F(1→) is an F-test for the variables deleted from the general regression (Censored 1) to obtain the reported equation. Figures in squared parentheses denote probability values. All estimations were carried out using E-Views 3.1.

Table 4: OLS Non-Linear Regression Estimates

Model →	OLS 4			OLS 5			OLS 6		
	Coeft	OLS T	WhiteT	Coeft	OLS T	WhiteT	Coeft	OLS T	WhiteT
Intercept	0.032	0.016	0.028	1.650	6.199	6.583	1.669	6.251	6.965
V09P2	–0.088	–0.237	–0.292						
V10P2	0.632	0.573	0.916						
V11P3	–0.004	–1.779	–1.816						
V16P4	0.485	2.187	2.311	0.506	2.628	2.767	0.508	2.628	2.740
V17P3	1.105	2.058	3.444	0.658	1.496	4.337			
V19P4	–0.342	–1.585	–1.701						
V20N4	0.206	0.689	0.655						
V22P6	–0.426	–1.697	–1.560						
V23P6	1.359	3.130	3.015	0.521	3.969	3.920	0.514	3.899	3.806
V28P4	–0.118	–0.903	–1.003						
V31P5	–0.105	–0.581	–0.565						
V33P5	0.814	2.446	2.469	0.568	4.644	4.728	0.597	4.929	5.092
V39C1P3	0.069	2.205	2.592						
RV40AP6	0.043	1.709	2.394						
RV40BP6	–0.008	–0.306	–0.420						
RV40CP6	0.010	0.417	0.498						
RV40DP6	0.008	0.324	0.400						
V43P4	0.348	1.082	0.832						
V44N4	–0.169	–0.549	–0.559						
V47AN4	–0.194	–0.431	–0.325						
V48P4	–0.252	–1.722	–1.435						
V49P6	–0.164	–1.019	–0.972						
V53N5	–0.157	–0.880	–0.887	–0.342	–2.189	–2.283	–0.339	–2.161	–2.255
V54PN4	0.231	1.384	1.221						
V56AP4	–0.011	–1.163	–1.132						
V56BP4	0.015	2.285	2.337	0.011	3.629	3.921	0.011	3.565	3.887
V19P4^2	–0.498	–2.056	–2.166						
V22P6^2	0.252	1.486	1.647						
V23P6^2	–0.566	–2.237	–2.591						
V33P5^2	–0.173	–0.949	–1.084						
V39C1P3^2	–0.0008	–1.607	–1.895						
RV40AP6^2	–0.0003	–1.555	–1.646						
RV40BP6^2	0.0003	1.658	1.827						
RV40CP6^2	–0.00002	–0.129	–0.114						
RV40DP6^2	–0.00004	–0.256	–0.237						
V48P4^2	–0.079	–0.477	–0.425						
V56AP4^2	0.00003	1.283	1.282						
V56BP4^2	–0.00002	–1.371	–1.604	–0.00001	–1.733	–2.461	–0.00001	–1.720	–2.450
AdjR^2	0.472			0.446			0.441		
s	0.836			0.857			0.860		
DW	2.075			2.083			2.115		
FSC1	0.243 [0.623]			0.329 [0.567]			0.606 [0.438]		
FFF1	1.072 [0.303]			2.223 [0.138]			2.803 [0.096]		
χ^2N2	0.231 [0.891]			2.779 [0.249]			3.207 [0.201]		
FH1	0.437 [0.510]			0.299 [0.585]			0.040 [0.842]		
F(1→)				1.247 [0.198]			1.282 [0.169]		

See notes to Table 2 for an explanation of the statistics.

Table 5: Censored Non-Linear Regression Estimates

Model →	Censored 4		Censored 5		Censored 6	
	Coeft	T-ratio	Coeft	T-ratio	Coeft	T-ratio
Intercept	0.032	0.018	1.650	6.358	1.669	6.391
V09P2	–0.088	–0.272				
V10P2	0.632	0.658				
V11P3	–0.004	–2.042				
V16P4	0.485	2.510	0.506	2.696	0.508	2.686
V17P3	1.105	2.361	0.658	1.534		
V19P4	–0.342	–1.819				
V20N4	0.206	0.791				
V22P6	–0.426	–1.948				
V23P6	1.359	3.592	0.521	4.071	0.514	3.986
V28P4	–0.118	–1.036				
V31P5	–0.105	–0.667				
V33P5	0.814	2.807	0.568	4.763	0.597	5.039
V39C1P3	0.069	2.530				
RV40AP6	0.043	1.961				
RV40BP6	–0.008	–0.351				
RV40CP6	0.010	0.478				
RV40DP6	0.008	0.372				
V43P4	0.348	1.242				
V44N4	–0.169	–0.631				
V47AN4	–0.194	–0.495				
V48P4	–0.252	–1.976				
V49P6	–0.164	–1.170				
V53N5	–0.157	–1.010	–0.342	–2.246	–0.339	–2.209
V54PN4	0.231	1.589				
V56AP4	–0.011	–1.335				
V56BP4	0.015	2.622	0.011	3.722	0.011	3.645
$V19P4^2$	–0.498	–2.359				
$V22P6^2$	0.252	1.705				
$V23P6^2$	–0.566	–2.567				
$V33P5^2$	–0.173	–1.089				
$V39C1P3^2$	–0.0008	–1.845				
$RV40AP6^2$	–0.0003	–1.785				
$RV40BP6^2$	0.0003	1.903				
$RV40CP6^2$	–0.00002	–0.148				
$RV40DP6^2$	–0.00004	–0.294				
$V48P4^2$	–0.079	–0.548				
$V56AP4^2$	0.00003	1.472				
$V56BP4^2$	–0.00002	–1.573	–0.00001	–1.777	–0.00001	–1.758
$AdjR^2$	0.473		0.449		0.445	
s	0.835		0.854		0.857	
QLB1	0.187 [0.666]		0.265 [0.606]		0.526 [0.468]	
QLB2	2.858 [0.240]		0.271 [0.873]		0.526 [0.769]	

χ^2N2	0.263 [0.877]	3.201 [0.202]	3.679 [0.159]
F(1→)		1.231 [0.212]	1.258 [0.188]

See the notes to Table 3 for an explanation of the statistics.

Table 6: Alternative OLS and Censored Non-Linear Regression Estimates

Model →	OLS 7			Censored 7	
	Coeft	OLS T	White T	Coeft	T-ratio
Intercept	1.849	9.491	10.473	1.849	9.766
V16P4	0.459	2.397	2.665	0.459	2.467
V17P3	0.840	1.908	3.212	0.840	1.963
V23P6	0.983	3.796	4.190	0.983	3.906
V33P5	0.612	5.012	4.979	0.612	5.157
RV40ABP6	0.006	1.920	1.884	0.006	1.976
V53N5	–0.308	–1.975	–1.985	–0.308	–2.032
V56BP4	0.006	4.214	4.293	0.006	4.336
$V23P6^2$	–0.399	–2.272	–2.595	–0.399	–2.338
$AdjR^2$	0.459			0.465	
s	0.847			0.842	
DW	2.072				
QLB1				0.185 [0.667]	
QLB2				0.601 [0.741]	
FSC1	0.243 [0.623]				
FFF1	3.885 [0.051]				
χ^2N2	3.995 [0.136]			4.373 [0.112]	
FH1	0.066 [0.797]				
F(1→)	1.128			1.094	

Both OLS and censored regression models are reported. See the notes to Table 2 and 3 for an explanation of the statistics. Note the F-tests, denoted F(1→), impose the same coefficient on RV40AP6 and RV40BP6 (RV40ABP6=RV40AP6+RV40BP6) and delete 29 variables from the model OLS 4 and Censored 4. The distribution is F(30, 123) and the 5% critical value is approximately1.68 – this statistic is based on the distribution F(30, 120).

Figure 1: Implied Non-linear Relationship Between Intended SME Expansion (Y) and Estimated Change in Income (V56BP4)

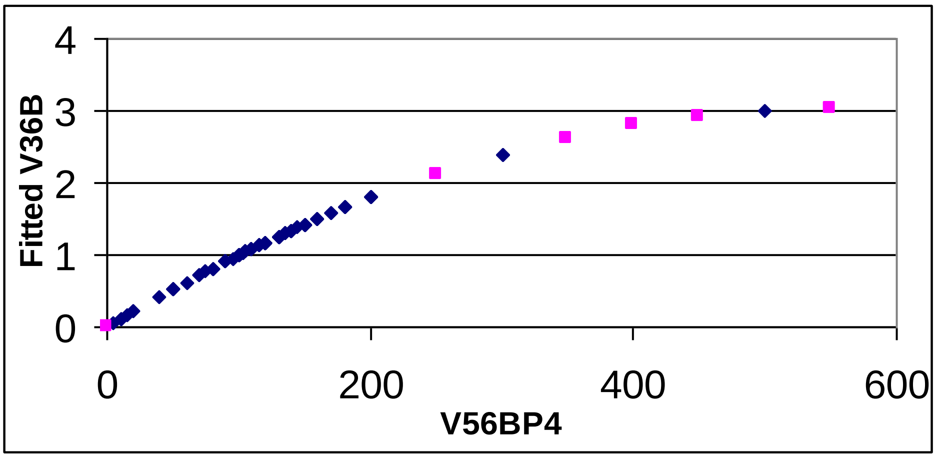


Figure 2: Linear Relationship between the Rate of Change of Intended SME Expansion (dY/dV56BP4) and the Estimated Change in Income (V56BP4)

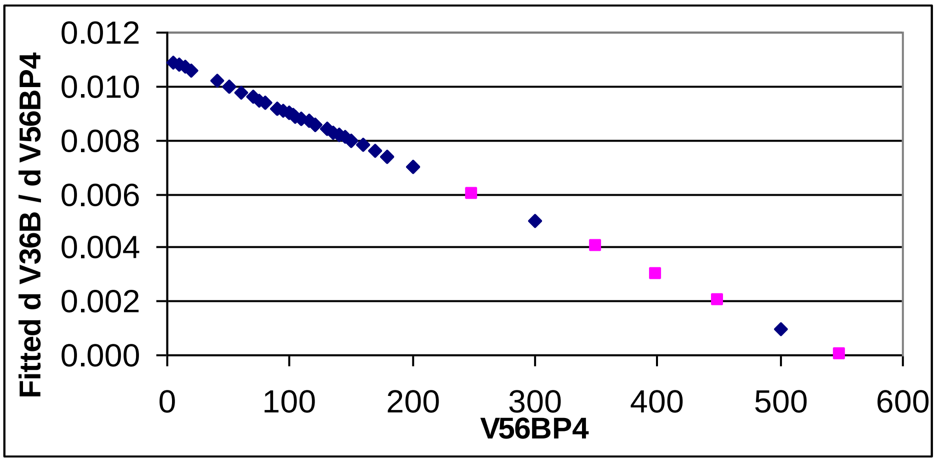
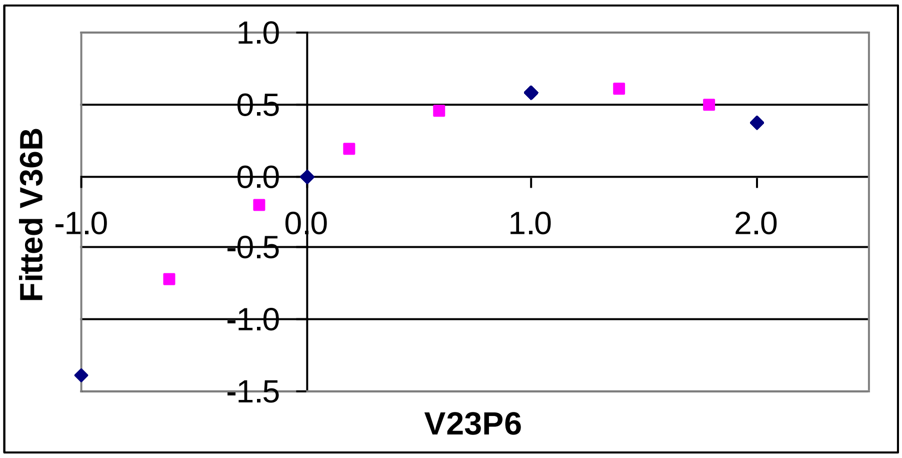


Figure 3: Implied Non-linear Relationship Between Intended SME Expansion (Y) and Estimated Change in Income (V56BP4)


1.0
0.5
0.0
-0.5
-1.0
-1.5
-1.0
0.0
1.0
2.0
Fitted V36B
V23P6