E/B/R ECONOMIC AND BUSINESS REVIEW

Volume 11 | Issue 2 Article 2

12-31-2009

Planned growth as a determinant of the markup: the case of Slovenian manufacturing

Nina Ponikvar

Maks Tajnikar

Follow this and additional works at: https://www.ebrjournal.net/home

Recommended Citation

Ponikvar, N., & Tajnikar, M. (2009). Planned growth as a determinant of the markup: the case of Slovenian manufacturing. *Economic and Business Review, 11*(2). https://doi.org/10.15458/2335-4216.1263

This Original Article is brought to you for free and open access by Economic and Business Review. It has been accepted for inclusion in Economic and Business Review by an authorized editor of Economic and Business Review.

PLANNED GROWTH AS A DETERMINANT OF THE MARKUP: THE CASE OF SLOVENIAN MANUFACTURING

NINA PONIKVAR*
MAKS TAJNIKAR**

ABSTRACT: *The paper follows the idea of heterodox economists that a cost-plus price is above all a reproductive price and growth price. The authors apply a firm-level model of markup determination which, in line with theory and empirical evidence, contains proposed firm-specific determinants of the markup, including the firm's planned growth. The positive firm-level relationship between growth and markup that is found in data for Slovenian manufacturing firms implies that retained profits gathered via the markup are an important source of growth financing and that the investment decisions of Slovenian manufacturing firms affect their pricing policy and decisions on the markup size as proposed by Post-Keynesian theory. The authors thus conclude that at least a partial trade-off between a firm's growth and competitive outcome exists in Slovenian manufacturing.*

Key words: *Manufacturing; Markup; Firm's growth; Slovenia*
UDC: 338.3:330.35(497.4)
JEL classification: B50; C23; D21; L21; L6

1. INTRODUCTION

It is generally acknowledged by theory and empirical facts that the formation of price in manufacturing firms is largely achieved by adding the markup to some sort of average unit cost. Although a lively discussion about the determinants of the markup has been underway for several decades, various authors still list and investigate quite mixed factors influencing the size of the markup. The reason behind these differences in opinion is clearly the complexity of the pricing decision-making process regarding the markup size. A concern about the factors causing the markup to differ across countries, industries and firms can be found in neoclassical economic theory (Lerner, 1934; Oliver, 1947), in a more applied and empirically-based branch of mainstream economics, namely in-

* University of Ljubljana, Faculty of Economics, Kardeljeva pl. 17, 1000 Ljubljana, Slovenia, Email: nina.ponikvar@ef.uni-lj.si
** University of Ljubljana, Faculty of Economics, Kardeljeva pl. 17, 1000 Ljubljana, Slovenia, Email: maks.tajnikar@ef.uni-lj.si

dustrial economics (Bain, 1956; Schmalensee, 1989; Martin, 2001), within the strategic management school (Porter, 1980; Barney, 1991) and especially within Post-Keynesian price theory and its pricing hypotheses (Hall and Hitch, 1939; Kalecki, 1954 and Andrews, 1955).

The paper follows the idea of heterodox economists, especially Kalecki (1954) and Eichner (1973), who argue that a cost-plus price is above all a reproductive price and growth price and accordingly tests the hypothesis that the firm's investment plans impact on its pricing decisions and the size of the markup. The study thus focuses on the firm's planned growth as one of the firm-specific markup determinants. It is hypothesised that firms with larger growth ambitions incorporate higher markups into the prices of their products compared to their rivals. In order to test this hypothesised relationship, the authors apply a firm-level model of markup determination which in line with theory and empirical evidence contains proposed firm-specific markup determinants, including the firm's planned growth. The model also controls for industry membership and environmental factors and is based on data on Slovenian manufacturing firms for an 11-year period.

2. LITERATURE REVIEW

The factors determining the markup size can be classified in three general groups. The first group of determinants includes the characteristics of the firm, usually called firm-specific factors. These factors are connected to the firm's market power (Kalecki, 1954; Demsetz, 1973), its cost efficiency and/or the productivity of its production factors and to the technological characteristics of the firm's production process and which are chiefly a result of strategies accepted and pursued by the firm in order to achieve its goal, i.e. long-run profit maximisation and growth (Eichner, 1973). Industry-specific factors represent the characteristics of a particular industry with regard to the concentration of firms, entry barriers, product differentiation, technological characteristics of the industry's production and the demand dynamics (Kalecki, 1954; Schmalensee, 1989). Industry-level factors determine the average power that firms within a particular industry exert over the price and the markup of their products. Consequently, these factors determine the average industry markup, while firm-level factors determine the deviations of a firm's markups from the industry average. Environmental and institutional factors represent the third group of markup determinants and consist of governmental anti-trust policy, the role of workers' and employers' organisations as well as general economic trends (Motta, 2004; Konings et al., 2001). The environmental factors are time-specific since they influence all firms in a particular economy in a similar fashion. While for the most part the industry and environmental characteristics set limits on the markup size, the internal, firm-specific factors mainly comprise the firm's activities aimed at realisation of the business plan and achieving the firm's goal and as such determine the required markup (Shapiro, 1981).

For Kalecki (1954), in cost-determined oligopolistic markets prices are set at the firm level with reference to average costs and the prices of other firms producing similar prod-

ucts. Thus, the firm's price p is $p = mu + n\overline{p}$, where u are average prime costs, $\overline{p}$ is the average price charged by all firms in the industry and m and n are parameters characterising the price-fixing policy of the firm reflected in the 'degree of monopoly'[1]. Accordingly, prices are expected to vary directly with the level of average direct cost but to be constrained by the price level in the industry, namely the competing group of firms (Kalecki, 1954, p. 13). The firm must ensure that the price does not become too high in relation to the prices of other firms, for this would drastically reduce sales, and that the price does not become too low in relation to its average prime cost, for this would drastically reduce its profit margin. The average price and average degree of monopoly of the industry was defined by Kalecki (1954, p. 16) with the equation $\overline{p} = \overline{u}(\overline{m}/(1 - \overline{n}))$, where $\overline{p}$ is the average price of the industry, $\overline{u}$ are average unit prime costs, $\overline{m}$ and $\overline{n}$ are weighted averages of the coefficients m and n and the expression $\overline{m}/(1 - \overline{n})$ represents the degree of monopoly of the industry. The firm's decision on the price and markup is thus subject to various factors deriving from the firm itself or from the firm's environment.

The idea of a strong linkage between the markup and investment finance has mostly been developed in theoretical works of non-neoclassical economists, especially within the Post-Keynesian school such as Eichner (1973, 1976), Eichner and Kregel (1975), Harcourt and Kenyon (1976), Shapiro (1981), Wood (1975) etc. These authors present a variant of a model of a price-setting firm facing relatively stable marginal costs, assuming that the firm's main objective is its growth and thus the preservation and/or improvement of its market position. Their models show that investment decisions influence firms' pricing decisions, more specifically; they at least partially determine the markup size. Price and the markup size are thus determined by the firm, not solely by current demand but also by expected future demand and investment requirements (Kalecki, 1971).

The latter also derives from the empirically confirmed fact that firms gather a large part of the funds they need for investing from their retained profits in both developing and developed countries, although institutional and historical factors must be taken into account to explain some of the variation seen across countries (see Hubbard (1998) for a review of empirical studies). Athey and Lumas (1994) along with Athey and Reeser (2000) in their empirical work using panel data from developed countries find that the availability of internal funds is an important determinant of firms' capital spending. Similarly, the amount of corporate investment is affected by internal resources in OECD countries (Kadapakkan et al., 1998). For the USA, for example, Carpenter and Petersen (2002) test a panel of small firms and Worthington (1995) a panel of manufacturing firms. They find that the growth of most of these firms is constrained by internal finance and that the cash flow and investment spending are positively correlated. Similarly, evidence of the existence of a liquidity constraint on investment in the Dutch manufacturing sector can be found in Van Ees et al. (1997). When comparing the dependence of firms on internal finance, Bond et al. (2003) report that there is less dependence on internal financial sources in the countries of continental Europe, while the external financial constraints on investment are more serious in the more market-oriented UK financial system.

[1] The first important use of the concept of the degree of monopoly was made by Lerner (1934) as a measure of the welfare loss of a monopoly and not as a measure of market imperfections.

For transition economies, Konings et al. (2005) confirm that firms' investment levels in these countries are sensitive to internal finance, although the sensitivity is not equally strong in all the investigated countries. They ascertain that the strength of sensitivity to internal funds depends on the strength of the persistence of soft budget constraints. Similar results are obtained for Slovenia for which empirical studies that are based on aggregate or sectoral data confirm that financial factors, the availability of internal financial funds as well as the accessibility of external financial sources significantly impact on the business sector's investment decisions (Tajnikar and Ogrin, 2001). Based on extensive survey data for Slovenian firms, Bartlett and Bukvič (2001) similarly identify external financial constraints, including the high cost of capital, as one of the biggest obstacles to the growth of small- and medium-sized firms in Slovenia. Accordingly, funds for growth financing have to be gathered internally.

Financial factors are hence closely related to investment decisions in which internally generated earnings play a crucial role in investment financing and where external financial funds are a complementary financial source, not a substitute for internal financial sources. Because the markup size determines the profits and is thus a source of retained internal financial funds, the pricing decisions of the firm and the size of its markup also depend on the firm's aspirations for investing and growth (Harcourt and Kenyon, 1976). The firm's growth ambitions, and the factors expressing it, are therefore important firm-specific markup determinants.

3. DATA AND METHODOLOGY

3.1 Data

The primary data source for the empirical investigation of markup determinants is the database of firms' financial statements collected by the Agency of the Republic of Slovenia for Public Legal Records and Related Services, which covers the whole population of Slovenian manufacturing firms and is extended with some of the internal databases of the Statistical Office of the Republic of Slovenia. The database employed in our analysis contains 35,371 observations for 6,987 manufacturing firms for the 1994-2004 period[2]. However, only 20,466 observations on 4,470 firms are without missing values and are thus regarded as our sample. A firm's industry membership is defined according to the five-digit NACE classification of industries and all financial data are in fixed prices from the year 2000 in Slovenian tolars. The panel nature of the firm-level data allows us to combine inter-temporal (within units) as well as inter-firm (between-unit) information efficiently and to control for unobservable firm-specific variables by focusing on differences over time (Schmalensee, 1989) and to efficiently overcome the problems. In addition, it enables us to test the time persistence of the markup and to study the variability of markups over time.

[2] Firms with missing values and with the highest and lowest 5 percent of markup values were excluded from the analysis using the method of removing excessive outliers from the dataset introduced by Hadi (1992) since the excessive outliers could have biased the subsequent results and conclusions.

3.2 Model and description of the variables

In line with the various theoretical approaches there is a theoretical disagreement about the list of markup determinants and especially the relative importance of these determinants. Yet, irrespective of the theoretical foundations underpinning the empiricism, the list of markup factors becomes very similar in the case of empirical investigations (Porter, 1981). Accordingly, the markup of firm *i* from industry *j* in year *t* is determined by general economic trends and the economic environment γ_t, industry-specific factors η_{jt} and firm-specific factors ε_{ijt}. We can thus formulate the most general model of markup determination as:

$$markup_{ijt} = f(\gamma_t, \eta_j, \varepsilon_{ijt}) \tag{1}$$

where subscript *i* refers to a firm, *j* to industries according to the five-digit NACE classification of industries and *t* to a particular year, respectively. Thus, the markup of firm *i* operating in industry *j* in year *t* is modelled as a function of firm *i's* contemporaneous characteristics, industry *j's* contemporaneous characteristics and the characteristics of the economic environment in year *t* ($\mathbf{X'}_{it}$, $\mathbf{X'}_{jt}$ and $\mathbf{X'}_t$ respectively) with unknown weights β, γ and θ and a lagged dependent variable with an unknown weight δ.

$$y_{it} = \sigma y_{\text{it-1}} + \mathbf{X'}_{it}\boldsymbol{\beta} + \mathbf{X'}_{jt}\boldsymbol{\gamma} + \mathbf{X'}_t\,\boldsymbol{\theta} + u_{it} \quad i = 1,\ldots,N;\ j = 1,\ldots,J;\ t = 1,\ldots,T \tag{2}$$

where y_{it} is the markup for firm *i* in time period *t*, δ is a scalar, $\mathbf{X'}_{it}$, $\mathbf{X'}_{jt}$ and $\mathbf{X'}_t$ are 1 x K vectors of explanatory variables with unknown K x 1 coefficient vectors β, γ and θ. Further, a dynamic relationship can be characterised by the presence of a lagged dependent variable among the regressors[3]. u_{it} is composed of $\mu_{it} = \mu_i + \lambda_i + v_{it}$, where μ_i is an unobserved individual-specific time-invariant effect which allows for heterogeneity in the means of the average markup across individual firms, λ_t is a time-specific individual-invariant effect and ν_{it} is a disturbance term.

Because the aim of this study is to test the hypothesised impact of a firm's investment plans on its markup policy, we estimate a firm-level model with a specification that includes a firm's planned growth according to firm-specific markup determinants suggested by theory and empirical evidence. The model also controls for industry membership and changes in the economic and institutional environment. The model allows us first of all to explain the deviations of a firm's markups from the industry average, and especially to investigate whether a firm's growth plans are affecting its pricing decisions. The variables of the model are specified as follows.

The appropriate empirical measurement of the markup that arises from theory is a contentious issue and empirical results have been shown to be sensitive to the measure of the margins that is used. In the Industrial Organisation tradition, the difference be-

[3] For the purpose of clarity, the lags and expected values of some variables as well as some interaction terms between regressors are not explicitly included in the general model, but are considered in detail in the specifications of the empirical model.

tween price and production costs is usually defined as the price-cost margin (hereinafter 'PCM') as proposed by Collins and Preston (1969) and improved by Domowitz, Hubbard and Petersen (1986), which is a good proxy for Lerner's degree of monopoly (Lerner, 1934) on the proposition that $MC = AVC$. A similar, but theoretically differently based idea of the structure of price is that of Kalecki (1954), according to which the degree of monopoly (markup μ) is derived from the price equation, where the price is a product of the markup and the variable unit cost of production. By using sales, inventories and costs in a similar manner as Domowitz, Hubbard and Petersen (1986), Kalecki's version of the markup definition as the ratio between price and unit direct cost of production can be constructed. When multiplied by the quantity produced, the firm's $markup_{ijt}$ is thus defined as the ratio between a firm's revenues and direct (variable) costs:

$$markup_{ijt} = \frac{value\ of\ sales_{ijt} + \Delta\ inventories_{ijt}}{payroll_{ijt} + cost\ of\ material_{ijt}} \tag{3}$$

and the average industry markup $INDmarkup_{jt}$ as

$$INDmarkup_{jt} = \frac{\Sigma\ value\ of\ sales_{ijt} + \Sigma\ \Delta\ inventories_{ijt}}{\Sigma\ payroll_{ijt} + \Sigma\ cost\ of\ material_{ijt}} \tag{4}$$

We proxy the firm's planned growth $\boldsymbol{GR_{ijt}}$, which is the dependent variable that we are focussing on, by the growth of a firm's fixed assets. A one-year lead of asset growth is included among the regressors as it is presumed that all of the firm's plans are fully carried into effect in the next year, as proposed by Blecker (1989). We have already argued that when a product's price set by an oligopolistic firm is seen first of all as 'a reproductive price and growth price' (Lee, 1998), the firm's growth ambitions become one of the most important markup determinants (Eichner, 1973) since the markup is the source of generating profits to finance growth.

Other firm-specific markup determinants are defined as proposed by existing empirical investigations. Market share $\boldsymbol{MS_{ijt}}$ is defined as the share of a firm's domestic market sales in the five-digit NACE industry annual sales (the home sales of domestic firms in an industry plus imports in industry *j*). The simple oligopoly model of firm performance implies a positive relationship between market share and markup size because a firm with a bigger market share is able to charge higher prices (and therefore achieve a superior level of markup) due to its stronger markup power (Stigler, 1968). The empirical literature also shows that the relationship is very likely not to be linear and that a certain threshold market power (market share) often exists (Feeny and Rogers, 1999; Bennenbroek and Haris, 1995). However, an opposing hypothesis is that as market share increases competitive pressures are weakened, suggesting that profitability (and the markup) is lower because the incentive to minimise costs is no longer important. Equally, it is possible that firms with lower market shares are smaller and more flexible, allowing for lower costs and higher profitability.

The criterion for the firm's $\boldsymbol{size_{ijt}}$ is the number of employees. Firms are regarded as small when they have less than 50 employees and as large when they have 250 or more employees. All other firms are regarded as being of a medium size. The impact of size on the markup can be twofold. On one hand, larger firms have larger market power (Bain, 1956) and/or are more efficient (Penrose, 1972; Demsetz, 1973) and can therefore achieve higher markups. On the other hand, when the markup is measured in gross form (see Kalecki, 1954), as in our empirical study, larger firms theoretically have lower overhead unit costs and can therefore charge lower markups.

The utilisation of production capacities $\boldsymbol{CU_{ijt}}$ of firm *i* from industry *j* in year *t* is defined as a ratio between the actual and potential volume of sales of a firm, where the potential sales of firm *i* are a product of the highest existing ratio between sales and production capacities (fixed assets) in the period 1994 to 2004 and the production capacities of firm *i* from industry *j* in year *t*. Production capacities are measured in terms of fixed assets. In a short-term analysis, the production capacities of a firm and its capacity costs are given. However, a firm can produce various quantities of output with the same production capacities. There are three possible effects of a firm's production capacity utilisation on the markup size. The first is the negative effect of capacity utilisation on the markup size in the case of target return pricing (Lanzillotti, 1958). The second is a positive effect due to the higher technical efficiency of a firm, which utilises its production capacities better (Blecker, 1989). The more the firm utilises its capacities, the higher the output it produces. At given unit variable costs and at a given price, fixed unit costs are lower at a higher production capacity utilisation and consequently the markup can be higher. The third source of a possible positive relationship between capacity utilisation and the markup level is the incentive of an oligopolistic firm to keep some level of reserve capacities, allowing the exploitation of any chance increase in selling power and acting as a competitive weapon (Sylos-Labini, 1969). The higher capacity utilisation of a firm also indicates that fewer reserve capacities are available and that a firm is moving closer to full capacity utilisation. The latter forces the firm to plan its investments in additional production capacity in order to be able to adapt to changing demand conditions with some level of reserve capacity. The last two reasons speak in favour of a positive capacity utilisation-markup level linkage.

A firm's labour productivity $\boldsymbol{Lprod_{ijt}}$ is defined as the value added per employee in real terms, the price of labour on firm level $\boldsymbol{w_{ijt}}$ is calculated by dividing real annual gross wages by the average number of employees for each firm, while the price of capital $\boldsymbol{r_{ijt}}$ is defined as the ratio of the sum of depreciation and the cost of financing to the sum of fixed assets and inventory. More productive firms are able to charge higher markups due to their lower unit costs at given prices of inputs. It is therefore expected that labour productivity explains the variability of the firm-level markups of firms within the same industry since these firms compete with each other. In addition, the price set for a particular product by a firm is the sum of the unit production cost and the markup. Higher production factor prices on the firm-level, leading to higher production costs and also to higher unit costs, do not always result in higher prices. How much of the higher costs will be spilled over into higher prices depends on the strength of the competition within

a particular industry. When the competition among firms within the same industry is strong enough, it is able to prevent the complete (or even any) transformation of the higher unit cost into higher prices of final products. In such cases, higher production costs, especially the cost of labour, which are not covered by the firm's markup, lead to lower markups. Because the markup is defined in a gross form, it is composed of one part for profit and another part for covering overhead costs (including capital costs). It is thus expected that a higher capital price leads to a higher cost of capital and therefore to a higher markup at a given level of sales.

A firm's export orientation $\boldsymbol{EXor_{ijt}}$ is measured by the share of revenues from exports in the total annual sales of firm *i*. Empirical literature and theory suggests that firms that sell their products in domestic and foreign markets are disciplined by foreign competition and thus charge lower markups within their price (Bughin, 1996; Caves and Porter, 1980), although the direction of the impact of an export orientation on markups also depends on the market structure and institutional framework.

The capital intensity of a firm's production $\boldsymbol{KI_{ijt}}$ is calculated as the ratio of total fixed assets to the number of employees. Firms with a higher capital intensity of production compared to the industry average are expected to have a lower firm-level markup compared to the average markup in the industry due to their inferior cost efficiency (Coelli et al., 1998). This implies a higher capital cost per unit of output and, at a given output's price, it leads to a lower markup. Further, studies using price-cost margins or markup as a dependent variable generally employ the capital/revenue ratio as a control because the margins and markup are used in their gross form (see the overview in Schmalensee, 1989). A positive relationship between the capital intensity of production and the markup size should only appear on the industry level where more capital demanding technology leads to higher industry-level markups.

The broad literature on profit persistence (Mueller, 1977; Mueller and Cubbin, 1990) suggests that current markups will be heavily influenced by the past realisation of such. Econometrically, this necessitates the additional inclusion of a lagged dependent variable in the basic specification. In addition, a serial correlation of markups and profit margins is empirically observed in time series (Machin and Van Reenen, 1993). Both issues suggest that current output conjectures may depend on previous performance.

The model is thus specified as:

$$markup_{ijt} = \alpha + \beta_1\, markup_{ij,t\text{-}1} + \beta_2 INDmarkup_{jt} + \beta_3 Gr_{ai(t+1)} + \beta_4 MS_{it} + \beta_5 MS^2_{it} + \beta_6 EXor_{it} + \beta_7 Lprod_{it} + \beta_8 w_{it} + \beta_9 r_{it} + \beta_{10} KI_{it} + \beta_{11} CU_{it} + u_{it} \quad (5)$$

where subscript *i* refers to a firm, subscript *j* to industries according to the five-digit NACE classification of industries and subscript *t* to a particular year, respectively. The average industry-level markup is included in the model in order to control for the influence of industry and market characteristics as well as the impact of environmental and

institutional factors, which influence all firms in a particular industry in the same year in the same fashion.

In Table 1 the characteristics of an average firm in the sample according to the year and firm size are described.

TABLE 1: *Characteristics of the database*

1994 to 2004 period average	All firms	Small firms	Medium firms	Large firms
Markup	1.125	1.134	1.078	1.095
Annual growth of fixed assets	1.07	6.88	1.41	1.02
Average number of employees	55	7	117	658
Market share	2.4	1.0	6.5	15.1

In the 1994–2004 period the average Slovenian manufacturing firm from the sample employed 55 people and had a market share of 2.4 percent. This average firm set its prices 12.5 percent above its variable unit costs although the average markup varied from 11 to 14 percent in the 1994-2004 period. According to the size class, small firms achieved the highest and medium-sized firms the lowest markups on average, while large firms remained in the middle during the whole investigated period. The average firm had an average annual growth of fixed assets (in real terms) of 1 percent, while on average the growth in the value of a firm's fixed assets was negative at the beginning of the 1994–2004 period and positive in later years.

The model is estimated in three specifications, denoted I, II and III respectively. Specification I includes all firm-level markup determinants proposed by theory and empirical literature as well as the average industry-level markup as a control variable for the industry-specific factors and changes in the economic environment. In specification II a set of year time dummies is additionally tested as a measure of the impact of the changes in the environment, while a firm's size is added in the form of a set of size dummies in the third specification (III). The latter specification is included because the descriptive statistics of the data (see Ponikvar, 2008 and Table 1) show that in Slovenian manufacturing the characteristics regarding a firm's capital intensity, export orientation, price of production factors and productivity differ a great deal among small, medium and large firms.

3.3 Method

The lagged dependent variable among the regressors complicates the application of the markup dynamic panel since y_{it} is a function of μ_i and it thus immediately follows that $y_{i,t-1}$ is also a function of μ_i. Therefore, $y_{i,t-1}$, the right-hand side regressor in the model is correlated with the error term and the OLS estimator is thus biased. Further, the usual panel data techniques cannot be used for the above equation since they are biased and inconsistent as $N \rightarrow \infty$ and finite T in a dynamic setting (Nickell, 1981). In addition, the fact that the specification of models includes firm-specific variables can also imply the

possibility of endogeneity arising from individual effects, that is from the fact that firm-level variables are likely to be correlated with unobserved firm-specific effects μ_i. Besides, the possibility of simultaneity bias should also be considered since, according to the theoretical origins of the Structure-Conduct-Performance paradigm, some fundamental variables in the model of firm performance (e.g. markup, concentration, product differentiation) are jointly determined (Hay and Morris, 1991) and as such do not satisfy the zero-conditional-mean assumption. In our case, the most apparent possible source of endogeneity among the regressors are sellers' concentration, market share, import penetration, export orientation etc.

These issues prevent the standard procedures for estimating panel data models from being consistent and/or efficient. Arellano and Bond (1991) propose the Generalised Method of Moments procedure (hereinafter 'AB GMM') which offers a large feasible instrument set by exploring instruments motivated by moment conditions, compared to Anderson and Hsiao (1982). The instruments include suitable lags of the levels of endogenous variables, which enter the equation in differenced form, as well as strictly exogenous regressors and any others that might be specified. It is argued that all the $x_{i,t}$ are also valid instruments for the first differenced equation if $x_{i,t}$ are correlated with μ_i. This permits us to exploit both the cross-section and time-series elements of the data in constructing instruments and hence yields efficiency gains relative to other estimation methods for panel data. In the case of the presence of heteroscedasticity in the model, a two-step procedure should be used where the first-step residuals are used to compute the variance covariance matrix in a second step. In other words, $\Delta\nu_{it}$ need to be replaced by differenced residuals obtained from the one-step estimator and the resulting estimator becomes the Arellano-Bond two-step estimator. The consistency of the two Arellano Bond GMM estimators hinges heavily upon the assumption that the $E(\nu_{it}\nu_{i(t-2)}) = 0$, where E is the mathematical expectation. $E(\nu_{it}\nu_{i(t-1)}) = 0$ need not be zero since the ν_{it} are differences of serially uncorrelated errors. Arellano and Bond (1991) therefore propose a test of hypothesis H_0 that there is no second-order serial correlation for the disturbances of the first-differenced equation with the test statistic m_2 for second-order serial correlation based on residuals from the first-differenced equation. A further aspect of interest concerns the validity of the chosen instruments above the minimum set necessary for econometric identification. Although we cannot test the validity of the instruments directly, we can assess the adequacy of instruments in an over-identified context with a test of over-identifying restrictions. If we reject the null hypothesis of such test, we cast doubt on the suitability of the instrument set and establish that one or more of the applied instruments do not appear to be uncorrelated with the disturbance process (Baum, 2006). In our case, a test of over-identifying restrictions as advised by Sargan (1958) is used.

4. RESULTS

The null hypothesis of the Wald test that the estimated coefficients of all regressors are all zero is rejected in all of the tested specifications. The moment conditions in the model are

appropriate since the null hypothesis of the Sargan test of over-identifying restrictions cannot be rejected, which is also our case. Crucial for dynamic models is the absence of autocorrelation of differenced model residuals of order 2. It is evident from the test statistics m_2 that in none of the model specifications does such an autocorrelation exist. On the other hand, the null hypothesis that average autocorrelation in residuals of order 1 is 0 is rejected, which is also what was expected with regard to the estimation technique applied.

TABLE 2: *Firm-specific markup determinants*

Dependent variable: Firm-level markup	**Specification I**	**Specification II**	**Specification III**
Markup(-1)	0.1306 (7.46)**	0.1285 (7.32)**	0.1275 (7.27)**
INDmarkup	0.2082 (8.60)**	0.2075 (7.91) **	0.2076 (7.94)**
žMS	-0.6633 (-6.97)**	-0.5337 (-5.86)**	-0.5297 (-5.82)**
MS2	0.5926 (5.94)**	0.5005 (5.18)**	0.4978 (5.18)**
EXor	-0.1285 (-3.35)**	-0.1507 (-3.68)**	-0.1496 (-3.62)**
GRa (+1)	0.0096 (4.73)**	0.0091 (4.50)**	0.0091 (4.49)**
Lprod	0.0000029 (5.51)**	0.0000031 (5.97)**	0.0000031 (5.95)**
W	-0.000055 (-9.84)**	-0.00006 (-10.69)**	-0.00006 (-10.59)**
R	0.1221 (2.09)*	0.0806 (1.36)	0.0800 (1.35)
KI	0.0000052 (5.48)**	0.0000055 (5.78)**	0.0000055 (5.77)**
CU	0.0222 (3.88)**	0.0251 (4.34)**	0.0253 (4.36)**
Medium size firm			-0.0032 (-0.35)
Large size firm			-0.0147 (-1.14)
Year dummy	NO	YES	YES
Constant	0.0051 (4.97)**	0.0080 (6.77)**	0.0080 (1.99)*
No. of observations	20466	20466	20466
No. of firms (i)	4470	4470	4470
Instrumented	MS, EXor, CU	MS, EXor, CU	MS, EXor, CU
(df) Wald χ2	(11) 322.05**	(19) 416.52**	(21) 424.72**
(df) Sargan χ2	(140) 187.33	(140) 143.42	(140) 143.51
m_1	-15.24**	-15.23**	-15.21**
m_2	0.10	0.03	0.02

Notes:
- t-statistics are in parentheses
- **,* denote significance at 1% and 5%, respectively

The size and signs of the estimated regression coefficients are mostly in accordance with the theoretical expectations, with their size remaining relatively stable regardless of changes in the model specification, which is an indicator of the model's robustness.

The firm's planned growth positively impacts on the markup size, as proposed by Post-Keynesian theory. The size of the estimated coefficient of planned growth on the markup size is stable in all specifications. Various economic reasons can be provided to explain this link. First, retained profits are a prime source of capital for a firm seeking expansion

and/or, alternatively, if a firm seeks to raise capital externally, adequate profitability is likely to be viewed by lenders as an important prerequisite. Second, according to the institutional theory of the firm the main objective of the 'megacorp' is to grow and expand its market share (Eichner, 1973). In addition, according to well-known managerial theories whereby managers have a discretion to pursue their own objectives as well, growth as well as profit may enter the firm's objective function and are thus positively correlated. Our results show that profits accumulated from markups are needed to finance growth (a high markup today is a precursor of high growth in the next period). Similar results are reported by Goddard et al., (2005) for a panel of manufacturing firms from the EU.

The direction of the impact of other regressors in the model is in accordance with the expectations. Firm-level markups relative to the industry average are higher when labour is more productive and when the price of labour is lower. On the other hand, the firm-level price of capital measured on the does not affect the markup size in a significant way. The linear relationship between a firm's market share and firm-level markup is significant and negative. Such a result is not predicted by the oligopoly models and is in contrast to some similar studies for developed European countries (see Goddard et al., 2005 for a review). One possible explanation is that being small is more advantageous in a small economy such as Slovenia. However, empirical literature has provided evidence of a U-shaped relationship between market share and profitability. In our case, when the possibility of both the linear and non-linear impact of the market share size on the markup is incorporated in the model the linear link remains statistically significantly negative, while the quadratic link is significantly positive. It is thus possible to identify the 'threshold' market share size above which the market share starts to increase markups and it is surprisingly high, amounting to a 53 percent market share. Other studies for larger economies (e.g. Fenny et al., 2005 for Australia) find this threshold market share to be much smaller. An acceptable explanation is that a firm must have a relatively large market share in the small Slovenian market to obtain enough market power in a general product market to be able to achieve higher prices and increase its markups.

Exposure to competition in foreign markets obviously decreases firms' markup sizes in Slovenian manufacturing. This is also confirmed in studies for manufacturing in other countries (e.g. Bennenbroek and Harris, 1995; Kambhampati and Parikh, 2003). Evidently, stronger competitive pressure due to greater exposure to competition abroad and the higher export orientation of firms decreases markups. In addition, large Slovenian manufacturing firms are more export-oriented and have smaller markups on average (Ponikvar, 2008).

The result that the higher capital intensity of a firm's production increases a firm's markup relative to the industry average was not expected since a firm's higher capital intensity of production relative to the industry average means inferior cost efficiency and should therefore result in a firm's lower markup relative to the industry markup. A positive link between the markup and the capital intensity of production is only expected to appear at the industry level. However, our results are in line with some other empirical studies (Bennenbroek and Harris, 1995; Feeny et al., 2005) where the difference between the industry- and firm-level impact was not accounted for. Firm-level capacity utilisation

also increases firm-level markups. The higher utilisation of a firm's production capacities means higher production (and possible revenues) at a given capital cost. Hence the achieved markups of firms can be higher at a given price. Similar results can be found in Bennenbroek and Harris (1995) for manufacturing industries in New Zealand.

Descriptive statistics of the dataset applied in the analysis (see Ponikvar, 2008) show that larger firms achieve lower markups on average, which is a logical consequence of the markup's gross definition. However, this is not confirmed in our models (III) where the impact of a firm's size (measured by dummy variables for small, medium and large firms) on markups is negative but insignificant.

The estimated coefficient on the lagged markup is positive and significant. These results are in line with the findings of the persistence of profitability literature (see the overview in Mueller and Cubbin, 1990). The coefficient amounts to approximately 0.13. It indicates that a 1 percent increase in the last year's firm-level markup will result in a 0.13 percent increase in this year's firm-level markup. In other words, 87 percent of the total adjustment in a firm's markup from a shock will occur in the first year, while 13 percent will not. This indicates that in Slovenian manufacturing the return of the markup to some equilibrium level is monotonic ($\delta<1$) and fast. The size of the obtained 'persistence' coefficient for Slovenian manufacturing firms is relatively small compared to studies for other economies. In estimations for other countries the coefficients on the lagged dependent variable in performance equations range from 0.2 to almost 0.5 (Fenny et al., 2005 and McDonald, 1999 for manufacturing firms in Australia; Machin and Van Reenen, 1993 for UK firms; Goddard et al., 2005 for Belgium, France, Italy and the UK). One possible explanation is that the markup definition in our study follows Kalecki's definition while the abovementioned studies use PCM as the dependent variable. Another, more content-oriented reason is that the relatively large export orientation of manufacturing firms, their exposure to competition abroad, the relatively large import penetration and relative smallness of Slovenian markets force manufacturing firms in Slovenia to adapt their markups to changed market conditions faster than in other larger economies.

The average industry markup included among the regressors shows a positive and significant impact on the markup of firms that belong to the industry. An increase in the average markup in an industry by 1 percentage point influences firms within this industry to increase their own markups on average by 0.2 of a percentage point. The positive and statistically significant coefficient thus shows the interdependence of the pricing decisions of firms within a particular industry. It thus empirically confirms the theoretical markup pricing equation (Kalecki, 1954, p.12), in which the pricing decision of a firm is influenced by its characteristics as well as the average industry price.

5. CONCLUSIONS

Our analysis shows that the differences seen in markups among Slovenian manufacturing firms within the same industry can be explained by differences in their ambitions to

grow, differences in their market share, differences in the utilisation of their production capacity, differences in the price of labour and productivity of their labour, the capital intensity of their production and differences in their export orientation.

In Slovenian manufacturing investment decisions affect the pricing policy and the decisions on the markup size, as proposed by Post-Keynesian theory. Our results show that planned growth positively affects the size of a firm's markup relative to its rivals, which confirms our hypothesis. We may conclude that the profits accumulating from markups are obviously needed to finance growth (a high markup today is a precursor of high growth in the next period).

This empirical evidence on the positive firm-level relationship between growth and markup also has some policy implications. It has generally been acknowledged that competitive pressure reduces markups, forces firms to organise themselves more efficiently and, as such, increases economic welfare. It would thus be socially desired for competitive pressures to be high and markups to be relatively low. On the other hand, the empirical evidence shows that firms which grow faster have higher markups compared to firms with lower growth ambitions. Economic growth can therefore be achieved only when markups are not on low competitive levels. Restrictive competition and/or antitrust policy might therefore, although resulting in a more competitive industrial environment and firms' decreased market power, slow down the grow path of Slovenian manufacturing industries since they limit the source of internal funds for investment financing via decreased markups. Obviously, at least a partial trade-off between a firm's growth and competitive outcome exists, which is an important issue that has to be considered by competition policy authorities when adopting policy measures. The same also holds for restrictive fiscal policy.

The empirical evidence also reveals the interdependence of the pricing decisions of firms within a particular industry since any change in the industry markup is reflected in the markup size of the firm. The theoretical markup pricing equation (Kalecki, 1954, p.12), in which a firm's pricing decision is influenced by its characteristics as well as by the average industry price, is thus confirmed in the case of Slovenian manufacturing.

RECEIVED: NOVEMBER 2008

REFERENCES:

Anderson, T.W. and Hsiao, C. (1982), "Formulation and Estimation of Dynamic Models Using Panel Data", *Journal of Econometrics* 18 (1), 47–82.

Andrews, P.S. (1955), *Manufacturing Business*, London: Macmillan.

Arellano, M. and Bond, S. (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies* 58 (194), 277–297.

Athey, M. J. and Laumas, P. S (1994), "Internal Funds and Corporate Investment", *Journal of Development Economics* 45 (2), 287–303.

Athey, M. J. and Reeser, W. D. (2000), "Asymmetric Information, Industrial Policy and Corporate Investment in India", *Oxford Bulletin of Economics and Statistics* 62 (2), 267–292.

Bain, J.S. (1956), *Barriers to New Competition*, Cambridge, Mass.: Harvard University Press.

Barney, J. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management* 17 (1), 99–120.

Bartlett, W. and Bukvič, V. (2001), "Barriers to SME Growth in Slovenia", *SME Development* 11 (2), 177–195.
Baum, F. C. (2006), *An Introduction to Modern Econometrics Using Stata*, Texas: Stata Press.

Bennenbroek, N. and Harris, R.I.D. (1995), "An Investigation of the Determinants of Profitability in New Zealand Manufacturing Industries in 1986-1987", *Applied Economics* 27 (11), 1093–1101.

Blecker, R. A. (1989), "Markup Pricing, Import Competition, and the Decline of the American Steel Industry", *Journal of Post Keynesian Economics* 12 (1), 70–87.

Bond, S. R. et al. (2003), "Financial Factors and Investment in Belgium, France, Germany and the United Kingdom: A Comparison Using Company Panel Data", *Review of Economics and Statistics* 85 (1), 153–165.

Bughin, J. (1996), "Capacity Constraints and Export Performance: Theory and Evidence from Belgian Manufacturing", *Journal of Industrial Economics* 44 (2), 187–204.

Carpenter, R. E. and Petersen, B. C. (2002), "Is the Growth of Small Firms Constrained by Internal Finance", *Review of Economics and Statistics*, 84 (2), 2, 298–309.

Caves, R. E. and Porter, M. E. (1980), "The Dynamics of Changing Seller Concentration", *Journal of Industrial Economics* 29 (1), 1–15.

Coelli, T.J., Rao, P.D.S. and Battese, G.E. (1998), *An Introduction to Efficiency and Productivity Analysis*, Kluwer Academic Publishers.

Collins, N.R. and Preston, L.E. (1969), "Price-Cost Margins and Industry Structure", *Review of Economics and Statistics* 51 (3), 271–286.

Demsetz, H. (1973) "Industry Structure, Market Rivalry and Public Policy", *Journal of Law and Economics* 16 (1), 1–10.

Domowitz, I., Hubbard, G. R. and Petersen, B. C. (1986), "Business Cycles and the Relationship between Concentration and Price Cost Margins", *Rand Journal of Economics* 17 (1), 1–17.

Eichner, A. S. (1973), "A Theory of the Determinants of the Mark-up under Oligopoly", *Economic Journal* 83 (332), 1184–1200.

Eichner, A. .S. (1976), *The Megacorp and Oligopoly*, Cambridge: Cambridge University Press.

Eichner, A. S. and Kregel, J.A. (1975), "An Essay on Post-Keynesian Theory: A New Paradigm in Economics", *Journal of Economic Literature* 13 (4), 1293–1314.

Feeny, S., Harris, M. N. and R., Mark (2005), "A Dynamic Panel Analysis of the Profitability of Australian Tax Entities", *Empirical Economics* 30 (1), 209–233.

Feeny, S. and Rogers, M. (1999), *Market Share, Concentration and Diversification in Firm Profitability*. Melbourne: Melbourne Institute Working Papers, no. 22/99.

Goddard, J., Tavakoli, M. and Wilson, J.O.S. (2005), "Determinants of Profitability in European Manufacturing and Services: Evidence from Dynamic Panel Model", *Applied Financial Economics* 15 (18), 1269–1282.

Hadi, A. S. (1992), "Identifying Multiple Outliers in Multivariate Data", *Journal of the Royal Statistical Society*, Series B 54, 761–771.

Hall, R.L. and Hitch, C.J. (1952), "Price Theory and Business Behaviour", In Wilson T. and P.W.S Andrews, eds. *Oxford Studies in the Price Mechanism*, Oxford: Clarendon Press, 107–138.

Harcourt, G.C. and Kenyon, P. (1976), "Pricing and the Investment Decisions", *Kyklos* 29 (3), 449–477.

Hay, D. A. and Morris, D. J. (1991), *Industrial Economics and Organisation: Theory and Evidence*, Oxford: Oxford University Press.

Hubbard, G. R. (1998), "Capital-Market Imperfections and Investment", *Journal of Economic Literature* 36 (1), 193–225.

Kadapakkan, P. R., Kumar, P.C. and Riddick, L. (1998), "The Impact of Cash Flow and Firm Size on Investment: The International Evidence", *Journal of Banking and Finance* 22 (3), 293–320.

Kalecki, M. (1954), *Theory of Economic Dynamics: An Essay on Cyclical and Long-Run Changes in Capitalist Economy*, London: Allen&Unwin.

Kalecki, M. (1971), *Cost and Prices, Selected Essays on the Dynamic of the Capitalist Economy, 1933-1970*, Cambridge: Cambridge University Press.

Kambhampati, U. S. and Parikh, A. (2003) "Disciplining Firms: The Impact of Trade Reforms on Profit Margins in Indian Industry", *Applied Economics* 35 (4), 461–470.
Konings, J., Van C., Patric and Warzynski, F. (2001), "The Dynamics of Industrial Mark-ups in Two Small Open Economies: Does National Competition Matter?", *Journal of Industrial Organization* 19 (5), 841–860.

Konings, J., Van Cayseele, P. and Warzynski, F. (2005) "The Effects of Privatization and Competitive Pressure on Firms' Price-Cost Margins: Micro Evidence from Emerging Economies", *Review of Economics and Statistics* 87 (1), 124–134.

Lanzillotti, R. F. (1958), "Pricing Objectives in Large Corporations", *American Economic Review*, 48 (5), 921–940.

Lee, F. S. (1998), *Post Keynesian Price Theory*, Cambridge: Cambridge University Press.

Lerner A. (1934), "The Concept of Monopoly and Measurement of Monopoly Power", *Review of Economic Studies* 1 (3), 157–175.

Machin, S. in Van Reenen, J. (1993), "Profit Margins and the Business Cycle: Evidence from U.K. Manufacturing Firms", *Journal of Industrial Economics* 41 (1), 29–50.

Martin, S. (2001), *Industrial Organisation: A European Perspective*, Oxford: University Press.

McDonald, J. T. (1999), "The Determinants of Firm Profitability in Australian Manufacturing", *Economic Record* 75 (229), 115–126.

Motta, M. (2004), *Competition Policy: Theory and Practise*, Cambridge: Cambridge University Press.

Mueller D. C. (1977), "The Persistence of Profits above the Norm", *Economica* 44 (176), 369–380.

Mueller, D. C. and Cubbin, J. (1990), *The Dynamics of Company Profits: An International Comparison,* Cambridge: Cambridge University Press.

Nickell, S. (1981), "Biases in Dynamic Models with Fixed Effects", *Econometrica* 49 (6), 1417–1426.

Oliver, H. M. Jr. (1947), "Marginal Theory and Business Behaviour", *American Economic Review* 37 (3), 375–383.

Penrose, E. T. (1972), *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.

Ponikvar, N. (2008), *Markup Determinants in Manufacturing Industries: The Case of Slovenia*, Doctoral dissertation, Ljubljana: Faculty of Economics.

Porter, M. E. (1980), "Industry Structure and Competitive Strategy: Keys to Profitability", *Financial Analysts Journal* 36 (4), 30–41.

Porter, M. E. (1981), "The Contributions of Industrial Organisation to Strategic Management", *Academy of Management Review* 6 (4), 609–620.

Sargan, J. D. (1958), "The Estimation of Economic Relationships Using Instrumental Variables", *Econometrica* 26 (July) 393–415.

Schmalensee, R. (1989), "Inter-Industry Empirical Analysis", In Schmalensee R. and Willig R. D, eds. *The Handbook of Industrial Organization, Vol. 2*, Amsterdam: North-Holland, 951–1009.

Shapiro, N. (1981), "Pricing and the Growth of the Firm", *Journal of Post Keynesian Economics* 4 (1), 85–100.
Stigler, G. J. (1968), *The Organisation of Industry*, Homewood: Richard D. Irwin.

Sylos-Labini, P. (1969), *Oligopoly and Technical Progress*, Cambridge, Mass.: Harvard University Press.

Tajnikar, M. and Ogrin, N. (2001), "Post-Keynesian Explanation of the Transitional Adaptation of the Investment Function in Slovenia", In *Fourth International Conference on Enterprise in Transition: Proceedings*, Split: University of Split, Faculty of Economics.

Van Ees, H., Kuper, G. H. and Sterken, E. (1997), "Investment, Finance and the Business Cycle: Evidence form the Dutch Manufacturing Sector", *Cambridge Journal of Economics* 21 (3), 395–407.

Wood, A. (1975), *A Theory of Profits*, London: Cambridge University Press.

Worthington, P. R. (1995), "*Investment, Cash Flows and Sunk Costs", Journal of Industrial Economics*, 43 (1), 49–61.