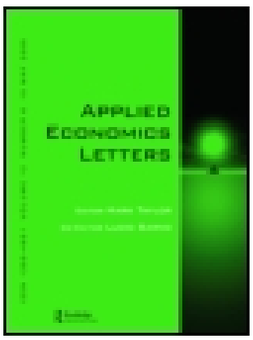

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Interaction between product market and labour market power: evidence from France, Belgium and Chile

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This article jointly estimates price-cost mark-ups and union bargaining power of manufacturing firms in France, Belgium and Chile. Our GMM results provide strong evidence of price-cost mark-ups being underestimated when labour market imperfections are ignored, corresponding to the omission of the part of product rents captured by the workers.

I. Introduction

The identification and estimation of imperfect competition in the product market has received great attention in the empirical industrial organisation literature (see Breshnahan, 1989 and Schmalensee, 1989 for surveys). Likewise, the degree of labour market imperfections has been explored extensively in the empirical rent sharing literature (see e.g. Blanchflower *et al.*, 1996; Hildreth and Oswald, 1997). However, there are few empirical studies (see e.g. Schroeter, 1988; Bughin, 1996; Neven *et al.*, 2002; Dobbelaere, 2004) which consider the possible interaction between product market and labour market imperfections when investigating price-cost mark-ups. These studies do however not allow for consistent comparisons as they rely on different modelling frameworks and econometric techniques.

The contribution of this short article is (1) to compare consistently joint estimates of price-cost mark-ups and extent of rent sharing of manufacturing firms in France, Belgium and Chile and (2) to evaluate the effect of ignoring rent sharing on the estimation of price-cost mark-ups in the three countries. Methodologically, we follow Crépon-Desplatz-Mairesse (1999, 2002). By embedding the Efficient Bargaining model (McDonald and Solow, 1981) in a microeconomic version of Hall's (1988) framework, they derive a reduced-form equation. Estimating this equation allows the identification of several structural parameters. These parameters concern the firm's price-cost mark-up, the scale elasticity and the workers' bargaining power.

The main point of this article is that price-cost mark-ups of French, Belgian as well as Chilean manufacturing firms are systematically underestimated when imperfect competition in the labour market is ignored. This underestimation corresponds to the omission of the part of product rents captured by the workers.

II. Theoretical Framework

We start from a production function $Q_{it} = \Theta_{it} F(L_{it}, M_{it}, K_{it})$, where i is a firm index, Q is output, t a time

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index, L is labour, M is material input, K is capital and $\Theta_{it} = Ae^{a_i+a_t+u_{it}}$, is an index of technical change or 'true' total factor productivity. The function F is assumed to be homogeneous of degree λ_{it}.[1]

Under imperfect competition in the product market and perfect competition in the labour market, the Solow Residual (Total factor productivity conventionally measured) can be expressed as:

$$\begin{aligned} SR_{it} &= \Delta q_{it} - \alpha_{Lit}\Delta l_{it} - \alpha_{Mit}\Delta m_{it} - (1-\alpha_{Lit}-\alpha_{Mit})\Delta k_{it} \\ &= (\mu_{it}-1)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + (\lambda_{it}-1)\Delta k_{it} + \Delta\theta_{it} \end{aligned} \tag{1}$$

with q_{it}, l_{it}, m_{it}, k_{it} and θ_{it} the logarithms of Q_{it}, L_{it}, M_{it}, K_{it} and Θ_{it}. $\alpha_{Jit} = (P_{Jit}\,\mathrm{J}_{it})/(P_{it}\,Q_{it})$ $(J = L, M)$ are the shares of labour and materials inputs in total revenue. Equation 1 shows that the Solow Residual can be decomposed into (1) a price-cost mark-up component $\mu_{it} = P_{it}/C_{Q,\ it}$ (where P denotes the output price and C_Q the marginal cost); (2) a scale factor component with λ_{it} being the scale elasticity and (3) a technological change residual term $(\Delta\theta_{it} = \Delta\alpha_t + \Delta u_{it})$.

Embedding the Efficient Bargaining model[2] into the framework extends the expression for the Solow Residual as follows:

$$\begin{aligned} SR_{it} &= (\mu_{it}-1)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + (\lambda_{it}-1)\Delta k_{it} + \mu_{it}\frac{\phi_{it}}{1-\phi_{it}}(\alpha_{Lit}+\alpha_{Mit}-1) \\ &\quad \times (\Delta l_{it}-\Delta k_{it}) + \Delta\theta_{it} \end{aligned} \tag{2}$$

This equation only differs from Equation 1 by an additional term reflecting the workers' bargaining power $\phi_{it} \in [0, 1]$.

III. Empirical Analysis

Reduced-form equations

Considering μ, λ and ϕ as average parameters, we can estimate the following reduced-form equations:

$$\begin{aligned} SR_{it} &= (\mu-1)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + (\lambda-1)\Delta k_{it} + \Delta\theta_{it} \end{aligned} \tag{I}$$

$$\begin{aligned} SR_{it} &= (\mu-1)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + (\lambda-1)\Delta k_{it} + \mu\frac{\phi}{1-\phi}(\alpha_{Lit}+\alpha_{Mit}-1) \\ &\quad \times (\Delta l_{it}-\Delta k_{it}) + \Delta\theta_{it} \end{aligned} \tag{II}$$

$$\begin{aligned} SR_{it} &= \left(\frac{\mu}{\mu_\eta}-1\right)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + \left(\frac{\lambda}{\mu_\eta}-1\right)\Delta k_{it} + \left(\frac{\mu_\eta-1}{\mu_\eta}\right)\Delta q_{It} + \Delta\nu_{it} \end{aligned} \tag{I$-$C}$$

$$\begin{aligned} SR_{it} &= \left(\frac{\mu}{\mu_\eta}-1\right)[\alpha_{Lit}(\Delta l_{it}-\Delta k_{it}) + \alpha_{Mit}(\Delta m_{it}-\Delta k_{it})] \\ &\quad + \left(\frac{\lambda}{\mu_\eta}-1\right)\Delta k_{it} + \frac{\mu}{\mu_\eta}\frac{\phi}{1-\phi}(\alpha_{Lit}+\alpha_{Mit}-1) \\ &\quad \times (\Delta l_{it}-\Delta k_{it}) + \left(\frac{\mu_\eta-1}{\mu_\eta}\right)\Delta q_{It} + \Delta\nu_{it} \end{aligned} \tag{II$-$C}$$

(I) and (II) follow directly from the theoretical framework.

Changes in output prices (Δp_{it}) and hence in real output (Δq_{it}) are generally not observed at the firm level. In empirical practice, changes in real output are replaced by changes in nominal output (or sales) that are deflated by a common industry price index Δp_{It}. Ignoring output price differentials might lead to downwardly biased and inconsistent estimates of the parameters of interest if there are large differentials in the firm output prices (across firms within industry) and if these differentials are correlated with the explanatory variables (changes in factor inputs and factor shares). Equations (I$-$C) and (II$-$C) control for output price differentials, following the solution suggested by Klette and Griliches (1996).[3] This solution results in modified regressions with the growth in industry output (Δq_{It}) as an additional regressor and a different interpretation of the coefficients in terms of the average scale elasticity and parameter λ and ϕ, and two mark-up

[1] For technical details, see Crépon *et al.* (1999, 2002).

[2] Crépon *et al.* (1999) and Dobbelaere (2004) adopt a different formulation of the bargaining model. They assume that the firm has to bear both the costs of capital and the costs of materials in its fall-back position. The firm's objective is to maximize its short run profit defined as total revenue minus labour costs: $R_{it} - w_{it}L_{it}$. In this article, we follow Crépon *et al.* (2002) and assume that the short run profit of the firm is value added minus labour costs: $R_{it} - j_{it}\,M_{it} - w_{it}\,L_{it}$ The firm has only to cover capital costs in its fall-back position.

[3] The Klette-Griliches solution relies on the assumption that the market power of firms mainly arises from product differentiation. In a differentiated product market, the firm market share depends on its relative price within the industry, and hence the change in the firm relative price ($\Delta P_{it} - \Delta P_{It}$) can be expressed in terms of its output growth relative to the industry ($\Delta q_{it} - \Delta q_{It}$). See also Mairesse and Jaumandreu (2005).

Table 1. Summary Statistics

Variables	France 1986–1992 ($N=1026$) Mean (SD)		Belgium 1988–1995 ($N=5565$) Mean (SD)		Chile 1993–1999 ($N=1954$) Mean (SD)	
Real firm output growth rate Δq	0.028	(0.203)	0.047	(0.177)	−0.011	(0.282)
Real industry output growth rate Δq_{Ind}	0.024	(0.041)	0.046	(0.168)	−0.013	(0.118)
Labour growth rate Δl	−0.002	(0.151)	0.020	(0.142)	−0.008	(0.221)
Capital growth rate Δk	0.039	(0.208)	−0.009	(0.253)	−0.016	(0.179)
Materials growth rate Δm	0.037	(0.248)	0.048	(0.221)	−0.022	(0.396)
Labour share α_L in nominal output	0.267	(0.130)	0.272	(0.138)	0.150	(0.087)
Materials share α_M in nominal output	0.612	(0.145)	0.587	(0.160)	0.533	(0.163)
Solow residual SR (TFP)	0.002	(0.082)	0.014	(0.084)	0.005	(0.197)

Note: $SR=\Delta q_{it}-\alpha_{Lit}\ \Delta l_{it}-\alpha_{Mit}\Delta m_{it}-(1-\alpha_{Lit}-\alpha_{Mit})\Delta k_{it}$.

parameters: μ_η capturing a specific demand mark-up associated with the within-industry demand elasticity η, where $\mu_\eta=\eta/(\eta-1)$, and the average general mark-up μ, corresponding also to other forms of product market imperfections.

Data

To estimate the four reduced-form Equations (I), (II), (I−C) and (II−C) for France, we use a balanced panel of 1026 manufacturing firms over the period 1986 to 1992. This sample has been constructed from the database SUSE ('Système Unifé des Statistiques d'Entreprises') of INSEE, the French National Institute for Statistics and Economic Studies. For Belgium, we rely on an unbalanced panel of 5565 firms in the manufacturing industry over the period 1988 to 1995. The data are taken from company accounts which are collected by the NBB (National Bank of Belgium). For Chile, we have a balanced panel of 1954 manufacturing firms over the period 1993 to 1999; it is largely drawn from the ENIA ('la Encuesta Nacional Industrial Annual') which is gathered by the INE ('el Instituto de Estadísticas de Chile'). Table 1 reports the means and the SDs of the included data for our main variables. The definitions of these variables are practically the same in the three countries.[4]

Estimation method and main results

Since changes in factor inputs (Δl, Δm and Δk) are endogenous to our model and since these changes can be affected by past and current productivity shocks (and demand shocks through the specification error due to unobserved firm level output prices), Ordinary Least Squares (OLS) estimates of the reduced-form coefficients and the corresponding structural estimates are likely to be biased and inconsistent. To avoid such biases and to take into account endogeneity problems, we estimate Equations (I)–(II–C) by the Generalized Method of Moments (GMM) technique. More specifically, we use interior variables (lagged values of the growth of the input factors Δl, Δm and Δk) as instruments. To capture possible unobservable aggregate shocks and productivity shocks common to all firms in a given year, we include time dummies.

Since our focus is on the magnitude of the underlying structural parameters (μ, μ_η, λ and ϕ) and on assessing the differences which result from modelling imperfect competition in both the product and the labour market in the three different countries, we present in Table 2 the structural parameters. These are computed from the estimated values of the reduced-form coefficients. For all reported results, we can never reject the null hypothesis that the instruments are valid on the basis of the Sargan test.

Our main findings can be summarized as follows. First, the parameter of average degree of rent sharing ϕ is estimated precisely and robustly across the specifications. The estimates point to a statistically significant workers' bargaining power of 0.66 (France), 0.36 (Belgium) and 0.31 (Chile) on a scale going from 0 to 1, indicating a high degree of rent sharing. Second, in the three countries, the lack of explicit consideration of labour market imperfections results in an underestimation of the average price-cost mark-up, corresponding to the omission of the part of rents captured by the workers. When taking into account the existence of rent sharing and controlling

[4] For detailed information on the sample construction and the variable measurement, we refer to Crépon *et al.* (2002), Dobbelaere (2004) and Contreras and Benavente (2006), respectively.

Table 2. Structural parameter estimates

	Not controlling for firm output price differentials								Controlling for output price differentials							
	France			Belgium			Chile		France			Belgium			Chili	
	(I)		(II)	(I)		(II)	(I)	(II)	(I-C)		(II-C)	(I-C)		(II-C)	(I-C)		(II-C)	
General mark-up: μ	1.02	(0.02)	1.05 (0.03)	1.16 (0.09)	1.21	(0.10)	0.95 (0.10)	1.00 (0.11)	1.23	(0.12)	1.42 (0.18)	1.21	(0.14)	1.24 (0.14)	1.18	(0.63)	1.28 (0.49)
Demand mark-up: μ_η	1		1	1	1		1	1	1.19	(0.11)	1.32 (0.15)	1.04	(0.08)	1.02 (0.08)	1.15	(0.38)	1.17 (0.34)
Scale elasticity: λ	0.92	(0.01)	0.76 (0.02)	1.01 (0.08)	0.94	(0.10)	0.75 (0.06)	0.60 (0.10)	1.10	(0.10)	1.01 (0.12)	1.06	(0.12)	0.96 (0.13)	0.88	(0.45)	0.78 (0.36)
Workers' bargaining power: ϕ	0		0.66 (0.01)	0	0.36	(0.22)	0	0.39 (0.12)	0		0.66 (0.01)	0		0.36 (0.16)	0		0.31 (0.11)
Profit ratio: μ/λ	1.11	(0.02)	1.38 (0.04)	1.14 (0.07)	1.29	(0.12)	1.28 (0.16)	1.66 (0.39)	1.11	(0.02)	1.41 (0.04)	1.14	(0.07)	1.29 (0.13)	1.35	(0.38)	1.65 (0.59)

Note: Robust SEs in parentheses.

for output price differentials, the average profit ratio (μ/λ) increases from 1.11 to 1.41 (France), 1.14 to 1.29 (Belgium) and 1.35 to 1.65 (Chile). For the three countries, this increase is due to a rise in the estimated average mark-up μ and a decline in the estimated scale elasticity λ.[5] Third, controlling for price heterogeneity leads to a sizeable increase in the average mark-up and the scale elasticity of French and Chilean manufacturing firms and a small increase in both parameters of Belgian manufacturing firms. Taking into consideration the problem of price heterogeneity does however not modify our assessment of the magnitude of the average profit ratio (μ/λ). Finally, the results suggest that the mark-up of French and Chilean manufacturing firms is mainly a differentiated product or demand mark-up. In contrast, it seems that the main source of market power of Belgian manufacturing firms is not in product differentiation but rather corresponds to other forms of imperfect competition.

IV. Conclusion

This article compares in a consistent way joint estimates of imperfections in both the product and the labour market in three different countries, i.e. France, Belgium and Chile, and evaluates the effect of ignoring labour market imperfections on the estimation of the price-cost mark-up. For the three countries, the empirical analysis shows clearly that the lack of explicit consideration of labour market imperfections results in a considerable underestimation of the average price-cost mark-up, corresponding to the omission of the part of firm rents captured by the workers. The average workers' bargaining power is estimated at 0.66 (France), 0.36 (Belgium) and 0.31 (Chile), while our estimate of the average price-cost mark-up is about 1.42 (France), 1.24 (Belgium) and 1.28 (Chile). Ignoring the occurrence of rent sharing reduces the price-cost mark-up to 1.23 (France), 1.21 (Belgium) and 1.18 (Chile). A key implication of our results is that wages should not be considered exogenous in econometric tests of product market power.

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References

Blanchflower, D. G., Oswald, A. J. and Sanfey, P. (1996) Wages, profits and rent-sharing, *The Quarterly Journal of Economics*, **111**, 227–50.

Bresnahan, T. (1989) Empirical studies of industries with market power, in *Handbook of Industrial Organization*, Vol. 2 (Eds) R. Schmalensee and R. Willig, North Holland, Amsterdam.

Bughin, J. (1996) Trade unions and firms' product market power, *The Journal of Industrial Economics*, **XLIV**, 289–307.

Contreras, J. S. and Benavente, J. M. (2006) Margen de utilidad y distribución de las rentas: la industria manufacturera chilena durante los noventas, Serie Documentos de Trabajo 219, Departamento de economía, Universidad de Chile.

Crépon, B., Desplatz, R. and Mairesse, J. (1999) Estimating price-cost margins, scale economies and workers' bargaining power at the firm level, CREST Working Paper G9917, Centre de Recherche en Economie et Statistique.

Crépon, B., Desplatz, R. and Mairesse, J. (2002) Price-cost margins and rent sharing: evidence from a panel of French manufacturing firms, Centre de Recherche en Economie et Statistique, revised version.

Dobbelaere, S. (2004) Estimation of price-cost margins and union bargaining power for Belgian manufacturing, *International Journal of Industrial Organization*, **22**, 1381–98.

Hall, R. E. (1988) The relationship between price and marginal cost in US industry, *Journal of Political Economy*, **96**, 921–47.

Hildreth, A. and Oswald, A. (1997) Rent sharing and wages: evidence from company and establishment panels, *Journal of Labour Economics*, **15**, 318–37.

Klette, T.J. and Griliches, Z. (1996) The inconsistency of common scale estimators when output prices are unobserved and endogenous, *Journal of Applied Econometrics*, **11**, 343–61.

Mairesse, J. and Jaumandreu, J. (2005) Panel-data estimates of the production function and the revenue function: What difference does it make?, *Scandinavian Journal of Economics*, **107**, 651–72.

McDonald, I. M. and Solow, R. M. (1981) Wage bargaining and employment, *American Economic Review*, **71**, 896–908.

Neven, D.J., Röller, L. and Zhang, Z. (2006) Endogenous costs and price-costs margins: an application to the European airline industry, *Journal of Industrial Economics*, **54**, 351–68.

Schmalensee, R. (1989) Inter-industry studies of structure and performance, in *Handbook of Industrial Organization*, Vol. 2 (Eds) R. Schmalensee and R. Willig, North Holland, Amsterdam.

Schroeter, J. R. (1988) Estimating the degree of market power in the beef packing industry, *Review of Economics and Statistics*, **70**, 158–62.

[5] In Dobbelaere (2004), the Belgian manufacturing industry is split up into 18 sectors. For each sector separately, it is found that price-cost mark-ups are underestimated when labour market imperfections are ignored.