Fondazione Eni Enrico Mattei

Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors

Carla Massidda

NOTA DI LAVORO 12.2005

JANUARY 2005

KTHC - Knowledge, Technology, Human Capital

Carla Massidda, *Department of Economics, University of Cagliari*

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:
http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm

Social Science Research Network Electronic Paper Collection:
http://ssrn.com/abstract=657142

Corso Magenta, 63, 20123 Milano (I), web site: www.feem.it, e-mail: working.papers@feem.it

Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors

Summary

The purpose of this paper is to test the general validity of the NKPC previsions for the Italian manufacturing industries. In particular we are interested in estimating the extent to which the degree of nominal inertia and the fraction of backward-looking price-setters differ from industry to industry. We attempt to address this issue by testing three different model specifications: a pure forward-looking model versus a hybrid model where an income labour share marginal cost measure is considered, and a modified hybrid model specification where marginal costs are corrected to include intermediate inputs. Our results show that the backward-looking component is statistically significant and quantitatively large for all industries. Moreover, this estimate does not depend on the model's specification. Conversely, the parameter measuring the extent of price rigidity is sensitive to the definition of firms' cost. Interpreting the overall results, we conclude that price-setting behaviour is not totally homogeneous among Italian firms.

Keywords: Phillips curve, Inflation, Unit labour cost

JEL Classification: E3

Address for correspondence:

Carla Massidda
Department of Economics
University of Cagliari
Viale S. Ignazio, 17
09123 Cagliari
Italy
Phone: +39 070 6753346
Fax: +39 070660929
E-mail: massidda@unica.it

Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors

Carla Massidda
Department of Economics
University of Cagliari

Abstract

The purpose of this paper is to test the general validity of the *NKPC* previsions for the Italian manufacturing industries. In particular we are interested in estimating the extent to which the degree of nominal inertia and the fraction of backward-looking price-setters differ from industry to industry. We attempt to address this issue by testing three different model specifications: a pure forward-looking model versus a hybrid model where an income labour share marginal cost measure is considered, and a modified hybrid model specification where marginal costs are corrected to include intermediate inputs. Our results show that the backward-looking component is statistically significant and quantitatively large for all industries. Moreover, this estimate does not depend on the model's specification. Conversely, the parameter measuring the extent of price rigidity is sensitive to the definition of firms' cost. Interpreting the overall results, we conclude that price-setting behaviour is not totally homogeneous among Italian firms.

Jel classification code: E3
Keywords: Phillips Curve, Inflation, Unit Labour Cost

1 Introduction

The existence of possible sectoral asymmetries in firms' pricing behaviour and in the degree of nominal price stickiness represents a central question in economics and is a particularly pertinent issue in current studies on inflation control. In this context, relative prices are often used as a measure of "supply shocks" in Phillips curve equations that seek to model the short run output-inflation trade-off. However, it is still not obvious how changes in relative price affect aggregate inflation nor how relative price is related to supply shocks. According to Aoki (2001) and the new-Keynesian view[1], only in a sticky-prices environment

[1] Goodfriend and King (1997), Rotemberg and Woodford (1997), Clarida et al. (1999), Erceg et al. (2000), Christiano et al. (2001), Dotsey and King (2001).

with different degrees of inertia characterising the different sectors, can a structural link between relative-price changes and aggregate permanent inflation be formally derived.

Despite of this, a multi-sector analysis of pricing behaviour and optimal monetary policy is rather limited and it lacks of conclusive evidence. There are, however, some considerable exceptions highlighting two main approaches utilised by researchers in this field. One is to ask private agents themselves how they set prices and would respond to particular events. This kind of evidence has been provided by Bils and Klenow (2002) for the U.K., Hall and Walsh (2000) for the USA and Fabiani and Gatulli (2004) for Italy. Accordingly, some interesting asymmetries in nominal inertia in various sectors and in the responsiveness of firms' price to shocks have been detected.

Another approach is to collect data on economic outcomes and infer price-stickiness from real/nominal correlations. The empirical analysis undertaken as part of this approach draws on the work of Aoki (2001), Bartsky et al. (2003) and Erceg and Levin (2002). As a whole, these works, although an important step forward in sectoral interdependency analysis, still fail to explore a multi-sector environment.

In this sense, Leith and Malley (2003) offer an important contribution. Using the insight of the new-Keynesian approach, they extend the original model to take sectoral differences in price setting behaviour into account. In particular, in their work a *New Keynesian Phillips Curve* sectoral relationship is formally derived by allowing firms in one sector to buy goods from other firms. More precisely, they construct a model of firms' price-setting behaviour which allows firms to sell their products to consumers, the government and other firms and to substitute intermediate goods for labour in production. In so doing, they allow for variations in raw materials and intermediate goods prices affecting the marginal cost faced by a price-setter. Then, as suggested by Galì and Gertler (1999), Galì et al. (2001) and Sbordone (2002) at aggregate level, they insert their new intermediate input-based marginal cost measure into their sectoral-*NKPC* relationship as the variable driving inflation dynamics. Furthermore, keeping in following Galì and Gertler (1999) and Galì et al. (2001), they relax the pure forward-looking assumption, admitting the existence of rules of thumb within the model.

In the same spirit as this recent literature on inflation dynamics, this paper attempts to provide new empirical evidence on Italian manufacturing firms' pricing behaviour within a *NKPC* framework. In particular, we are interested in estimating the extent to which the degree of nominal inertia and the fraction of backward-looking price-setters differs from sector to sector. To accomplish this task we first estimate the forward-looking version of the *NKPC* versus its hybrid formulation considering labour cost as the only variable cost component in our marginal cost measure. This exercise is aimed at testing the general relevance of the backward-looking component for each industry. Then we go a step further focusing our attention on the role of material costs in determining the degree of price stickiness for each sector. In the light of this, we correct our measure of marginal cost to take intermediate inputs into account and estimate the corrected *NKPC* as derived by Leith and Malley.

Following the prevailing empirical literature on this subject, we implement a *GMM* estimation of the *NKPC* for eight branches of the Italian manufacturing sector.

Our results show that the backward-looking component is statistically significant and quantitatively large for all industries. Moreover, this estimate does not depend on the model's specification. Conversely, the parameter measuring the extent of price rigidity is sensitive to the definition of firms' cost. All in all, we conclude that price-setting behaviour is not completely homogeneous among Italian firms.

The remainder of the paper is organised as follows. Section 2 develops the theoretical model used for estimation. Section 3 contains the empirical analysis. Finally, section 4 draws conclusions.

2 The theory

2.1 The general specification of marginal cost based NKPCs

The New Keynesian model's basic theoretical framework takes into consideration a *continuum* of monopolistically competitive firms, uniformly distributed on a unit interval. Each firm, indexed by $z[0,1]$, produces at time t a differentiated good Y_t^z whose price is P_t^z. Firm z faces a downward-sloping isoelastic demand curve $Y_t^z = D\left(\frac{P_t^z}{P_t}\right)^{-\varepsilon} Y_t$ for its product, where P_t and Y_t are respectively the aggregate price and output level. The same firm produces according to a Cobb-Douglas (CD) production technology $Y_t^z = (K_t^z)^{\alpha}(A_t N_t^z)^{1-\alpha}$ where K_t^z and $A_t N_t^z$ are, respectively, the *z-th* firm's capital and effective-labour augmenting requirements. Since we are in a constant-returns-to-scale environment, $\alpha \in [0,1]$. In this context, profits maximising firms are not totally free in setting nominal price. In particular, a Calvo-type (1983) constraint is assumed: each firm faces a constant probability $(1-\theta)$ of adjusting its price in any given period, and such probability is assumed to be independent of previous price adjustments. It follows that, the expected period during which a firm's price can remain unchanged is given by the ratio $D = \left(\frac{1}{1-\theta}\right)$.

Consequently, the evolution of the price level (p_t) turns out to be expressed (in log term) as follows (Galì and Gertler, 1999):

$$p_t = (1-\theta)p_t^* + \theta p_{t-1}$$

where (p_t^*) is the new price. Under the assumed technology and demand conditions, an optimising firm sets its p_t^* by fixing a markup over a discounted stream of expected future nominal marginal cost[2]. The log-linear approxima-

[2] All firms that alter prices in period t choose the same optimal price.

tion (around a steady state, characterised by zero inflation and flexible price equilibrium) of this firm's optimal pricing rule can be expressed as:[3]

$$(1) \qquad p_t^* = \log \mu + (1 - \beta\theta) \sum_{k=0}^{\infty} (\beta\theta)^k E_t \left\{ mc_{t,t+k}^n \right\}$$

where β is the subjective discount rate, $mc_{t,t+k}^n$ is the logarithm of the nominal marginal cost in a particular period $t + k$ of a firm that last reset its price in period t and $\mu \equiv \varepsilon/(\varepsilon - 1)$ is the firm's desired markup.

In this arrangement, aggregating individual firms' decision leads to a verifiable trade-off between inflation and real marginal cost that turns out to be very useful in understanding inflation dynamics. Here the problem is that empirical implementation of such a relation raises some critical issues. As it is well known, it is impossible to observe real marginal costs at firm-level. It therefore follows that the empirical implementation of the model requires a substitute for this unobservable cost component. The normal procedure is to use average aggregate marginal cost instead of the unobservable cost component. Considering labour markets competitive, this "aggregation process" can be carried out according to two alternative assumptions regarding capital input. We can, in fact, assume that capital can be instantaneously reallocated from one firm to another, so as to equate the shadow price of capital services at all times[4]. If this is the case, all firms will be facing the same real marginal cost.[5] We know, however, that this is quite an extreme assumption, unlikely to correspond to reality.

On the contrary, according to Sbordone (2001), it can be assumed that firms' relative capital stocks do not vary with their relative prices or relative product levels. Thus, firms charging different relative prices will have different sales levels and hence different marginal cost levels. It follows that marginal costs are an increasing function of the firm's output level and, therefore, of the firm's relative price. Based on this assumption, Galì *et al.* (2001) found that the relationship between the real marginal cost of the firm that optimally sets price at t and the corresponding average aggregate cost component can be expressed as follows:[6]

$$(2) \qquad mc_{t,t+k} = mc_{t+k}^{avg} - h(p_t^* - p_{t+k})$$

where mc_{t+k}^{avg} is defined as the log deviation of average real marginal cost at time t from its steady-state and $h = (\frac{\varepsilon\alpha}{1-\alpha})$ is the aggregation factor (depending on technology curvature and on demand elasticity) which allows us to define the unobservable firm-level marginal cost in terms of the observable average aggregate marginal cost, when this cost component differs from one firm to

[3] Cf. Galì and Gertler (1999), Galì et al. (2001), Gagnon and Khan (2001) and Sbordone (2001).

[4] See, *inter al.* Yun (1996) and Goodfriend and Kings (1997).

[5] Under constant return to scale firms face identical constant marginal costs (Galì *et al.*, 2001: 1234).

[6] Practically the same algebra is found in Gagnon and Khan (2001).

another. In equation (2), the term in parenthesis may be interpreted as firm z's relative price.

By substituting expression (2) in firm z's optimal pricing rule the following forward-looking formulation of the cost-based *NKPC* can be derived*:*

$$(3) \qquad \pi_t = \beta E_t \{\pi_{t+1}\} + \lambda mc_t^{avg}$$

where π_t is the inflation rate, $\lambda \equiv (\frac{(1-\theta)(1-\beta\theta)}{\theta})\xi$ and $\xi = \frac{1-\alpha}{1+\alpha(\varepsilon-1)} = \frac{1}{1+h}$.

Within the same formulation, the model in Eq(3) was extended by Galì and Gertler (1999) in order to relax the rational expectations assumption. In so doing, they introduced a backward-looking component which allows a fraction ω of firms to set their prices following a non optimal rule-of-thumb[7]. In the presence of this rule-of-thumb, Benigno and Lopez-Salido (2002) proposed, as a better approximation of price inertia duration, the new index $D^H = \frac{1}{1-\theta}\frac{1}{1-\omega}$.[8]

The new so-called "hybrid" formulation of the *NKPC* takes the following form:

$$(4) \qquad \pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \{\pi_{t+1}\} + \widetilde{\lambda} mc_t^{avg}$$

where $\widetilde{\lambda} \equiv (\frac{(1-\omega)(1-\theta)(1-\beta\theta)}{\phi})\xi$, $\phi \equiv \theta + \omega [1 - \theta (1 - \beta)]$, $\gamma_b \equiv \omega\phi^{-1}$and $\gamma_f \equiv \beta\theta\phi^{-1}$.

Equations (3) and (4) now have the appeal of expressing inflation in terms of observable measures, thus proving to be suitable for empirical analysis. The observable measure which is generally chosen to represent average real marginal cost is provided by real unit labour cost or labour income share ($RMC_t = \frac{(W_t/Y_t)}{(1-\alpha)(P_t/N_t)}$). It follows that mc_t^{avg} in equations (3) and (4) can be proxied by the $\hat{s}_t$ variable, defined as the log deviation of labour income share (S_t) from its sample mean $\bar{S}$. However, as discussed by Rotemberg and Woodford (1999), if other technologies are considered, such a measure is inappropriate. As a matter of fact, estimates of price-setting behaviour grounded on the labour income share-based measure of marginal costs may suffer from a misspecification bias. This happens, for instance, when inputs other than labour force vary with production, even in the short run. In this case, sectoral interdependencies should be explicitly included within a complete theoretical model and material cost should appear as argument of the production function.

The model presented in the present section lacks of both components.

2.2 A multi-sector NKPC specification

The theory presented in the above section models aggregate price-setting behaviours in a single sector environment and consider labour input as the only

[7] Cf. Fuhrer-Moore (1995, 1997) and Robert (1999, 2001).

[8] They observe: among firms facing the probability $(1-\theta)$ of changing their prices, only the fraction $(1-\omega)$ follows an optimal rule; therefore, in the hybrid model, the total fraction of agents that keeps prices fixed is expressed by $\omega + (1-\omega)\theta$. The expression $(1-\omega)\theta$ measures the fraction of firms that behave in a forward-looking manner, but cannot adjust their price.

variable cost component. Following this literature, Leith and Malley (2003) extended the Galì and Gertler's single-sector hybrid *NKPC* and constructed a new environment where firms' price-setting behaviour takes into account the sectoral composition of a domestic economy. It follows that material input plays a relevant role in the determination of firms' marginal cost.

Leith and Malley assume that imperfectly competitive firms sell their goods to buyers who purchase goods from all sectors in the economy. It follows that relative prices assume a central role in determining firms' optimal pricing decisions. Again, a Calvo-type (1983) constraint limiting the frequency of price adjustment is assumed within the model.

The buyers of each firm's goods are consumers, the government and other firms so that the demand for firm z's product within a specific sector i is represented by:

$$(5) \qquad y(i,z)_t = (\tfrac{p_t(i,z)}{P_t^i})^{-\epsilon_i}(c(i)_t + g(i)_t + m(i)_t)$$

where $(\frac{p_t(i,z)}{P_t^i})$ is firm's z price $(p_t(i,z))$ relative to the prices of other producers in its sector (P_t^i), $c(i)_t$ and $g(i)_t$ are the respective amounts of private and public consumption, and $m(i)_t$ is the demand for the basket of products produced in sector i for use as an intermediate input in the production of all firms in the economy.

The same firm z produces according to a Constant elasticity of substitution (*CES*) production function of the following type:

$$(6) \qquad y(i,z)_t = (\alpha_{H,i} H(i,z)_t^{\frac{\rho_i - 1}{\rho_i}} + \alpha_{m,i}(m_t^{i,z})^{\frac{\rho_i-1}{\rho_i}})^{\frac{\rho_i}{\rho_i - 1}/\psi_i} \bar{K}_i^{1-\frac{1}{\psi_i}}$$

where $\bar{K}$ is the firm z's fixed capital stock weighted by the term $(1 - \frac{1}{\psi_i})$, $H(i,z)_t$ is the quantity of workers in sector i used in the production by the same firm and $m_t^{i,z}$ is a *CES* aggregate of the intermediate goods produced by other firms and used in production by firm z in sector i. In the model, variable inputs are assumed as being imperfect substitutes so as ρ_i in Eq. (6) measures the elasticity of substitution between them.

Considering the presence of two variable inputs, real marginal cost is defined as follows within this model:

$$(7) \qquad MC(i,z)_t = \frac{W_t^i}{P_t}\frac{\delta H(i,z)_t}{\delta y(i,z)_t} + \frac{P_t^{m,i}}{P_t}\frac{\delta m_t^{i,z}}{\delta y(i,z)_t}$$

where W_t^i is the wage rate in industry i and $P_t^{m,i}$ is defined as a price index associated with the use of intermediate goods in production in sector i. Again, the aim is to find an expression for $MC(i,z)_t$ in terms of observable variables. After substituting cost minimisation conditions for labour and intermediate goods in the production function, an expression for the optimal level of $H(i,z)_t$ and $m_t^{i,z}$ can be derived.[9] These two relationships can be exploited

[9] See Eq. (14) and (15) in Leith and Malley (2003)

to obtain the two partial derivatives $\frac{\delta H(i,z)_t}{\delta y(i,z)_t}$ and $\frac{\delta m_t^{i,z}}{\delta y(i,z)_t}$ which can be inserted into Eq.(7).

After their insertion, real marginal cost equals:

(8) $\quad MC(i,z)_t = (y(i,z)_t)^{\psi_i - 1}\widehat{MC}_t^i$

where $\widehat{MC}_t^i = \frac{W_t^i}{P_t}(\alpha_{H,i}+\alpha_{m,i}(\frac{W_t^i}{P^{m,i}}\frac{\alpha_{m,i}}{\alpha_{H,i}})^{\rho_i - 1})^{\frac{-\rho_i}{\rho_i - 1}} + \frac{P^{m,i}}{P_t}(\alpha_H(\frac{W_t^i}{P^{m,i}}\frac{\alpha_{m,i}}{\alpha_{H,i}})^{\rho_i - 1} + \alpha_{m,i})^{\frac{-\rho_i}{\rho_i - 1}}$.

Eq.(8) can be inserted into the firm's z profit maximising problem and then the evolution of the optimal price set by this profit-maximising firm can be derived as a function of marginal cost.

Aggregating firms' behaviour and considering that some firms do not follow an optimisation rule (but rather a rule of thumb), after doing some algebra[10] the expression of Leith and Malley's multi-sectoral modified Phillips curve can be derived. In what follows we present the version of this curve which is appropriate for estimation:

(9) $\quad \pi_t^i = \gamma_b^i \pi_{t-1}^i + \gamma_f^i E_t\{\pi_{t+1}\} + (\frac{(1-\omega^i)(1-\theta^i)(1-\beta\theta^i)}{\phi^i})\frac{1}{1+(\psi^i - 1)\epsilon^i}\widehat{\widehat{mc}}_t^i$

where the term $\widehat{\widehat{mc}}_t^i$ corresponds to the following expression

$\widehat{\widehat{mc}}_t^i = \frac{\overline{W^i H^i}}{\overline{W^i H^i}+\overline{P^{mi}m^i}}\widehat{mc}_t^i + \rho^i \frac{\overline{W^i H^i}}{\overline{W^i H^i}+\overline{P^{mi}m^i}}(1-\frac{\overline{W^i H^i}}{\overline{W^i H^i}+\overline{P^{mi}m^i}})\widehat{w}_t^{i,m} + (1-\frac{\overline{W^i H^i}}{\overline{W^i H^i}+\overline{P^{mi}m^i}})\widehat{p}_t^{m,i} + (\psi^i - 1)\widehat{y}_t^i$.

In that expression all hatted variables correspond to deviations from the steady-state: $\widehat{mc}_t^i$ is the deviation in the ratio of labour costs to gross output, $\widehat{w}_t^{i,m}$ is the deviation in the wage rate deflated by the price of material in industry i $(\hat{W}_t^i - \hat{P}^{mi})$, $\widehat{p}_t^{m,i}$ is the deviation in the price of materials deflated by the output price of industry i $(\hat{P}^{mi} - \hat{P}_t^i)$ and $\widehat{y}_t^i$ is the deviation in gross output.

As specified in Eq.(9), Leith and Malley's Phillips curve perfectly compares to the model highlighted in the previous section and, if no intermediate goods are used in production, the former and the latter coincide perfectly.[11]

3 Empirical evidence

The main purpose of our empirical analysis is to test the general validity of the *NKPC* predictions for the Italian manufacturing industries. In particular we are

[10] As it is common, the log-linearised index of output prices in sector i has to be inserted into the log-linearised equation describing the evolution of the optimal price set by profit-maximising firms.

[11] "[...] If no intermediate goods are used in production then this reduces to the Phillips curve employed in, for example, Galì et al. (2001). [...]". (Leith and Malley, 2003: 12).

interested in estimating the extent to which the degree of nominal inertia and the fraction of backward-looking price-setters differs from industry to industry. To accomplish this task, we first test predictions of the pure forward-looking model of Eq.(3) against those of the hybrid model expressed in Eq.(4). As we explained in the previous section, the empirical results obtained with these estimates may suffer from a misspecification bias since these models totally ignore the existence of sectoral interdependencies within a domestic economy. Nevertheless, this exercise is useful for the purpose of this paper, as it is mainly aimed at testing the *NKPC*'s general performance. Structural estimates of equations (3) and (4) are alternatively conducted under hypotheses of both $\xi^i = 1$ and $\xi^i \neq 1$.

We then go on to estimate structural parameters of the *NKPC* when intermediate input costs are considered into the definition of the equation to be estimated. In detail, to illustrate the potential importance of material input costs, we first repeat regress of Eq.(4), redefining marginal cost by taking into account the cost of materials. Finally, we estimate structural parameters of the model presented in Eq.(9) which is correctly defined in order to take sectoral interdependencies into account.

For simplicity of exposition, we will refer to *M1* as the reduced-form estimate of Eq.(3), to *M2* as the structural estimate of Eq (3) when $\xi^i = 1$, to *M3 as* the structural estimate of Eq.(4) when $\xi^i \neq 1$, to *M4* as the structural estimates of Eq.(4) when $\xi^i = 1$, to *M5* as the structural estimates of Eq.(4) when $\xi^i \neq 1$ and, finally, to *M6* as the structural estimates of Eq.(9).

As an econometric procedure, we implement Hansen's (1982) Generalised Method of Moment (*GMM*, hereafter) which easily handles the set of orthogonality conditions that, under *RE*, can be derived from equations (3), (4) and (9).

The data we use are value added, labour income, unit labour costs, inflation, intermediate inputs and price indexes. We implemented *GMM* with lagged variables for inflation, detrended output, real marginal cost and wage inflation as instruments. Standard errors on estimated parameters are modified using the Newey-West correction. To test the model's overidentifying restrictions, we performed Hansen's test based on the J-statistic.

3.1 Labour share based marginal cost measure

3.1.1 Reduced form estimates

We begin by presenting *GMM* non structural estimates of Eq.(3). The set of orthogonality conditions is as follows:

$$E_t \left\{ \left(\pi_t^i - \beta^i \pi_{t+1}^i - \lambda^i mc_t^i \right) z_t^i \right\} = 0$$

where z_t^i denotes a vector of variables observed at time t.

Results are summarised in Table 2, where we report the point estimate of the discount factor and the slope coefficient on marginal cost. Results regarding the model's overidentifying restrictions test (J-statistic) are reported as well. The empirical model works reasonably well: as implied by the theory, the slope coefficient is positive and significantly different from zero for 6 industries out of 8. We have problems only for industry n°8 (the λ coefficient exhibits the wrong sign) and for industry n°11 (the same coefficient is not significantly different from *zero*). Finally, the estimate of the discount factor is a bit low; this is especially true for sectors 6, 7, 9 and 11.

3.1.2 Forward-looking model structural estimates

We now go on to the structural estimate of the model in Eq.(3). In this case, previous empirical works have proved that *GMM* results may be sensitive to the specification of orthogonality conditions[12]. Taking this into consideration, we chose the following specification:

$$E_t \left\{ \left(\pi_t^i - \beta^i \pi_{t+1}^i - \theta^{i-1} \left(1 - \theta^i\right) \left(1 - \beta^i \theta^i\right) \xi mc_t^i \right) z_t^i \right\} = 0$$

which, according to Galì *et al.* (2001), produces more reasonable estimates of structural parameters.

The restrictions imposed by the model imply that we can estimate only two parameters. We have chosen to estimate the main structural parameters θ^i and β^i conditional on a set of plausible values imposed for α^i and ε^i. These values can be derived from information on the steady-state (average) markup levels μ^i and the labour income share, $\bar{S}^i$. In fact, simple algebra[13] shows that $\alpha^i = 1 - \bar{S}^i \mu^i$, whereas, by definition, $\varepsilon^i = \mu^i / (\mu^i - 1)$.

As we know, average markup and labour income share may differ among firms; for our work, this implies calibrating each industry separately [see Table 3].

As far as the calibration of average markup is concerned, we consider a study by Marchetti (1999) where markup values are estimated at branch level for the manufacturing sector as a whole.[14] Table 3 (column 1) reports these values. For calibrating $\bar{S}^i$, we use information on the average labour income share. These values are also reported in Table 3 (column 2).

Once values of μ^i and $\bar{S}^i$ are fed into the equations defining measures of α^i [Table 3, column 3] and ε^i [Table 3, column 4], these two parameters are used to derive a value for the constant ξ^i [Table 3, column 5]. Recall that ξ^i falls to one when all firms are facing the same real marginal cost.[15]

Table 4 reports estimates of Eq.(3) conditional on the two possible values of the constant ξ^i. The first two columns in the Table give the estimated values of the primitive parameters β^i and θ^i; the third and the fourth highlight the

[12] Galì *et al.* (2001).

[13] By definition, average markup equals the inverse of the average *RMC*. Since $RMC^{avg} = \frac{1}{1-\alpha} S$, it follows that $\alpha = 1 - \bar{S}\mu$.

[14] In fact, this study reveals that for the Italian manufacturing sectors the perfect competition is rejected.

[15] Under constant return to scale firms face identical constant marginal costs (Galì *et al.*, 2001: 1234).

values derived for λ^i, for D^i and, finally, the last column highlights the results of overidentifying restriction tests.

The general fit of the model appears reasonably good; the model's overidentifying restrictions are not rejected and the main New Keynesian hypothesis on the role of RMC in driving inflation dynamics at the industry level is confirmed. Coefficients always appear to be of the correct sign and significantly different from zero.

For a more detailed analysis of the results reported in Table 4, three main features are worth noting.

First, estimates of β^i are quite stable and very reasonable for all specifications (plausible values are considered those close to 0.99); the discount rate shows excessively low values only in $M2$ of sector n° 6, in $M3$ of sector n° 10 and in $M2$ of sector n° 11.

Second, alternative assumptions on the constant ξ^i affect the estimate of parameter θ^i, which measures the extent of price rigidity. According to Galì *et al.*' s (2001) imposing the assumption of constant return to scale ($\xi^i = 1$), we should get higher estimates of the parameter θ^i; we can confirm this finding for sectors n° 8, 9, 10, 11 and 13.

Third, the stickiness parameter θ^i differs from branch to branch, denoting the presence of branches where price inertia appears a more important phenomenon with respect to others. It follows that the implied measure of the average time prices remains unchanged, D^i, varies as well. We get degrees of prices stickiness which range between 3.2 and 9.1 quarters when we estimate $M1$ and between 1.7 and 6.25 quarters when we estimate $M2$.

3.1.3 Hybrid model structural estimates

Extending the approach in the previous section, we now estimate the hybrid model of Eq.(4). The orthogonality conditions are now specified as follows:

$$E_t\left\{\left(\pi_t^i - \omega^i\pi_{t-1}^i - \beta^i\theta^i\pi_{t+1}^i - \phi^{i-1}\left(1-\omega^i\right)\left(1-\theta^i\right)\left(1-\beta^i\theta^i\right)\xi^i mc_t^i\right)z_t^i\right\} = 0$$

As the hybrid model indicates, we can now estimate the additional parameter ω^i, measuring the fraction of backward-looking price setters. As for θ^i and β^i, estimates of ω^i are conditional on the values imposed for α^i and ε^i and, thus, on the parameter ξ^i.

Table 5 reports estimates of Eq.(4) dependent on the two possible values that ξ^i can assume. The first three columns in the Table give the estimated values of the primitive parameters ω^i, θ^i and β^i; the fourth and the fifth highlight the values derived for γ_b^i and γ_f^i; the sixth and seventh contain derived indexes of price rigidity D^i and D^{iH} respectively and, finally, the last column highlights the results of overidentifying restriction tests.

As we can see from the table, the good performance of the model is confirmed and, according to the J-test, the model's overidentifying restrinctions are not rejected (with the exclusion of sector 13). It is also evident that $M4(\xi^i = 1)$

performs better than $M5(\xi^i \neq 1)$. In fact, imposing $\xi^i \neq 1$ yields estimates for the θ^i and β^i parameters that are not statistically significant (despite having the right sign), for sectors n° 8, 9, 10 and 11. For sectors n° 7, 12 and 13 we can confirm that imposing the assumption of constant returns to labour ($\xi^i = 1$) yields a higher estimate of the stickiness parameter. Here, again, the main results in the Table are worth noting.

First, the fraction of firms that follow a rule of thumb is quite large and statistically robust. Furthermore, estimates of the parameter ω^i are stable in the two different models $M4(\xi^i = 1)$ and $M5(\xi^i \neq 1)$ and are economically plausible. It follows that, with the exclusion of industries 9 and 12, the weight on the backward-looking component of inflation, γ_b^i, is almost as large for each industry as that on the forward-looking component, γ_f^i, sometimes being even larger (industries 6, 7 and 10).

Second, here it is confirmed that the points estimate of the θ^i parameter varies from one branch to another, so that the implied index of price inertia varies as well. We calculate two versions of this index: the ratio $D^i = 1/(1-\theta^i)$ and the ratio $D^{iH} = 1/(1-\theta^i)(1-\omega^i)$, as suggested by Benigno-L.Salido. According to our results, with the index D^{iH}, the degree of price inertia increases for all sectors. With respect to results obtained estimating the pure forward-looking model in Eq.(3), we now obtain inertia degrees that are higher for industries 6, 7, 9,13 and lower for industries 10, 11.

Third, the estimate of the discount factor β^i is excessively low.

In conclusion, it appears that the hybrid $NKPC$ specification is a plausible framework for describing inflation dynamics in Italian manufacturing industries. Nevertheless, the degrees of price inertia we obtain are undoubtedly unrealistic.

3.2 Intermediate input based marginal cost measure

In this section, we determine whether material inputs, when included into the definition of the firms' real marginal cost, influence the point estimates of the principal structural parameters. In the following sub-sections, we first conduct an analysis on the quantitative relevance of material costs; then, as peviously anticipated, estimates of equations 4 and 9 will follow.

3.2.1 Intermediate input in Italian manufacturing sectors

This section analyses the importance of material costs and the behaviour of relative-price within Italian manufacturing sectors. This analysis is highly subject to the availability of sectoral-level data.

The main problem is related to the availability of adequate material cost and price series. For material cost, we construct our quarterly time series starting from a yearly series of Input/Output (I/O henceforth) tables computed by Rampa (2001) for the Italian economy and expressed in current-price. For each industry i, we consider material cost to be the amount of goods produced by all industries (industry i included) and used in production by industry i.[16]

[16] In doing this, we had to adapt the classification of the sectors as appearing in the I/O

Once these material cost series are available, our labour force-based marginal cost measure can be corrected in order to include this new cost component. Our new definition of marginal cost is then indicated by the following ratio:

$$MC^i tot = \frac{W^i H^i + P^{mi} m^i}{P^i Y^i}$$

where the ratio $\frac{W^i H^i}{P^i Y^i}$ espresses real unit labour costs and $P^{mi} m^i$ is material cost at current price.

For the price index series the problem is more serious since material prices are not available. Thus, for each sector i we approximate this index, calculating an intermediate inputs price index for industry i (P^{mi} of Eq. (7)) defined as a weighted average of sectoral price indexes, where material costs are used as weights. In details, in our index, the price of each industry is weighted by the ratio of material input demanded from this industry by industry i relative to the total amount of material input used in production by industry i.

With these data in hand, we can calculate some descriptive statistics which are shown in Table 8. The first column reports the ratio of material costs relative to variable costs; the second reports the ratio of material costs relative to GDP and the third the ratio of labour costs relative to GDP. All ratios indicate that material costs are an important part of the variable costs.

Table 6 - Material costs in Italian manufacturing industries

Sectors	$\frac{P^{mi} m^i}{W^i H^i + P^{mi} m^i}$	$\frac{P^{mi} m^i}{P^i Y^i}$	$\frac{W^i H^i}{P^i Y^i}$	μ^i
6	0.611	0.376	0.309	0.316
7	0.595	0.465	0.398	0.137
8	0.559	0.413	0.424	0.163
9	0.681	0.557	0.270	0.172
10	0.558	0.411	0.370	0.219
11	0.578	0.447	0.386	0.168
12	0.531	0.411	0.405	0.185
13	0.593	0.521	0.368	0.111

According to Domowitz *et al.* (1988), we also calculate the price-cost markup implicit in each industry as the ratio $\frac{\text{Value added - Production workers payroll}}{\text{Value added + Cost of Materials}}$. The average markup values we obtained are reported in the last column of Table 6 and can be compared with those obtained by Marchetti (1999), used in our calibrations. Interestingly, with the exclusion of industry 6, there are no noticeable differences.

tables to ours (ISTAT).

3.2.2 Estimates

We now proceed by estimating structural parameters of the *NKPC* when materials are included in the definition of the firms' real marginal cost.

First, to illustrate the potential importance of material input costs, we repeat the regression of Eq.(4) where our marginal cost measure is re-defined as the ratio of production workers' payroll plus intermediate inputs relative to gross output.

Table 7 reports the main results, displaying two noteworthy features. First, the general fit of the model is good and the relevance of non-rational behaviour is statistically confirmed. The coefficients on inflation and marginal cost are of the correct sign (with the sole exclusion of M5 for sector 12) and statistically significant (only *M5* in sectors 8 and 9 they are not statistically different from zero). Second, estimates reported in the Table are again characterised by unrealistic values of the two parameters θ^i and β^i, with excessively high estimates for θ^i and excessively low ones for β^i.

Given these results, we then carried out a robustness check on the model, analysing how estimates of the model depend on restrictions imposed on β^i. In particular, as implied in the standard hybrid case, we restricted β^i to 1. Table 7*bis* reports the main results, three worthy of note. First, asymmetries in price-setting behaviour from industry to industry now seem a less important phenomenon. Second, estimates of θ^i, and therefore of the D^i and D^{iH} indexes, become more plausible values. Third, with respect to previous estimates, for many industries the importance of the backward-looking component is slightly reduced.

These latter results, despite of having been obtained in an incomplete theoretical context, are of great interest and give us an important feedback for the rest of our empirical analysis. On the one hand, they confirm that the hybrid model is a reasonable framework for describing sectorial inflation dynamics; on the other hand, they reveal that, restricting $\beta^i = 1$ yields very realistic and statistically robust estimates of the other structural parameters.

With this important feedback available, we move to the final part of the present study, estimating the hybrid *NKPC* presented in Eq.(9). As detailed in Section 2, this equation describes sectoral inflation dynamics taking into account of the sectoral composition of a domestic economy. With respect to the models specified in Eq.(3) and Eq.(4), here intermediate inputs are explicitly considered in defining the firms' production function, the other inputs being capital and labour.[17]

Similar to previous *GMM* estimates, orthogonality conditions are defined as follows:

$$E_t \left\{ \left(\pi_t^i - \omega^i \pi_{t-1}^i - \beta^i \theta^i \pi_{t+1}^i - \phi^{i-1} \left(1-\omega^i\right) \left(1-\theta^i\right) \left(1-\beta^i \theta^i\right) \frac{1}{1+(\psi^i-1)\epsilon^i} \widehat{mc}_t^i \right) z_t^i \right\} = 0$$

[17] If no intermediate goods are used in production, this becomes the Phillips curve derived by Galì *et al.* (1999).

Once again, model's restrictions do not allow us to estimate all the structural parameters. We have chosen to estimate the parameters θ^i, ω^i and ρ^i (the elasticity of substitution between labour and intermediate inputs for each industry) conditional on a set of plausible values imposed on β^i, ε^i and ψ^i. For ε^i, the previous calibration holds true (see Table 3). As far as the discount rate β^i is concerned, taking into consideration the latest results (see Table 7*bis*), we impose th condition $\beta^i = 1$. Finally, we calibrate the parameter ψ^i as follows: $\psi^i = \frac{1+\mu^i}{\frac{W^i H^i + P^{mi} m^i}{P^i Y^i}}$.[18]

Table 8 reports the main results. The general fit of the model appears extremely good: the model's overidentifying restrictions are not rejected and, with some exceptions, the coefficients appear to be of the correct sign and significantly different from zero. A more detailed examination of the latter results is now opportune.

For all industries, we obtain a large and significant fraction of backward looking price-setters, confirming that non-rational expectation behaviour is crucial in explaining inflation dynamics in Italian manufacturing industries. Moreover, it is here confirmed that estimates of ω^i are stable: similar to the results already presented, this parameter ranges between 0.3 and 0.86.

Conversely, the estimate of parameter θ^i decreases for all but two industries (industries 8 and 12). It follows that the derived degree of price stickiness decreases as well: the index D^i ranges between $1,25$ and 2.5 quarters, while the index D^{iH} ranges between 2.8 and 8.9 quarters. These values seem extremely plausible[19] and confirm that price-setting behaviour is not completely homogeneous among Italian firms. Actually, asymmetries in rigidities emerge from index D^{iH}, while intersectoral differences are less statistically significant when the index D is considered.

Finally, as far as the new parameter ρ^i is concerned, we obtain significantly positive different-from-zero estimates only for industries 6, 8, 9 and 10. It follows that for industries 7 (textiles, clothing, leather and footwear), 11 (metals and metal products, other than transportation equipment), 12 (agricultural and industrial machinery) and 13 (transportation equipment) there is little possibility for meaningful substitution between labour and intermediate input.[20] However, a note of caution is needed regarding the interpretation of this result, since data in our possession on material costs and price are not completely reliable.

[18] Cf. Leith and Malley (2003).

[19] This consideration can be supported by recalling recent firm-level evidence, collected by a Bank of Italy survey and reported in Fabiani-Gattulli and Sabbattini (2003). This evidence indicates a frequency of 1 price change per year for the median firm. Other evidence which supports our conclusion has been produced at aggregate level by Massidda (2004); this evidence indicates a value of 2.6 quarters for D and of 4.83 quarters for D^H. Furthermore, our results also compare with the median frequency of two price changes per year repoted for UK firms by Hall *et al.* (2000) and 1.4 price changes per year reported for US firms by Blinder *et al.* (1998).

[20] This does not deny the fact that intermediate inputs are an important part of variable cost definition.

4 Comments and Conclusions

This paper attempts to provide new empirical evidence on Italian manufacturing firms' pricing behaviour within a marginal cost-based *NKPC* framework. In particular we were interested in testing the extent to which points estimate of the structural parameters differ from industry to industry and are sensitive to the model specification being considered. To this end we estimate three specifications for the *NKPC*: the standard cost-based forward-looking specification; the cost-based hybrid model and, finally the Leith and Malley's *NKPC* correctly defined for multi-sectoral analysis.

Our results suggest that the hybrid *NKPC* is a plausible framework for modeling inflation dynamics within the Italian manufacturing industries. The backward-looking component of inflation is statistically robust and it does not depend on the model specification. Moreover, the fraction of firms following a rule of thumb in setting prices is almost as large as that of forward-looking price setters, sometimes being even larger.

Conversely, the average duration of price stickiness is sensitive to the definition of a firm's real marginal cost and to the model specification. Precisely, when sectoral interdependencies are ignored, we find highly volatile and upward biased estimates. We start getting reasonable coefficients, considering the hybrid model derived by Galì and Gertler with the discount rate being restricted to one and variable cost defined as labour plus material cost. These results improve even further when the *NKPC* correctly defined for multi-sectoral analysis is considered. In that case, very plausible industry-specific estimates of price inertia are obtained. Accordingly, price-setting behaviour does not appear totally homogeneous among Italian firms. Actually, asymmetries emerge when the inertia degree is measured taking non-rational behaviour (D^H) into account, as suggested by Benigno and Lopez-Salido. Conversely, intersectoral differences are considerably reduced when the simple ratio D is considered.

References

[1] Aoki K.(2001), Optimal monetary policy responses to relative-price changes, *Journal of Monetary Economics*, 48:1, 55-80.

[2] Batini N. - Jackson B. - Nickell S. (2000), Inflation Dynamics and the Labour Share in the U.K., External MPC Unit Discussion Paper No 2, Bank of England.

[3] Benigno P. - Lopez Salido J.D. (2002), Inflation persistence and optimal monetary policy in the Euro Area, Banco de Espanã, servicio de Estudios, Documento de Trabajo n° 0215

[4] Bentolilla S. - Saint-Paul G. (2001), Explaining Movement in the Labour Share, CEPR Manuscript.

[5] Blinder A. - Canetti E. - Lebow E. - Ruud J. (1998), *Asking about prices: A new approach to understanding price stickiness*, Russel Sage Foundation, New York, NY.

[6] Calvo G.(1983), "Staggered Prices in a Utility Maximising Framework, *Journal of Monetary Economics*, 12:3, 383-398.

[7] Fabiani S. - Gattulli A. - Sabattini R. (2003), "The price behavior of italian firms: new survey evidence on price stickiness", European Central Bank Working Paper Series n°333

[8] Fuhrer J.C. (1997), "The (Un)Importance of Forward-Looking Behaviour in Price Specifications", *Journal of Money Credit and Banking*, 29, 338-350.

[9] Fuhrer J. – Moore G. (1995), "Inflation persistence", *Quarterly Journal of Economics*, 110, 127-160.

[10] Gagnon E. – Khan H. (2001), "New Phillips Curve with alternative marginal cost measure for Canada, U.S. and the Euro Area", Manuscript, Bank of Canada.

[11] Galì J. (2002), "New perspective on monetary policy, inflation and the business cycle", NBER Working Paper, No. 8767.

[12] Galì J. – Gertler M. (1999), "Inflation dynamics: a structural econometric analysis", *Journal of Monetary Economics*, 44, 195-222.

[13] Galì J. – Gertler M. – Lòpez-Salido J.D. (2001), "European inflation dynamics", *European Economic Review*, 45, 1237-1270.

[14] Galì J. – Gertler M. – Lòpez-Salido J.D. (2002), "Markups, gaps, and the welfare costs of business fluctuations", NBER Working Paper No. 8850.

[15] Galì J. – Lòpez-Salido J.D. (2000), "A New Phillips Curve for Spain", BIS Papers n°3.

[16] Goodfriend M.- Kings R.G. (1997), "The new neoclassical synthesis and the role of monetary policy", NBER *Macroeconomics Annual*, 12, 231-283.

[17] Jadresic E. (1999), "Sticky prices: An empirical assessment of alternative models", International Monetary Fund, Working Paper 99/72.

[18] Hall S. - Walsh M. - Yates A. (2002), "Are UK companies prices sticky?", *Oxford Economic Papers*, 52, 415-446.

[19] Leith C. - Malley J. (2002), Estimated open economy New Keynesian Phillips Curve for the G7, manuscript.

[20] Leith C. and Malley J. (2003), "A sectoral analysis of price-setting behavior in US manufacturing industries", manuscript.

[21] Marchetti D. (1999), "Markup and the business cycle: evidence from Italian manufacturing branches", *Temi di Discussione Banca d'Italia* - No. 362.

[22] Marchetti D. (2002), "Markup and the business cycle: evidence from Italian manufacturing branches", *Open Economy Review*, 13, 87-103.

[23] Massidda C. (1996), "Labour hoarding and the invariance of Solow residual", *Studi Economici*, 56, 39-74.

[24] Massidda C. (2004), "Prices inertia and backward-looking behaviour estimates for the Italian manufacturing branches", Working Paper n.34, Facoltà di Economia, Università degli Studi di Cagliari, Febbraio.

[25] Neiss K.S. - Nelson E. (2002), "Inflation dynamics, marginal cost, and the output gap: evidence from three countries", Manuscript, Bank of England.

[26] Norbbin S.C. (1993), "The relation between price and marginal cost in U.S. industry: a contradiction", *Journal of Political Economy*, 101, 1149-1164.

[27] Roberts J.M. (1995), "New keynesian economics and the Phillips curve, *Journal of Money, Credit and Banking*, 27, 975-984.

[28] Roberts J.M. (1997), "Is inflation sticky?", *Journal of Monetary Economics*, 39, 173-196.

[29] Roberts J.M. (1998), "Inflation expectations and the transmission of monetary policy", unpublished.

[30] Roberts J.M. (2001), "How well does the New Keynesian sticky-price model fit the data?", Manuscript, Board of Governors of the Federal Reserve System, Washington D.C.

[31] Rotemberg J. - Woodford M. (1999), "The cyclical behaviour of prices and costs", *The Handbook of Macroeconomics*, vol.1B, Amsterdam , North-Holland.

[32] Sbordone A.M.(2001), "An optimising model of U.S. wage and price dynamics", Manuscript, Rutgers University.

[33] Sbordone (2001), "Price and unit labor costs: a new test of price stickiness", Manuscript, Rutgers University.

[34] Sbordone (2002), "Price and unit labor costs: a new test of price stickiness", *Journal of Monetary Economics*, 49, 265-292.

[35] Wolman A.L. (1999), "Sticky prices, marginal cost, and the behavior of inflation", Federal Reserve bank of Richmond *Economic Quarterly*, 85/4, 29-48.

[36] Yun T. (1996), "Nominal price rigidity, money supply endogeneity, and business cycles, J*ournal of Monetary Economics*, 37, 345-370.

5 Tables

Table 1 - Branches of the Italian industrial sector

Branches
6 - Food products, beverages and tobacco
7 - Textiles, clothing, leather and footwear
8 - Timber, furniture, paper and printing, rubber and plastic products
9 - Chemical products
10 - Non-metallic mineral products
11 - Metals and metal products (other than transportation equipment)
12 - Agricultural and industrial machinery
13 - Transportation equipment

Table 2 - Non structural estimates of equation $\pi_t^i = \beta^i E_t \left\{ \pi_{t+1}^i \right\} + \lambda^i mc_t^i$

	Parameters		Tests
Industries	β^i	λ^i	J^i
6	0.55 (0.088)	0.25 (0.056)	11.29 (0.335)
7	0.88 (0.003)	0.12 (0.003)	8.04 (0.529)
8	0.93 (0.05)	$-.65$ (0.07)	11.57 (0.315)
9	0.81 (0.005)	0.06 (0.009)	2.04 (0.98)
10	0.96 (0.022)	0.14 (0.054)	12.74 (0.238)
11	0.37 (0.098)	0.02* (0.027)	3.45 (0.486)
12	0.98 (0.014)	0.12 (0.032)	5.28 (0.872)
13	1.26 (0.036)	0.18 (0.065)	11.17 (0.344)

Table 3 - Calibration of parameters μ, S, α, ϵ, ξ

	Parameters				
Industries	μ	S	α	ϵ	ξ
6	1.00	0.49	0.51	∞	0
7	1.28	0.74	0.05	4.57	0.8
8	1.21	0.72	0.13	5.76	0.5
9	1.07	0.60	0.35	15.29	0.11
10	1.18	0.63	0.26	6.56	0.31
11	1.13	0.70	0.21	8.69	0.34
12	1.25	0.69	0.14	5.00	0.53
13	1.20	0.76	0.09	6	0.59

Table 4 - Structural estimates of equation $\pi_t^i = \beta^i E_t \left\{\pi_{t+1}^i\right\} + \left(\frac{(1-\theta^i)(1-\beta^i\theta^i)}{\theta^i}\right)\xi^i mc_t^i$

		Parameters					Tests
Industries		ξ^i	θ^i	β^i	λ^i	D^i	J^i
6	$M2$	1	0.87 (0.05)	0.85 (0.03)	0.04	7.7	3.79 (0.96)
	$M3$	0	–	–	–	–	
7	$M2$	1	0.7 (0.05)	1.12 (0.03)	0.09	3.3	11.9 (0.37)
	$M3$	0.8	0.84 (0.02)	1.12 (0.01)	0.01	6.25	10.9 (0.45)
8	$M2$	1	0.65 (0.07)	1.02 (0.03)	0.18	2.9	8.99 (0.53)
	$M3$	0.5	0.58 (0.08)	1.02 (0.03)	0.15	2.4	9.06 (0.53)
9	$M2$	1	0.75 (0.12)	1 (0.11)	0.08	4	10.22 (0.36)
	$M3$	0.11	0.6 (0.00)	1.08 (0.00)	0.03	2.5	2 (0.99)
10	$M2$	1	0.8 (0.1)	0.92 (0.04)	0.07	5	10.25 (0.42)
	$M3$	0.31	0.56 (0.08)	0.74 (0.00)	0.14	2.3	8.56 (0.57)
11	$M2$	1	0.7 (0.04)	0.9 (0.03)	0.16	3.33	12.15 (0.67)
	$M3$	0.34	0.56 (0.07)	0.95 (0.03)	0.13	2.3	10.3 (0.8)
12	$M2$	1	0.69 (0.06)	1.12 (0.02)	0.10	3.2	9.27 (0.51)
	$M3$	0.53	0.62 (0.08)	1.16 (0.02)	0.09	2.6	9.26 (0.51)
13	$M2$	1	0.89 (0.13)	1.02 (0.01)	0.01	9.1	14.09 (0.44)
	$M3$	0.59	0.4 (0.04)	0.93 (0.06)	0.55	1.67	14.09 (0.44)

Table 5 - Structural estimates of equation $\pi_t^i = \gamma_b^i \pi_{t-1}^i + \gamma_f^i E_t \left\{ \pi_{t+1}^i \right\} + \overset{\sim}{\lambda}^i mc_t^i$

		Parameters									Tests
Industries		ξ^i	θ^i	β^i	ω^i	λ^i	γ_b^i	γ_f^i	D^i	D^{iH}	J^i
6	$M4$	1	0.95 (0.1)	0.46 (0.04)	0.55 (0.02)	0.010	0.45	0.35	20	44.4	4.43 (0.88)
7	$M4$	1	0.9 (0.22)	0.2 (0.06)	0.81 (0.07)	0.014	0.72	0.16	10	52.6	6.86 (0.55)
	$M5$	0.8	0.87 (0.3)	0.21 (0.06)	0.8 (0.07)	0.015	0.71	0.16	7.7	38.3	8.02 (0.43)
8	$M4$	1	0.56 (0.00)	0.94 (0.00)	0.46 (0.00)	0.11	0.46	0.52	2.3	4.2	6.61 (0.76)
	$M5$	0.5									
9	$M4$	1	0.86 (0.19)	0.84 (0.22)	0.31 (0.05)	0.024	0.27	0.64	7.1	10.4	9.93 (0.27)
	$M5$	0.11	0.74* (1.4)	0.95* (1.8)	0.3 (0.04)	0.006	0.29	0.68	3.8	5.5	8.59 (0.38)
10	$M4$	1	0.75 (0.05)	0.57 (0.06)	0.56 (0.02)	0.056	0.5	0.38	4	9.1	1.7 (0.42)
	$M5$	0.31	0.45* (0.3)	0.98* (0.66)	0.55 (0.02)	0.043	0.55	044	1.8	4	1.4 (0.5)
11	$M4$	1	1.28 (0.44)	0.47 (0.15)	0.41 (0.05)	−0.05	0.29	0.43			3.91 (0.69)
	$M5$	0.34	0.46* (3.54)	0.34* (0.2)	0.31 (0.04)	0.16	0.31	0.46	1.8	2.7	12.37 (0.05)
12	$M4$	1	0.91 (0.2)	0.76 (0.18)	0.34 (0.06)	0.016	0.29	0.59	11.1	16.8	11.9 (0.06)
	$M5$	0.53	0.81 (0.35)	0.88 (0.39)	0.33 (0.06)	0.017	0.3	0.64	5.26	7.8	11.6 (0.07)
13	$M4$	1	0.94 (0.1)	0.56 (0.06)	0.45 (0.03)	0.013	0.45	0.44	16.7	30	14.04 (0.03)
	$M5$	0.59	0.89 (0.16)	0.59 (0.1)	0.45 (0.3)	0.014	0.38	0.45	9.1	16.5	14.4 (0.03)

Table 7 - Structural estimates of equation $\pi_t^i = \gamma_b^i \pi_{t-1}^i + \gamma_f^i E_t \left\{ \pi_{t+1}^i \right\} + \widetilde{\lambda}^i mc_t^i(tot)$

	Parameters									Tests
Industries	ξ^i	θ^i	β^i	ω^i	λ^i	γ_b^i	γ_f^i	D^i	D^{iH}	J^i
6	1	0.99 (0.12)	0.51 (0.07)	0.49 (0.02)	0.002	0.39	0.41	100	19.6	5.36 (0.80)
7	1	0.99 (0.02)	0.5 (0.02)	0.52 (0.02)	0.002	0.42	0.4	100	208	5.07 (0.75)
	0.8	0.86 (0.02)	0.65 (0.03)	0.42 (0.02)	0.025	0.36	0.48	7.14	12.3	4.25 (0.83)
8	1	0.56 (0.00)	0.94 (0.00)	0.46 (0.00)	0.11	0.46	0.52	2.3	4.2	9.71 (0..37)
	0.5	0.39* (0.22)	1.2* (0.7)	0.45 (0.04)	0.10	0.51	0.53	1.64*	3	10.23 (0.33)
9	1	0.94 (0.15)	0.78 (0.13)	0.3 (0.05)	0.01	0.26	0.62	16.7	23.8	10.2 (0.33)
	0.11	0.76* (1.0)	0.92* (1.2)	0.3 (0.05)	0.005	0.29	0.67	4.2	5.95	8.6 (0.38)
10	1	0.97 (0.01)	0.46 (0.01)	0.56 (0.01)	0.006	0.45	0.36	33.3	75.76	3.63 (0.3)
	0.31	0.93 (0.17)	0.5 (0.08)	0.46 (0.03)	0.005	0.39	0.4	14.3	26.45	5.7 (0.45)
11	1	0.94 (0.08)	0.5 (0.07)	0.51 (0.05)	0.013	0.42	0.39	16.7	34	6.02 (0.42)
	0.34	0.84 (0.22)	0.57 (0.18)	0.51 (0.05)	0.012	0.44	0.41	6.25	12.76	6.03 (0.42)
12	1	0.76 (0.25)	0.58 (0.2)	0.54 (0.04)	0.06	0.48	0.39	4.17	9.1	10.68 (0.06)
	0.53	2.66 (1.27)	0.24 (0.11)	0.41 (0.045)	−0.08	0.18	0.29			7.11 (0.625)
13	1	0.83 (0.15)	0.6 (0.09)	0.47 (0.03)	0.04	0.41	0.44	5.88	11.1	14.4 (0.025)
	0.59	0.73 (0.23)	0.69 (0.19)	0.47 (0.03)	0.04	0.43	0.46	3.7	7	14.4 (0.025)

Table 7bis - Structural estimates of equation $\pi_t^i = \gamma_b^i \pi_{t-1}^i + \gamma_f^i E_t \left\{ \pi_{t+1}^i \right\} + \overset{\sim}{\lambda}^i mc_t^i(tot)$

	Parameters						Tests
Industries	ξ^i	θ^i	β	ω^i	D^i	D^{iH}	J^i
6	1	0.7	1	0.36	3.3	5.2	3.66
		(0.02)		(0.01)			(0.93)
7	1	0.75	1	0.25	4	5.3	6.86
		(0.02)		(0.02)			(0.74)
	0.8	0.74	1	0.26	3.8	5.2	6.54
		(0.02)		(0.02)			(0.77)
8	1	0.48	1	0.46	1.9	3.6	9.98
		(0.02)		(0.03)			(0.44)
	0.5	0.46	1	0.46	1.8	3.4	9.85
		(0.04)		(0.03)			(0.36)
9	1	0.86	1	0.21	7.14	9.04	10.5
		(0.05)		(0.05)			(0.4)
	0.11	0.81	1	0.23	5.3	6.8	9.88
		(0.05)		(0.05)			(0.45)
10	1	0.77	1	0.31	4.3	6.3	12.5
		(0.03)		(0.03)			(0.25)
	0.31	0.62	1	0.37	2.6	4.2	10.67
		(0.04)		(0.03)			(0.38)
11	1	0.71	1	0.28	3.5	4.8	10.14
		(0.03)		(0.03)			(0.43)
	0.34	0.56	1	0.43	2.3	4	9.6
		(0.02)		(0.02)			(0.48)
12	1	0.77	1	0.27	4.3	6	13.18
		(0.06)		(0.05)			(0.21)
	0.53	0.75	1	0.29	4	5.6	12.9
		(0.06)		(0.05)			(0.23)
13	1	0.59	1	0.45	2.4	4.4	14.1
		(0.03)		(0.03)			(0.17)
	0.59	0.52	1	0.5	2.1	4.2	14.16
		(0.03)		(0.03)			(0.17)

Table 8 - Structural estimates of Eq. (8)

Industries		Parameters θ^i	β	ω^i	ρ^i	γ_b^i	γ_f^i	D^i	D^{iH}	Tests J^i
6	$M6$	0.37 (0.05)	1	0.49 (0.02)	14.9 (2.01)	0.57	0.42	1.59	3.2	4.67 (0.86)
7	$M6$	0.2 (0.06)	1	0.86 (0.06)	-13.8^* (11.6)	0.8	0.19	1.25	8.9	7.74 (0.56)
8	$M6$	0.59 (0.04)	1	0.31 (0.03)	17.4 (4.4)	0.34	0.66	2.44	3.5	8.44 (0.49)
9	$M6$	0.6 (0.09)	1	0.3 (0.05)	16.6 (2.6)	0.33	0.67	2.5	3.6	4.3 0.8
10	$M6$	0.32 (0.05)	1	0.48 (0.05)	9.5 (1..31)	0.6	0.4	1.48	2.8	4.75 (0.85)
11	$M6$	0.43 (0.04)	1	0.6 (0.04)	-1.05^* (3.36)	0.58	0.42	1.75	4.4	4.34 (0.89)
12	$M6$	0.75 (0.07)	1	0.31 (0.06)	-4.8^* (7.88)	0.29	0.71	4	5.8	10.16 (0.34)
13	$M6$	0.5 (0.03)	1	0.49 (0.03)	1.5^* (2.87)	0.5	0.5	2	3.9	8.84 (0.47)

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:
http://www.feem.it/Feem/Pub/Publications/WPapers/default.html
http://www.ssrn.com/link/feem.html

NOTE DI LAVORO PUBLISHED IN 2004

IEM	1.2004	*Anil MARKANDYA, Suzette PEDROSO and Alexander GOLUB*: Empirical Analysis of National Income and So2 Emissions in Selected European Countries
ETA	2.2004	*Masahisa FUJITA and Shlomo WEBER:* Strategic Immigration Policies and Welfare in Heterogeneous Countries
PRA	3.2004	*Adolfo DI CARLUCCIO, Giovanni FERRI, Cecilia FRALE and Ottavio RICCHI:* Do Privatizations Boost Household Shareholding? Evidence from Italy
ETA	4.2004	*Victor GINSBURGH and Shlomo WEBER:* Languages Disenfranchisement in the European Union
ETA	5.2004	*Romano PIRAS:* Growth, Congestion of Public Goods, and Second-Best Optimal Policy
CCMP	6.2004	*Herman R.J. VOLLEBERGH:* Lessons from the Polder: Is Dutch CO2-Taxation Optimal
PRA	7.2004	*Sandro BRUSCO, Giuseppe LOPOMO and S. VISWANATHAN* (lxv): Merger Mechanisms
PRA	8.2004	*Wolfgang AUSSENEGG, Pegaret PICHLER and Alex STOMPER* (lxv): IPO Pricing with Bookbuilding, and a When-Issued Market
PRA	9.2004	*Pegaret PICHLER and Alex STOMPER* (lxv): Primary Market Design: Direct Mechanisms and Markets
PRA	10.2004	*Florian ENGLMAIER, Pablo GUILLEN, Loreto LLORENTE, Sander ONDERSTAL and Rupert SAUSGRUBER* (lxv): The Chopstick Auction: A Study of the Exposure Problem in Multi-Unit Auctions
PRA	11.2004	*Bjarne BRENDSTRUP and Harry J. PAARSCH* (lxv): Nonparametric Identification and Estimation of Multi-Unit, Sequential, Oral, Ascending-Price Auctions With Asymmetric Bidders
PRA	12.2004	*Ohad KADAN* (lxv): Equilibrium in the Two Player, k-Double Auction with Affiliated Private Values
PRA	13.2004	*Maarten C.W. JANSSEN* (lxv): Auctions as Coordination Devices
PRA	14.2004	*Gadi FIBICH, Arieh GAVIOUS and Aner SELA* (lxv): All-Pay Auctions with Weakly Risk-Averse Buyers
PRA	15.2004	*Orly SADE, Charles SCHNITZLEIN and Jaime F. ZENDER* (lxv): Competition and Cooperation in Divisible Good Auctions: An Experimental Examination
PRA	16.2004	*Marta STRYSZOWSKA* (lxv): Late and Multiple Bidding in Competing Second Price Internet Auctions
CCMP	17.2004	*Slim Ben YOUSSEF:* R&D in Cleaner Technology and International Trade
NRM	18.2004	*Angelo ANTOCI, Simone BORGHESI and Paolo RUSSU* (lxvi): Biodiversity and Economic Growth: Stabilization Versus Preservation of the Ecological Dynamics
SIEV	19.2004	*Anna ALBERINI, Paolo ROSATO, Alberto LONGO and Valentina ZANATTA:* Information and Willingness to Pay in a Contingent Valuation Study: The Value of S. Erasmo in the Lagoon of Venice
NRM	20.2004	*Guido CANDELA and Roberto CELLINI* (lxvii): Investment in Tourism Market: A Dynamic Model of Differentiated Oligopoly
NRM	21.2004	*Jacqueline M. HAMILTON* (lxvii): Climate and the Destination Choice of German Tourists
NRM	22.2004	*Javier Rey-MAQUIEIRA PALMER, Javier LOZANO IBÁÑEZ and Carlos Mario GÓMEZ GÓMEZ* (lxvii): Land, Environmental Externalities and Tourism Development
NRM	23.2004	*Pius ODUNGA and Henk FOLMER* (lxvii): Profiling Tourists for Balanced Utilization of Tourism-Based Resources in Kenya
NRM	24.2004	*Jean-Jacques NOWAK, Mondher SAHLI and Pasquale M. SGRO* (lxvii):Tourism, Trade and Domestic Welfare
NRM	25.2004	*Riaz SHAREEF* (lxvii): Country Risk Ratings of Small Island Tourism Economies
NRM	26.2004	*Juan Luis EUGENIO-MARTÍN, Noelia MARTÍN MORALES and Riccardo SCARPA* (lxvii): Tourism and Economic Growth in Latin American Countries: A Panel Data Approach
NRM	27.2004	*Raúl Hernández MARTÍN* (lxvii): Impact of Tourism Consumption on GDP. The Role of Imports
CSRM	28.2004	*Nicoletta FERRO:* Cross-Country Ethical Dilemmas in Business: A Descriptive Framework
NRM	29.2004	*Marian WEBER* (lxvi): Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: an Application to Canada's Boreal Mixedwood Forest
NRM	30.2004	*Trond BJORNDAL, Phoebe KOUNDOURI and Sean PASCOE* (lxvi): Output Substitution in Multi-Species Trawl Fisheries: Implications for Quota Setting
CCMP	31.2004	*Marzio GALEOTTI, Alessandra GORIA, Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part I: Sectoral Analysis of Climate Impacts in Italy
CCMP	32.2004	*Marzio GALEOTTI, Alessandra GORIA ,Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part II: Individual Perception of Climate Extremes in Italy
CTN	33.2004	*Wilson PEREZ:* Divide and Conquer: Noisy Communication in Networks, Power, and Wealth Distribution
KTHC	34.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI* (lxviii): The Economic Value of Cultural Diversity: Evidence from US Cities
KTHC	35.2004	*Linda CHAIB* (lxviii): Immigration and Local Urban Participatory Democracy: A Boston-Paris Comparison

KTHC	36.2004	*Franca ECKERT COEN and Claudio ROSSI* (lxviii): Foreigners, Immigrants, Host Cities: The Policies of Multi-Ethnicity in Rome. Reading Governance in a Local Context
KTHC	37.2004	*Kristine CRANE* (lxviii): Governing Migration: Immigrant Groups' Strategies in Three Italian Cities – Rome, Naples and Bari
KTHC	38.2004	*Kiflemariam HAMDE* (lxviii): Mind in Africa, Body in Europe: The Struggle for Maintaining and Transforming Cultural Identity - A Note from the Experience of Eritrean Immigrants in Stockholm
ETA	39.2004	*Alberto CAVALIERE:* Price Competition with Information Disparities in a Vertically Differentiated Duopoly
PRA	40.2004	*Andrea BIGANO and Stef PROOST:* The Opening of the European Electricity Market and Environmental Policy: Does the Degree of Competition Matter?
CCMP	41.2004	*Micheal FINUS* (lxix): International Cooperation to Resolve International Pollution Problems
KTHC	42.2004	*Francesco CRESPI:* Notes on the Determinants of Innovation: A Multi-Perspective Analysis
CTN	43.2004	*Sergio CURRARINI and Marco MARINI:* Coalition Formation in Games without Synergies
CTN	44.2004	*Marc ESCRIHUELA-VILLAR:* Cartel Sustainability and Cartel Stability
NRM	45.2004	*Sebastian BERVOETS and Nicolas GRAVEL* (lxvi): Appraising Diversity with an Ordinal Notion of Similarity: An Axiomatic Approach
NRM	46.2004	*Signe ANTHON and Bo JELLESMARK THORSEN* (lxvi): Optimal Afforestation Contracts with Asymmetric Information on Private Environmental Benefits
NRM	47.2004	*John MBURU* (lxvi)*:* Wildlife Conservation and Management in Kenya: Towards a Co-management Approach
NRM	48.2004	*Ekin BIROL, Ágnes GYOVAI and Melinda SMALE* (lxvi)*:* Using a Choice Experiment to Value Agricultural Biodiversity on Hungarian Small Farms: Agri-Environmental Policies in a Transition al Economy
CCMP	49.2004	*Gernot KLEPPER and Sonja PETERSON:* The EU Emissions Trading Scheme. Allowance Prices, Trade Flows, Competitiveness Effects
GG	50.2004	*Scott BARRETT and Michael HOEL:* Optimal Disease Eradication
CTN	51.2004	*Dinko DIMITROV, Peter BORM, Ruud HENDRICKX and Shao CHIN SUNG:* Simple Priorities and Core Stability in Hedonic Games
SIEV	52.2004	*Francesco RICCI*: Channels of Transmission of Environmental Policy to Economic Growth: A Survey of the Theory
SIEV	53.2004	*Anna ALBERINI, Maureen CROPPER, Alan KRUPNICK and Nathalie B. SIMON:* Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?
NRM	54.2004	*Ingo BRÄUER and Rainer MARGGRAF* (lxvi): Valuation of Ecosystem Services Provided by Biodiversity Conservation: An Integrated Hydrological and Economic Model to Value the Enhanced Nitrogen Retention in Renaturated Streams
NRM	55.2004	*Timo GOESCHL and Tun LIN* (lxvi): Biodiversity Conservation on Private Lands: Information Problems and Regulatory Choices
NRM	56.2004	*Tom DEDEURWAERDERE* (lxvi): Bioprospection: From the Economics of Contracts to Reflexive Governance
CCMP	57.2004	*Katrin REHDANZ and David MADDISON:* The Amenity Value of Climate to German Households
CCMP	58.2004	*Koen SMEKENS and Bob VAN DER ZWAAN:* Environmental Externalities of Geological Carbon Sequestration Effects on Energy Scenarios
NRM	59.2004	*Valentina BOSETTI, Mariaester CASSINELLI and Alessandro LANZA* (lxvii): Using Data Envelopment Analysis to Evaluate Environmentally Conscious Tourism Management
NRM	60.2004	*Timo GOESCHL and Danilo CAMARGO IGLIORI* (lxvi):Property Rights Conservation and Development: An Analysis of Extractive Reserves in the Brazilian Amazon
CCMP	61.2004	*Barbara BUCHNER and Carlo CARRARO*: Economic and Environmental Effectiveness of a Technology-based Climate Protocol
NRM	62.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Resource-Abundance and Economic Growth in the U.S.
NRM	63.2004	*Györgyi BELA, György PATAKI, Melinda SMALE and Mariann HAJDÚ* (lxvi): Conserving Crop Genetic Resources on Smallholder Farms in Hungary: Institutional Analysis
NRM	64.2004	*E.C.M. RUIJGROK and E.E.M. NILLESEN* (lxvi): The Socio-Economic Value of Natural Riverbanks in the Netherlands
NRM	65.2004	*E.C.M. RUIJGROK* (lxvi): Reducing Acidification: The Benefits of Increased Nature Quality. Investigating the Possibilities of the Contingent Valuation Method
ETA	66.2004	*Giannis VARDAS and Anastasios XEPAPADEAS*: Uncertainty Aversion, Robust Control and Asset Holdings
GG	67.2004	*Anastasios XEPAPADEAS and Constadina PASSA*: Participation in and Compliance with Public Voluntary Environmental Programs: An Evolutionary Approach
GG	68.2004	*Michael FINUS*: Modesty Pays: Sometimes!
NRM	69.2004	*Trond BJØRNDAL and Ana BRASÃO*: The Northern Atlantic Bluefin Tuna Fisheries: Management and Policy Implications
CTN	70.2004	*Alejandro CAPARRÓS, Abdelhakim HAMMOUDI and Tarik TAZDAÏT*: On Coalition Formation with Heterogeneous Agents
IEM	71.2004	*Massimo GIOVANNINI, Margherita GRASSO, Alessandro LANZA and Matteo MANERA*: Conditional Correlations in the Returns on Oil Companies Stock Prices and Their Determinants
IEM	72.2004	*Alessandro LANZA, Matteo MANERA and Michael MCALEER*: Modelling Dynamic Conditional Correlations in WTI Oil Forward and Futures Returns
SIEV	73.2004	*Margarita GENIUS and Elisabetta STRAZZERA*: The Copula Approach to Sample Selection Modelling: An Application to the Recreational Value of Forests

CCMP	74.2004	*Rob DELLINK and Ekko van IERLAND*: Pollution Abatement in the Netherlands: A Dynamic Applied General Equilibrium Assessment
ETA	75.2004	*Rosella LEVAGGI and Michele MORETTO*: Investment in Hospital Care Technology under Different Purchasing Rules: A Real Option Approach
CTN	76.2004	*Salvador BARBERÀ and Matthew O. JACKSON* (lxx): On the Weights of Nations: Assigning Voting Weights in a Heterogeneous Union
CTN	77.2004	*Àlex ARENAS, Antonio CABRALES, Albert DÍAZ-GUILERA, Roger GUIMERÀ and Fernando VEGA-REDONDO* (lxx): Optimal Information Transmission in Organizations: Search and Congestion
CTN	78.2004	*Francis BLOCH and Armando GOMES* (lxx): Contracting with Externalities and Outside Options
CTN	79.2004	*Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE* (lxx): Merger Performance under Uncertain Efficiency Gains
CTN	80.2004	*Francis BLOCH and Matthew O. JACKSON* (lxx): The Formation of Networks with Transfers among Players
CTN	81.2004	*Daniel DIERMEIER, Hülya ERASLAN and Antonio MERLO* (lxx): Bicameralism and Government Formation
CTN	82.2004	*Rod GARRATT, James E. PARCO, Cheng-ZHONG QIN and Amnon RAPOPORT* (lxx): Potential Maximization and Coalition Government Formation
CTN	83.2004	*Kfir ELIAZ, Debraj RAY and Ronny RAZIN* (lxx): Group Decision-Making in the Shadow of Disagreement
CTN	84.2004	*Sanjeev GOYAL, Marco van der LEIJ and José Luis MORAGA-GONZÁLEZ* (lxx): Economics: An Emerging Small World?
CTN	85.2004	*Edward CARTWRIGHT* (lxx): Learning to Play Approximate Nash Equilibria in Games with Many Players
IEM	86.2004	*Finn R. FØRSUND and Michael HOEL*: Properties of a Non-Competitive Electricity Market Dominated by Hydroelectric Power
KTHC	87.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Investment and Long-Term Income
CCMP	88.2004	*Marzio GALEOTTI and Claudia KEMFERT*: Interactions between Climate and Trade Policies: A Survey
IEM	89.2004	*A. MARKANDYA, S. PEDROSO and D. STREIMIKIENE*: Energy Efficiency in Transition Economies: Is There Convergence Towards the EU Average?
GG	90.2004	*Rolf GOLOMBEK and Michael HOEL* : Climate Agreements and Technology Policy
PRA	91.2004	*Sergei IZMALKOV* (lxv): Multi-Unit Open Ascending Price Efficient Auction
KTHC	92.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI*: Cities and Cultures
KTHC	93.2004	*Massimo DEL GATTO*: Agglomeration, Integration, and Territorial Authority Scale in a System of Trading Cities. Centralisation versus devolution
CCMP	94.2004	*Pierre-André JOUVET, Philippe MICHEL and Gilles ROTILLON*: Equilibrium with a Market of Permits
CCMP	95.2004	*Bob van der ZWAAN and Reyer GERLAGH*: Climate Uncertainty and the Necessity to Transform Global Energy Supply
CCMP	96.2004	*Francesco BOSELLO, Marco LAZZARIN, Roberto ROSON and Richard S.J. TOL*: Economy-Wide Estimates of the Implications of Climate Change: Sea Level Rise
CTN	97.2004	*Gustavo BERGANTIÑOS and Juan J. VIDAL-PUGA*: Defining Rules in Cost Spanning Tree Problems Through the Canonical Form
CTN	98.2004	*Siddhartha BANDYOPADHYAY and Mandar OAK*: Party Formation and Coalitional Bargaining in a Model of Proportional Representation
GG	99.2004	*Hans-Peter WEIKARD, Michael FINUS and Juan-Carlos ALTAMIRANO-CABRERA*: The Impact of Surplus Sharing on the Stability of International Climate Agreements
SIEV	100.2004	*Chiara M. TRAVISI and Peter NIJKAMP*: Willingness to Pay for Agricultural Environmental Safety: Evidence from a Survey of Milan, Italy, Residents
SIEV	101.2004	*Chiara M. TRAVISI, Raymond J. G. M. FLORAX and Peter NIJKAMP*: A Meta-Analysis of the Willingness to Pay for Reductions in Pesticide Risk Exposure
NRM	102.2004	*Valentina BOSETTI and David TOMBERLIN:* Real Options Analysis of Fishing Fleet Dynamics: A Test
CCMP	103.2004	*Alessandra GORIA e Gretel GAMBARELLI:* Economic Evaluation of Climate Change Impacts and Adaptability in Italy
PRA	104.2004	*Massimo FLORIO and Mara GRASSENI*: The Missing Shock: The Macroeconomic Impact of British Privatisation
PRA	105.2004	*John BENNETT, Saul ESTRIN, James MAW and Giovanni URGA*: Privatisation Methods and Economic Growth in Transition Economies
PRA	106.2004	*Kira BÖRNER*: The Political Economy of Privatization: Why Do Governments Want Reforms?
PRA	107.2004	*Pehr-Johan NORBÄCK and Lars PERSSON*: Privatization and Restructuring in Concentrated Markets
SIEV	108.2004	*Angela GRANZOTTO, Fabio PRANOVI, Simone LIBRALATO, Patrizia TORRICELLI and Danilo MAINARDI*: Comparison between Artisanal Fishery and Manila Clam Harvesting in the Venice Lagoon by Using Ecosystem Indicators: An Ecological Economics Perspective
CTN	109.2004	*Somdeb LAHIRI*: The Cooperative Theory of Two Sided Matching Problems: A Re-examination of Some Results
NRM	110.2004	*Giuseppe DI VITA*: Natural Resources Dynamics: Another Look
SIEV	111.2004	*Anna ALBERINI, Alistair HUNT and Anil MARKANDYA*: Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study
KTHC	112.2004	*Valeria PAPPONETTI and Dino PINELLI*: Scientific Advice to Public Policy-Making
SIEV	113.2004	*Paulo A.L.D. NUNES and Laura ONOFRI*: The Economics of Warm Glow: A Note on Consumer's Behavior and Public Policy Implications
IEM	114.2004	*Patrick CAYRADE*: Investments in Gas Pipelines and Liquefied Natural Gas Infrastructure What is the Impact on the Security of Supply?
IEM	115.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Oil Security. Short- and Long-Term Policies

IEM	116.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Social Costs of Energy Disruptions
IEM	117.2004	*Christian EGENHOFER, Kyriakos GIALOGLOU, Giacomo LUCIANI, Maroeska BOOTS, Martin SCHEEPERS, Valeria COSTANTINI, Francesco GRACCEVA, Anil MARKANDYA and Giorgio VICINI*: Market-Based Options for Security of Energy Supply
IEM	118.2004	*David FISK*: Transport Energy Security. The Unseen Risk?
IEM	119.2004	*Giacomo LUCIANI*: Security of Supply for Natural Gas Markets. What is it and What is it not?
IEM	120.2004	*L.J. de VRIES and R.A. HAKVOORT*: The Question of Generation Adequacy in Liberalised Electricity Markets
KTHC	121.2004	*Alberto PETRUCCI*: Asset Accumulation, Fertility Choice and Nondegenerate Dynamics in a Small Open Economy
NRM	122.2004	*Carlo GIUPPONI, Jaroslaw MYSIAK and Anita FASSIO*: An Integrated Assessment Framework for Water Resources Management: A DSS Tool and a Pilot Study Application
NRM	123.2004	*Margaretha BREIL, Anita FASSIO, Carlo GIUPPONI and Paolo ROSATO*: Evaluation of Urban Improvement on the Islands of the Venice Lagoon: A Spatially-Distributed Hedonic-Hierarchical Approach
ETA	124.2004	*Paul MENSINK*: Instant Efficient Pollution Abatement Under Non-Linear Taxation and Asymmetric Information: The Differential Tax Revisited
NRM	125.2004	*Mauro FABIANO, Gabriella CAMARSA, Rosanna DURSI, Roberta IVALDI, Valentina MARIN and Francesca PALMISANI*: Integrated Environmental Study for Beach Management:A Methodological Approach
PRA	126.2004	*Irena GROSFELD and Iraj HASHI*: The Emergence of Large Shareholders in Mass Privatized Firms: Evidence from Poland and the Czech Republic
CCMP	127.2004	*Maria BERRITTELLA, Andrea BIGANO, Roberto ROSON and Richard S.J. TOL*: A General Equilibrium Analysis of Climate Change Impacts on Tourism
CCMP	128.2004	*Reyer GERLAGH*: A Climate-Change Policy Induced Shift from Innovations in Energy Production to Energy Savings
NRM	129.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Innovation, and Growth
PRA	130.2004	*Bernardo BORTOLOTTI and Mara FACCIO*: Reluctant Privatization
SIEV	131.2004	*Riccardo SCARPA and Mara THIENE*: Destination Choice Models for Rock Climbing in the Northeast Alps: A Latent-Class Approach Based on Intensity of Participation
SIEV	132.2004	*Riccardo SCARPA Kenneth G. WILLIS and Melinda ACUTT*: Comparing Individual-Specific Benefit Estimates for Public Goods: Finite Versus Continuous Mixing in Logit Models
IEM	133.2004	*Santiago J. RUBIO*: On Capturing Oil Rents with a National Excise Tax Revisited
ETA	134.2004	*Ascensión ANDINA DÍAZ*: Political Competition when Media Create Candidates' Charisma
SIEV	135.2004	*Anna ALBERINI*: Robustness of VSL Values from Contingent Valuation Surveys
CCMP	136.2004	*Gernot KLEPPER and Sonja PETERSON*: Marginal Abatement Cost Curves in General Equilibrium: The Influence of World Energy Prices
ETA	137.2004	*Herbert DAWID, Christophe DEISSENBERG and Pavel ŠEVČIK*: Cheap Talk, Gullibility, and Welfare in an Environmental Taxation Game
CCMP	138.2004	*ZhongXiang ZHANG*: The World Bank's Prototype Carbon Fund and China
CCMP	139.2004	*Reyer GERLAGH and Marjan W. HOFKES*: Time Profile of Climate Change Stabilization Policy
NRM	140.2004	*Chiara D'ALPAOS and Michele MORETTO*: The Value of Flexibility in the Italian Water Service Sector: A Real Option Analysis
PRA	141.2004	*Patrick BAJARI, Stephanie HOUGHTON and Steven TADELIS* (lxxi): Bidding for Incompete Contracts
PRA	142.2004	*Susan ATHEY, Jonathan LEVIN and Enrique SEIRA* (lxxi): Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions
PRA	143.2004	*David GOLDREICH* (lxxi): Behavioral Biases of Dealers in U.S. Treasury Auctions
PRA	144.2004	*Roberto BURGUET* (lxxi): Optimal Procurement Auction for a Buyer with Downward Sloping Demand: More Simple Economics
PRA	145.2004	*Ali HORTACSU and Samita SAREEN* (lxxi): Order Flow and the Formation of Dealer Bids: An Analysis of Information and Strategic Behavior in the Government of Canada Securities Auctions
PRA	146.2004	*Victor GINSBURGH, Patrick LEGROS and Nicolas SAHUGUET* (lxxi): How to Win Twice at an Auction. On the Incidence of Commissions in Auction Markets
PRA	147.2004	*Claudio MEZZETTI, Aleksandar PEKEČ and Ilia TSETLIN* (lxxi): Sequential vs. Single-Round Uniform-Price Auctions
PRA	148.2004	*John ASKER and Estelle CANTILLON* (lxxi): Equilibrium of Scoring Auctions
PRA	149.2004	*Philip A. HAILE, Han HONG and Matthew SHUM* (lxxi): Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions
PRA	150.2004	*François DEGEORGE, François DERRIEN and Kent L. WOMACK* (lxxi): Quid Pro Quo in IPOs: Why Bookbuilding is Dominating Auctions
CCMP	151.2004	*Barbara BUCHNER and Silvia DALL'OLIO*: Russia: The Long Road to Ratification. Internal Institution and Pressure Groups in the Kyoto Protocol's Adoption Process
CCMP	152.2004	*Carlo CARRARO and Marzio GALEOTTI*: Does Endogenous Technical Change Make a Difference in Climate Policy Analysis? A Robustness Exercise with the FEEM-RICE Model
PRA	153.2004	*Alejandro M. MANELLI and Daniel R. VINCENT* (lxxi): Multidimensional Mechanism Design: Revenue Maximization and the Multiple-Good Monopoly
ETA	154.2004	*Nicola ACOCELLA, Giovanni Di BARTOLOMEO and Wilfried PAUWELS*: Is there any Scope for Corporatism in Stabilization Policies?
CTN	155.2004	*Johan EYCKMANS and Michael FINUS*: An Almost Ideal Sharing Scheme for Coalition Games with Externalities
CCMP	156.2004	*Cesare DOSI and Michele MORETTO*: Environmental Innovation, War of Attrition and Investment Grants

CCMP	157.2004	*Valentina BOSETTI, Marzio GALEOTTI and Alessandro LANZA*: How Consistent are Alternative Short-Term Climate Policies with Long-Term Goals?
ETA	158.2004	*Y. Hossein FARZIN and Ken-Ichi AKAO*: Non-pecuniary Value of Employment and Individual Labor Supply
ETA	159.2004	*William BROCK and Anastasios XEPAPADEAS*: Spatial Analysis: Development of Descriptive and Normative Methods with Applications to Economic-Ecological Modelling
KTHC	160.2004	*Alberto PETRUCCI*: On the Incidence of a Tax on PureRent with Infinite Horizons
IEM	161.2004	*Xavier LABANDEIRA, José M. LABEAGA and Miguel RODRÍGUEZ*: Microsimulating the Effects of Household Energy Price Changes in Spain

NOTE DI LAVORO PUBLISHED IN 2005

CCMP	1.2005	*Stéphane HALLEGATTE*: Accounting for Extreme Events in the Economic Assessment of Climate Change
CCMP	2.2005	*Qiang WU and Paulo Augusto NUNES*: Application of Technological Control Measures on Vehicle Pollution: A Cost-Benefit Analysis in China
CCMP	3.2005	*Andrea BIGANO, Jacqueline M. HAMILTON, Maren LAU, Richard S.J. TOL and Yuan ZHOU*: A Global Database of Domestic and International Tourist Numbers at National and Subnational Level
CCMP	4.2005	*Andrea BIGANO, Jacqueline M. HAMILTON and Richard S.J. TOL*: The Impact of Climate on Holiday Destination Choice
ETA	5.2005	*Hubert KEMPF*: Is Inequality Harmful for the Environment in a Growing Economy?
CCMP	6.2005	*Valentina BOSETTI, Carlo CARRARO and Marzio GALEOTTI*: The Dynamics of Carbon and Energy Intensity in a Model of Endogenous Technical Change
IEM	7.2005	*David CALEF and Robert GOBLE*: The Allure of Technology: How France and California Promoted Electric Vehicles to Reduce Urban Air Pollution
ETA	8.2005	*Lorenzo PELLEGRINI and Reyer GERLAGH*: An Empirical Contribution to the Debate on Corruption Democracy and Environmental Policy
CCMP	9.2005	*Angelo ANTOCI*: Environmental Resources Depletion and Interplay Between Negative and Positive Externalities in a Growth Model
CTN	10.2005	*Frédéric DEROIAN*: Cost-Reducing Alliances and Local Spillovers
NRM	11.2005	*Francesco SINDICO*: The GMO Dispute before the WTO: Legal Implications for the Trade and Environment Debate
KTHC	12.2005	*Carla MASSIDDA*: Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors

(lxv) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications” organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003

(lxvi) This paper has been presented at the 4th BioEcon Workshop on “Economic Analysis of Policies for Biodiversity Conservation” organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL) , Venice, August 28-29, 2003

(lxvii) This paper has been presented at the international conference on “Tourism and Sustainable Economic Development – Macro and Micro Economic Issues” jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

(lxviii) This paper was presented at the ENGIME Workshop on “Governance and Policies in Multicultural Cities”, Rome, June 5-6, 2003

(lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference “The Future of Climate Policy”, Cagliari, Italy, 27-28 March 2003

(lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

(lxxi) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications”, organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004

2004 SERIES	
CCMP	*Climate Change Modelling and Policy* (Editor: Marzio Galeotti)
GG	*Global Governance* (Editor: Carlo Carraro*)*
SIEV	*Sustainability Indicators and Environmental Valuation* (Editor: Anna Alberini)
NRM	*Natural Resources Management* (Editor: Carlo Giupponi)
KTHC	*Knowledge, Technology, Human Capital* (Editor: Gianmarco Ottaviano)
IEM	*International Energy Markets* (Editor: Anil Markandya)
CSRM	*Corporate Social Responsibility and Sustainable Management* (Editor: Sabina Ratti)
PRA	*Privatisation, Regulation, Antitrust* (Editor: Bernardo Bortolotti)
ETA	*Economic Theory and Applications* (Editor: Carlo Carraro)
CTN	*Coalition Theory Network*

2005 SERIES	
CCMP	*Climate Change Modelling and Policy* (Editor: Marzio Galeotti)
SIEV	*Sustainability Indicators and Environmental Valuation* (Editor: Anna Alberini)
NRM	*Natural Resources Management* (Editor: Carlo Giupponi)
KTHC	*Knowledge, Technology, Human Capital* (Editor: Gianmarco Ottaviano)
IEM	*International Energy Markets* (Editor: Anil Markandya)
CSRM	*Corporate Social Responsibility and Sustainable Management* (Editor: Sabina Ratti)
PRCG	*Privatisation Regulation Corporate Governance* (Editor: Bernardo Bortolotti)
ETA	*Economic Theory and Applications* (Editor: Carlo Carraro)
CTN	*Coalition Theory Network*